



Australian Government

Department of Climate Change, Energy,
the Environment and Water

EPBC 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, Burpengary East, Queensland

Dear Mr. McErlean,

Thank you for your email dated 02 October 2025 to the Department of Climate Change, Energy, the Environment and Water (the department), seeking approval of Action Management Plan for North East Business Park, in accordance with condition 9 of the above project 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 10 North Harbour Priority Development Area – Precinct 1, Version RW2* dated 02 October 2025.

Now this plan has been approved, it must be implemented. The approved plan must also be published in accordance with your conditions of approval.

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 Robert Hine by email to:

PostApproval@dcceew.gov.au

Yours sincerely

A handwritten signature in dark ink, appearing to read 'Brendan Linton-Smith'.

Brendan Linton-Smith

Director, Post Approvals (Qld)
Environment Assessments (Vic and Tas) and Post Approvals Branch
Environment Regulation Division
21 November 2025

DCCEEW.gov.au

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GPO Box 3090 Canberra ACT 2601 ABN: 63 573 932 849
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LAND BASED ENVIRONMENTAL MANAGEMENT PLAN - SUB-PLAN 10

North Harbour Priority Development Area Precinct 1

Part of Lot 1 SP332514
Burpengary East

A Report Prepared for
North Harbour Holdings Pty Ltd

OCTOBER 2025

DOCUMENT CONTROL

Document

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Version and Date	RW2 02/10/25
Client	North Harbour Holdings Pty Ltd

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1	RW1	DRAFT	26/08/25	Client	1	.pdf	Email
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Client Issue

Version	Date	Author		Approved by	
		Name	Initials	Name	Initials
RW1	26/08/25	Nicole Davies	ND	Adam McArthur	AM
RW2	02/10/25	Nicole Davies	ND	Adam McArthur	AM

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1 INTRODUCTION

1.1 Background

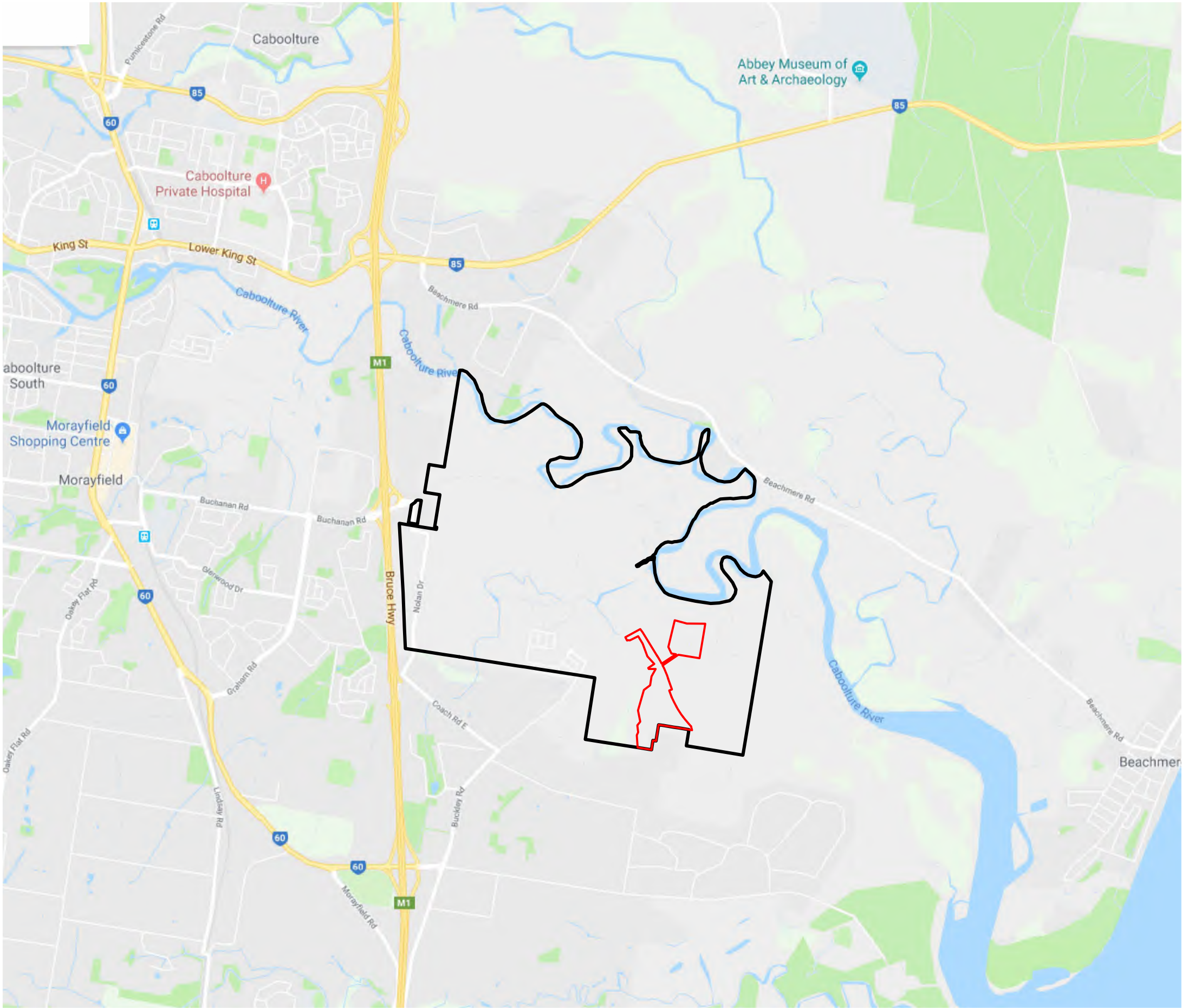
On 30th July 2025, The Queensland Government declared the North Harbour Priority Development Area (PDA). The PDA cover the Marina and Waterfront Residential development within North Harbour. To assist with housing supply, the PDA included an Early Release Area (Precinct 1) for 200-250 new homes.

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 early release phase earthworks, preceding the proposed marina and waterfront residential development at North Harbour. The North Harbour marina and waterfront residential development involves approximately 181.3 hectares, to which EPBC approval reference 2006/2912 is applicable to, part of Lot 1 SP332514. The lot is bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East) (**FIGURE 1**). An aerial photograph of the site is shown in **FIGURE 2**.

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.

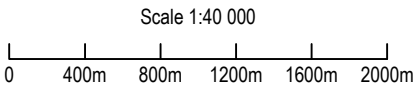
The following LBEMPs have previously been prepared for the NEBP and approved by the Commonwealth Minister for the Environment:

- *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. The overarching LBEMP was subsequently updated by JWA Pty Ltd in 2021. *North East Business Park - Land Based Environmental Management Plan for Matters of National Environmental Significance (Version 3)* prepared by JWA Pty Ltd and dated 30th November 2021 (LBEMP for MNES v3 (JWA 2021) - approved on 21st December 2021.
- *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



LEGEND

- LBEMP Sub-plan 10 Site Boundary
- NEBP Site Boundary



SOURCE: Google Maps

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CLIENT
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PROJECT
LBEMP Sub-Plan 10
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 1

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TITLE

LOCALITY
PLAN



LEGEND
 LBEMP Sub-plan 10 Site Boundary
 NEBP Site Boundary

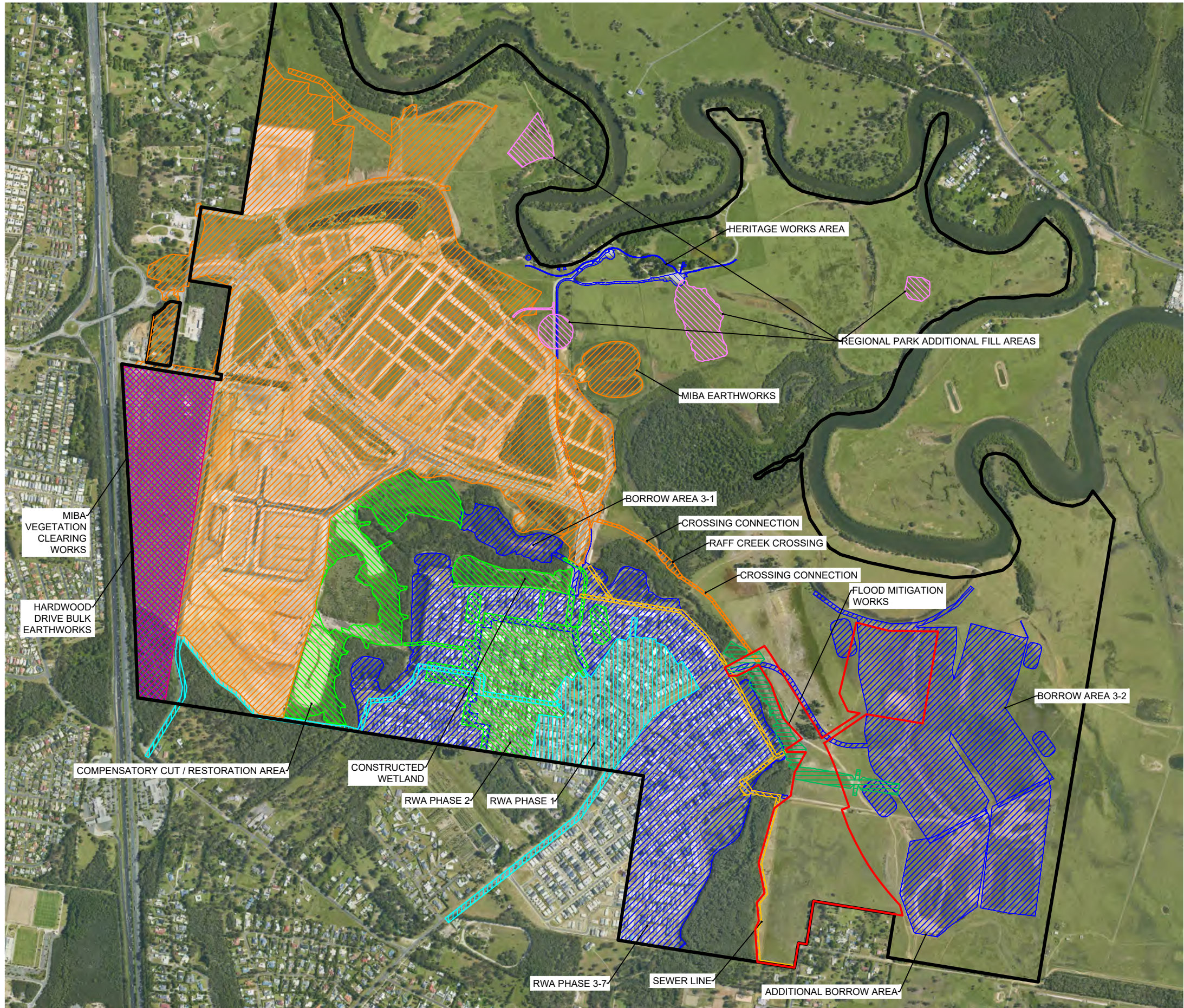
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SOURCE: Metro Maps Aerial dated 07/11/24 SCALE: 1 : 6000 @ A3 <i>JWA Pty Ltd</i> <i>Ecological Consultants</i>	CLIENT North Harbour Holdings Pty Ltd PROJECT LBEMP Sub-Plan 10 Priority Development Area - Precinct 1 North Harbour, Burpengary East QLD City of Moreton Bay LGA	FIGURE 2 PREPARED: BW DATE: 2 October 2025 FILE: Q15003_LBEMP10_20251002.dwg	TITLE AERIAL PHOTOGRAPH
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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 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.
- *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. Sub-Plan 06 was subsequently updated to address 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 on 20th September 2024.
- *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 - LBEMP Sub-Plan 08* prepared by JWA Pty Ltd and dated 19th December 2024, prepared in accordance with the specifications of the LBEMP v3 (JWA 2021) and addressing the works program associated with the Hardwood Drive bulk earthworks - approved by the Commonwealth Minister for the Environment on 21st February 2024.
- *North East Business Park - LBEMP Sub-Plan 09* prepared by JWA Pty Ltd and dated 13th June 2025, prepared in accordance with the specifications of the LBEMP v3 (JWA 2021) and addressing the works program associated with the Additional Fill Areas bulk earthworks - submitted for approval by the Commonwealth Minister for the Environment on 16th July 2025.

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



LEGEND

- LBEMP Sub-plan 10 Site Boundary
- NEBP Site Boundary
- LBEMP Sub-plan 01 Extent - MIBA (part of) Vegetation Clearing Works
- LBEMP Sub-plan 02 Extent - Residential West Area Phase 1
- LBEMP Sub-plan 03 Extent
 - Residential West Area - Phase 2
 - Compensatory Cut / Restoration Area
 - Constructed Wetland
- LBEMP Sub-plan 04 Extent
 - Residential West Area - Balance (Phases 3-7)
 - Borrow Areas
 - Heritage Works
- LBEMP Sub-plan 05 Extent - Sewer Pump Station SPS-BGY017 (PS3) Reticulation Network
- LBEMP Sub-plan 06 (Revised) Extent
 - MIBA (remaining areas) - Bulk Earthworks
 - Raff Creek Crossing & Connection
- LBEMP Sub-plan 07 Extent - Flood Mitigation Works
- LBEMP Sub-plan 08 Extent - Hardwood Drive Bulk Earthworks
- LBEMP Sub-plan 09 Extent - Regional Park Additional Fill Areas

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SOURCE: Metro Maps Aerial dated 07/11/24

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LBEMP Sub-Plan 10
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City of Moreton Bay LGA

FIGURE 3

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TITLE

EXTENT OF
CURRENT & PREVIOUS
LBEMP AREAS

1.2 Site Description

The North Harbour marina and waterfront residential development covers approximately 181 hectares, and is part of Lot 1 SP332514, bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East).

The majority of the site is highly disturbed and has been the subject of previous land clearing, livestock grazing and plantation forestry activities. As shown in **FIGURE 3**, part of the site has also been a borrow area as approved under LBEMP Sub-plan 04.

The works area has been largely cleared of native vegetation (**FIGURE 4**). The area previously cleared predominately consists of grassland, with vegetation dominated by a range of introduced pasture grasses. There are also several smaller patches of other vegetation communities mapped within the impact area. Vegetation within the impact area include (**FIGURE 4**):

- Coastal and subcoastal sandplain open forest - Callitris;
- Regenerating coastal and subcoastal wallum heath/shrubland;
- Disturbed wet-terrestrial grassland / sedgeland mosaic; and
- Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/sedgeland mosaic.

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.

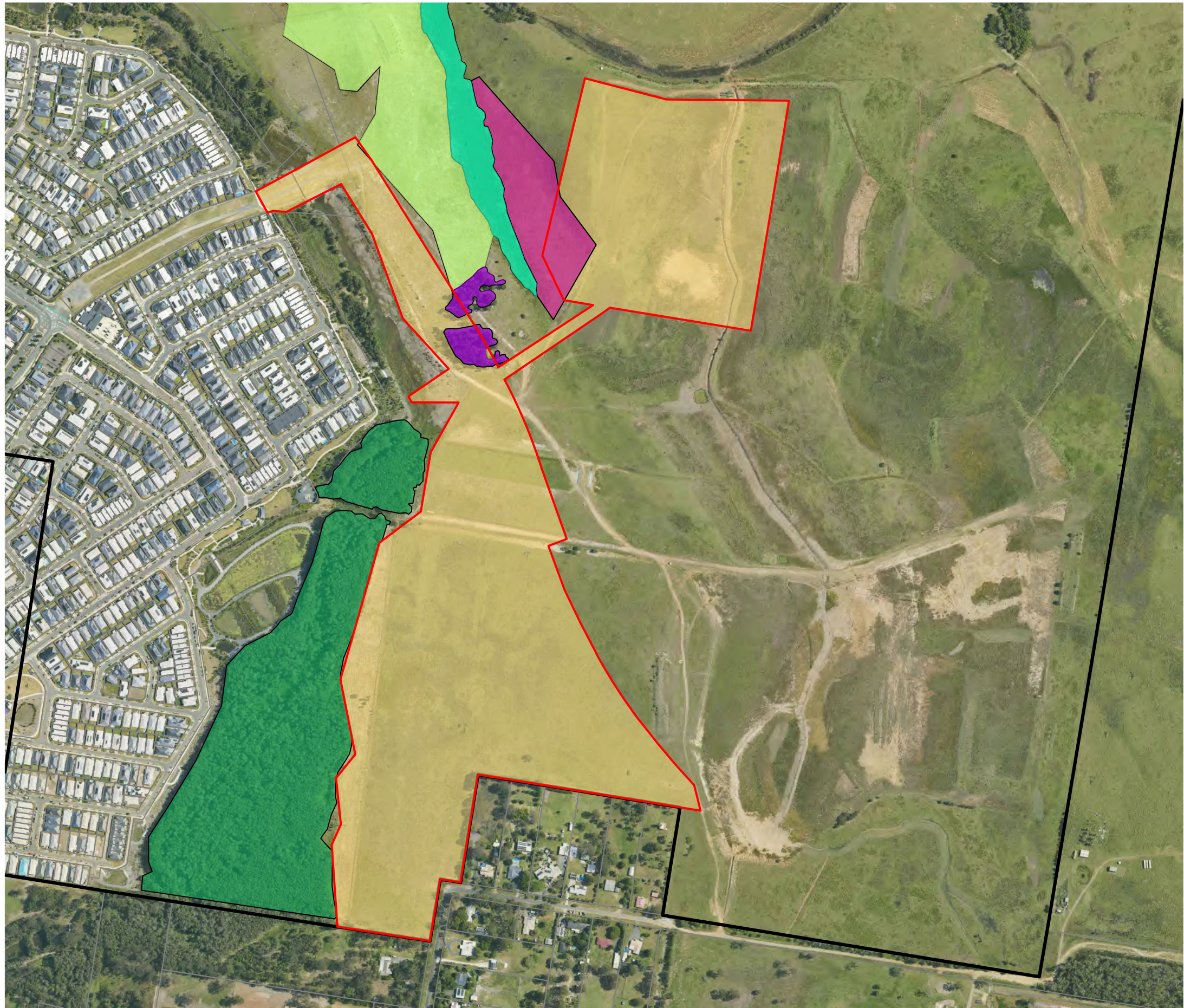
Specifically, the LBEMP addresses the bulk earthworks associated with the Early Release Areas, and provides:

- 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



LEGEND

LBEMP Sub-plan 10 Site Boundary

NEBP Site Boundary

Vegetation Communities

Community 1: Coastal and subcoastal sandplain open forest - Callitris

Community 2: Coastal and subcoastal wet heath / sedge swamp

Community 3: Coastal and subcoastal floodplain tree swamps - Melaleuca and Eucalypt

Community 4: Regenerating coastal and subcoastal wallum heath / shrubland

Community 5: Disturbed wet-terrestrial grassland / sedgeland mosaic

Community 6: Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland / sedgeland mosaic

Scale 1 : 6000
0 100m 200m 300m

SOURCE: JWA Site Investigations;
Metro Maps Aerial dated 07/11/24

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Priority Development Area - Precinct 1
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City of Moreton Bay LGA

FIGURE 4

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TITLE

VEGETATION
COMMUNITIES

requirements of the overarching LBEMP for MNES v3 (JWA 2021) and this LBEMP Sub-Plan 10.

In the preparation of this LBEMP Sub-Plan 10, 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. 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

Land Based Environmental Management Plan - Sub-plan 10
North Harbour - Early Release Area

Condition 9	Compliance
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

For the purposes of this report the subject site comprises the proposed borrow area and early release residential land zones, located on the western side of the broader marina and waterfront residential. The North Harbour marina and waterfront residential development covers approximately 181 hectares, and is part of Lot 1 SP332514, bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East).

It should be noted that parts of the Early Release Area have been covered by previous LBEMP Sub-Plans and works have been previously undertaken in this area.

The Early Release 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); and
- Ecological Assessment Report: NEBP - Balance Land (JWA 2015).

The majority of the works site has been subject to vegetation clearing as part of the historical land uses. The area previously cleared predominately consists of disturbed terrestrial grassland. There are also several smaller patches of other vegetation communities mapped within the impact area. Vegetation within the impact area include (FIGURE 4):

- Coastal and subcoastal sandplain open forest - Callitris;
- Regenerating coastal and subcoastal wallum heath/shrubland;
- Disturbed wet-terrestrial grassland / sedgeland mosaic; and
- Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/sedgeland mosaic.

Retained vegetation adjoining the works area consists of the following vegetation communities (FIGURE 4):

- Coastal and subcoastal sandplain open forest - Callitris;
- Coastal and subcoastal wet heath/sedge swamp;
- Coastal and subcoastal floodplain tree swamps - Melaleuca and Eucalypt
- Regenerating coastal and subcoastal wallum heath/shrubland;
- Disturbed wet-terrestrial grassland/sedgeland mosaic; and

- Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/sedgeland mosaic.

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

Proposed early release works will comprise excavation of approximately 354,575m³, from an approximate 10 ha borrow area (within the footprint of the proposed future marina) for placement as controlled fill across about 25 ha of proposed early release residential land. Excavations within the proposed borrow area will extend to a depth of about RL-2.5m (~3 m below ground level [BGL]) and are to be internally battered (at 1V:3H or sufficient safe angle). Works across the proposed early release residential land, will comprise placement and compaction of bulk fill. Excavations across this area, will be relatively minor, comprising stripping of topsoil and unsuitable subgrade material only. The extent of the early release works area is shown in **FIGURE 5**. Detailed bulk earthworks plans are provided in **APPENDIX 1**.

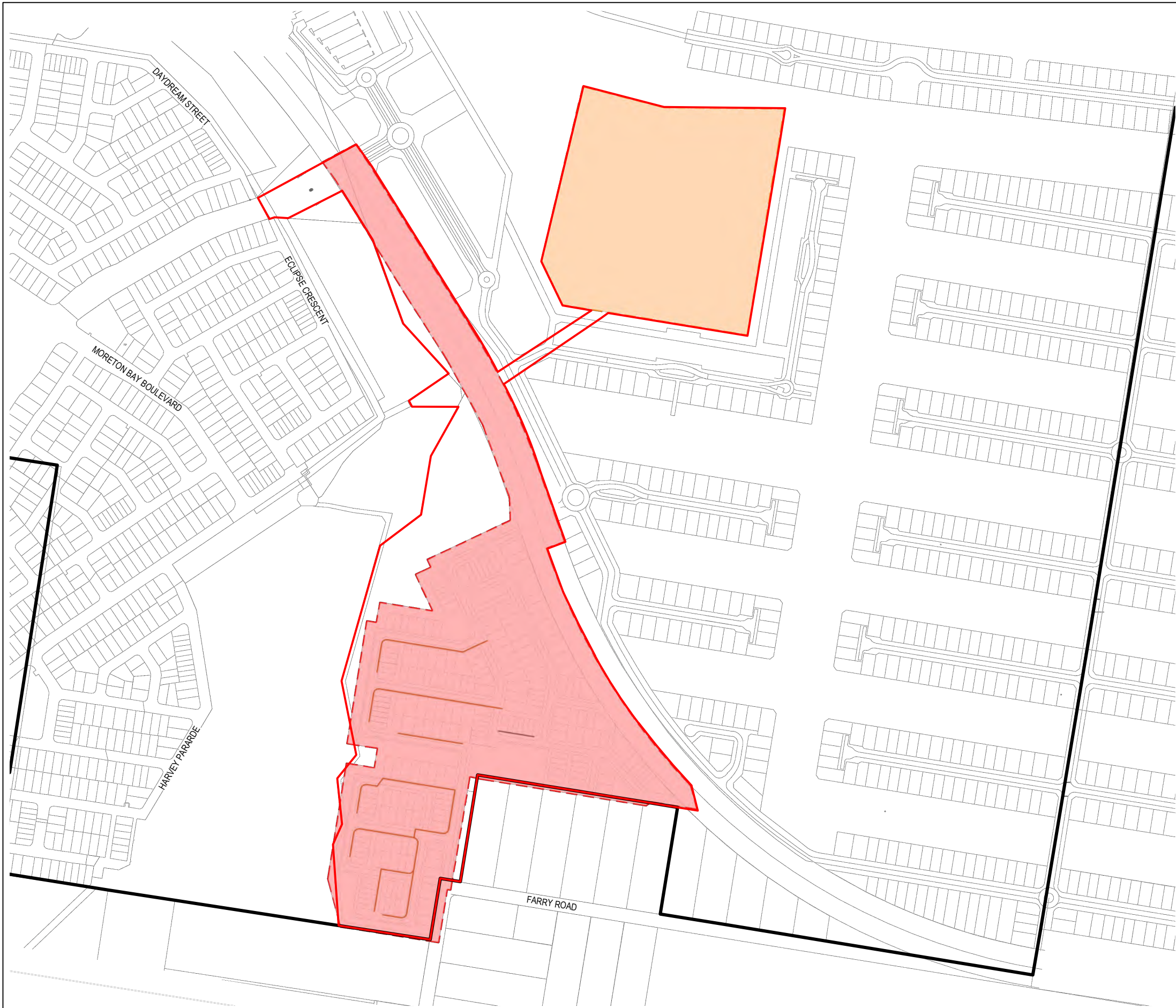
FIGURE 6 shows the vegetation communities proposed to be removed from within the works site.

2.3 Summary of Works Program

A summary of the works site and works program covered by this LBEMP Sub-Plan 10 is provided in **TABLE 1**.

TABLE 1
DESCRIPTION OF APPROVED WORKS PROGRAM ASPECT DESCRIPTION

Aspect	Description	Figure/Plan Reference
Works Site Description	Early Release Area - Part of Lot 1 SP332514	Refer to FIGURE 5
Works Site Area	Approximately 34.89 ha	FIGURE 5
Vegetation (Habitat) Types within Works Site	Currently vegetation communities present within the works site include: • Coastal and subcoastal sandplain open forest - Callitris; • Regenerating coastal and subcoastal wallum heath/shrubland; • Disturbed wet-terrestrial grassland / sedgeland mosaic; and • Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/sedgeland mosaic.	Refer to FIGURE 6 - Vegetation Clearing Plan .



- LEGEND**
- LBEMP Sub-plan 10 Site Boundary
 - NEBP Site Boundary
 - Proposed Works**
 - Proposed Earthworks Area
 - Proposed Borrow Area

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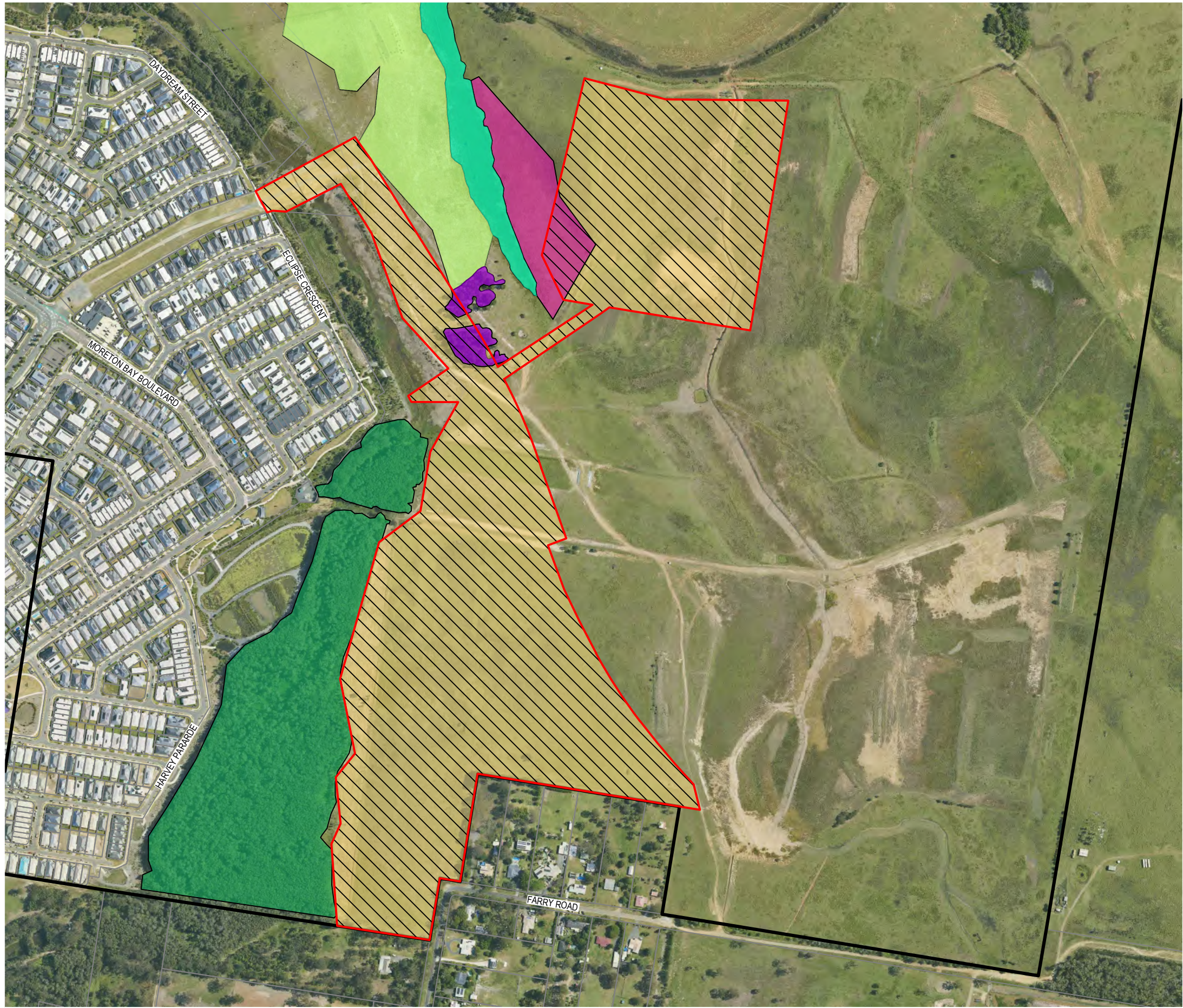
PROJECT
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FIGURE 5

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TITLE

PROPOSED
WORKS



LEGEND

-  Extent of Works
-  LBEMP Sub-plan 10 Site Boundary
-  NEBP Site Boundary

Vegetation Communities

-  Community 1: Coastal and subcoastal sandplain open forest - Callitris
-  Community 2: Coastal and subcoastal wet heath / sedge swamp
-  Community 3: Coastal and subcoastal floodplain tree swamps - Melaleuca and Eucalypt
-  Community 4: Regenerating coastal and subcoastal wallum heath / shrubland
-  Community 5: Disturbed wet-terrestrial grassland / sedgeland mosaic
-  Community 6: Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland / sedgeland mosaic

Scale 1 : 6000
0 100m 200m 300m

SOURCE: JWA Site Investigations;
Metro Maps Aerial dated 07/11/24

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FIGURE 6

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TITLE
VEGETATION
CLEARANCE
PLAN

Aspect	Description	Figure/Plan Reference
Nature and Extent of Vegetation Clearance Works	The following vegetation types will be cleared as part of the works program: - Coastal and subcoastal sandplain open forest - Callitris - 0.34 ha; - Regenerating coastal and subcoastal wallum heath/shrubland - 0.01 ha; - Disturbed wet-terrestrial grassland / sedgeland mosaic - 0.63 ha; and - Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/ sedgeland mosaic - 33.91 ha. The clearance of non-remnant vegetation will be subject to the same controls as outlined in the EPBC approval.	Refer to FIGURE 6 - Vegetation Clearing Plan.
Nature and Extent of Bulk Earthworks	Proposed works involves the following: Bulk earthworks of cut and fill associated with the Early Release 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.	Refer to FIGURE 5
Nature and Extent of Landscaping Works	NA	NA
Nature and Extent of Restoration Works	NA	NA
Relevant State and Local Government Approvals	The Bulk Earthworks will be part of a Reconfiguring a Lot application to the Queensland Government for approval of the early release area. The City of Moreton Bay Council will be consulted during the assessment process. However, no separate approval will be required from Council.	N/A
Timing and Duration of Works Program	Commencement: Early-mid 2026 Complete: Late 2026	N/A

3 MNES RISK ASSESSMENT

3.1 Introduction

For each works program forming part of the NEBP development, the approved overarching LBEMP for MNES v3 (JWA 2021) requires a risk assessment of potential adverse impacts of the works program on MNES (**TABLE 2**). Table 2 of Section 4 of the LBEMP for MNES v3 (JWA 2021) 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 10 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 5 of the LBEMP for MNES v3 (JWA 2021).

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 - Balance Land (JWA 2015).

TABLE 2
ASSESSMENT OF LIKELIHOOD OF OCCURRENCE

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
FLORA			
<i>Acacia attenuata</i>	Whipstick Wattle	This species occurs on flat coastal lowland plains, at altitudes of lower than 30 m above sea level. Across this range <i>A. attenuata</i> 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. <i>Acacia attenuata</i> has been recorded growing in shrublands with <i>Leptospermum whitei</i> and <i>Baeckea frutescens</i> ; in wallum with <i>Banksia aemula</i> and <i>Eucalyptus robusta</i> ; in woodlands with <i>Corymbia trachyphloia</i> , <i>E. umbra</i> and <i>Banksia oblongifolia</i> ; and in open forests of <i>E. umbra</i> , <i>E. racemosa</i> and <i>Melaleuca quinquenervia</i> . <i>Acacia attenuata</i> 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. <i>Melaleuca</i> tree swamps provide potentially suitable habitat but do not occur within the impact area.
<i>Acronychia littoralis</i>	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.
<i>Arthraxon hispidus</i>	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. <i>Melaleuca</i> tree swamps provide potentially suitable habitat but do not occur within the impact area.
<i>Bosistoa transversa</i>	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	Low. Suitable habitat for this species was not observed in the locality.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		Box (<i>Lophostemon confertus</i>). Associated canopy species include White Booyong, Soft Corkwood (<i>Caldcluvia paniculosa</i>), Rosewood (<i>Dysoxylum fraserianum</i>), Yellow Carabeen (<i>Sloanea woollsii</i>) and Giant Water Gum (<i>Syzygium francisii</i>). 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).	
<i>Cryptocarya foetida</i>	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 <i>Syzygium hemilamprum</i> (Broad-leaved Lilly Pilly), <i>Acronychia imperforata</i> (Beach Acronychia), <i>Cryptocarya triplinervis</i> (Three-veined Laurel), <i>Cupaniopsis anacardioides</i> (Tuckeroo), <i>Flindersia bennettiana</i> (Bennet's Ash), <i>Lophostemon confertus</i> (Brush Box) and <i>Syzygium luehmannii</i> (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.
<i>Cryptostylis hunteriana</i>	Leafless tongue orchid	The Leafless Tongue-orchid has been reported to occur in a wide variety of habitats including heathlands, heathy woodlands, sedgeland, <i>Xanthorrhoea</i> 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 generally considered to be moist and sandy, however, this species is also known to grow in dry or peaty soils (DoE 2016).	Low. This species has not previously been recorded on the NEBP site. <i>Melaleuca</i> tree swamps provide potentially suitable habitat but do not occur within the impact area.
<i>Cupaniopsis shirleyana</i>	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.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Macadamia integrifolia</i>	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.
<i>Macadamia ternifolia</i>	Bopple nut	Occurs in lowland warm complex notophyll vine forest and <i>Araucarian</i> 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 krasnozems 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.
<i>Macadamia tetraphylla</i>	Rough-shelled bush nut	Occurs in subtropical rainforest and complex notophyll vine forest, 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.
<i>Notelaea lloydii</i>	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.
<i>Persicaria elatior</i>	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.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Phaius australis</i>	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 (<i>Lophostemon suaveolens</i>)), swampy rainforest (often with sclerophyll emergents), or fringing open forest. It is often associated with rainforest elements such as Bangalow palm (<i>Archontophoenix cunninghamiana</i>) or Cabbage tree palm (<i>Livistona australis</i>) (DoE 2016).	Low. This species has not previously been recorded on the NEBP site. <i>Melaleuca</i> tree swamps provide potentially suitable habitat but are not present within the impact area.
<i>Phaius bernaysii</i>	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 <i>Melaleuca quinquenervia-Eucalyptus robusta</i> 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.
<i>Planchonella eerwah</i>	Shiny-leaved Condoo [#]	The species grows in subtropical rainforest, dry rainforest and Hoop Pine (<i>Araucaria cunninghamii</i>) vine scrub.	Low. This species was not located during recent site surveys and suitable habitat for this species was not observed in the locality.
<i>Rhodamnia rubescens</i>	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 eucalypt forests. Populations and individuals of this species are often found in wet sclerophyll associations in rainforest transition zones.	Low. This species was not located during recent site surveys and suitable habitat for this species was not observed in the locality.
<i>Rhodomyrtus psidioides</i>	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.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Samadera bidwillii</i>	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 (<i>Corymbia citriodora</i>), Grey Gum (<i>Eucalyptus propinqua</i>), White Mahogany (<i>E. acmenoides</i>), Forest Red Gum (<i>E. tereticornis</i>), Pink Bloodwood (<i>C. intermedia</i>), an ironbark (<i>E. siderophloia</i>), Gum Topped Box (<i>E. moluccana</i>), Gympie Messmate (<i>E. cloeziana</i>), and Broad-Leaved Ironbark (<i>E. fibrosa</i>) (Dept. Environment 2012).	Low. Suitable habitat for this species was not observed in the locality.
<i>Sophora fraseri</i>	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: <i>Corymbia citriodora</i> , <i>Eucalyptus carnea</i> , <i>E. microcorys</i> , <i>E. acmenoides</i> , <i>E. propinqua</i> and <i>Lophostemon confertus</i> . 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.
<i>Thesium australe</i>	Austral toadflax	Austral toadflax is semi-parasitic on roots of a range of grass species, notably Kangaroo Grass (<i>Themeda triandra</i>). 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	Low. Suitable habitat for this species was not observed in the locality.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		(<i>Leptospermum myrtifolium</i>), Small-fruit Hakea (<i>Hakea microcarpa</i>), Alpine Bottlebrush (<i>Callistemon sieberi</i>), Woolly Grevillea (<i>Grevillea lanigera</i>), Coral Heath (<i>Epacris microphylla</i>) and <i>Poa</i> spp.; Kangaroo Grass grassland surrounded by Eucalyptus woodland; and grassland dominated by Barbed-wire Grass (<i>Cymbopogon refractus</i>) (Dept. Environment 2012).	
<i>Triunia robusta</i>	Glossy spice bush	A species usually found in subtropical rainforest.	Low. Suitable habitat for this species was not observed in the locality.
<i>Zieria exsul</i>	Banished Stink Bush [#]	<i>Zieria exsul</i> 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.
FAUNA			
<i>Actitis hypoleucos</i>	Common Sandpiper	Outside breeding season, in wide variety of habitats, such as coastal shores, estuaries, saltmarshes, inland wetlands, riverbanks, pools and tidal creeks in mangroves and rice fields; sometimes on grassland, along roadsides or in urbanized areas, including reservoirs and dam lakes; large coastal mudflats are not favoured.	Low. Suitable habitat for this species is present within the impact area.
<i>Anseranas semipalmata</i>	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.
<i>Anthochaera phrygia</i>	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),	Low. Suitable habitat for this species was not observed in the locality.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		Regent Honeyeaters also use other woodland types and wet lowland coastal forest dominated by Swamp Mahogany (<i>Eucalyptus robusta</i>) or Spotted Gum (<i>Corymbia maculata</i>) (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.)	
<i>Apus pacificus</i>	Fork-tailed Swift	This species occurs 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 than 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 Brisbane and in much of the south south-eastern region (Dept. Environment 2012).	Moderate. This species may forage over the site.
<i>Ardea alba</i>	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	Moderate. A small amount of foraging habitat for this species may occur within the open paddocks when wet.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		offshore reefs. This species usually frequents shallow waters (Dept. Environment 2012).	
<i>Ardea ibis/ Bubulcus ibis</i>	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.
<i>Argyreus hyberbius inconstans</i>	Australian fritillary*	The Australian fritillary butterfly is restricted to open, swampy, coastal areas (i.e. <i>Melaleuca</i> wetlands) where the larval food plant, <i>Viola betonicifolia</i> , grows as a small, insignificant ground herb in association with <i>Lomandra longifolia</i> (long leaved matrush) and grasses, especially the grass <i>Imperata cylindrica</i> (blady 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 impact area.
<i>Botaurus poiciloptilus</i>	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 and/or reeds (e.g. <i>Phragmites</i> , <i>Cyperus</i> , <i>Eleocharis</i> , <i>Juncus</i> , <i>Typha</i> , <i>Baumea</i> , <i>Bolboschoenus</i>) or cutting grass (<i>Gahnia</i>) growing over muddy or peaty substrate (Dept. Environment 2012).	Low. Potential habitat for this species may be found within vegetation associated with the creek west of works area, however dense aquatic vegetation (sedges, rushes) was not present in the vicinity of the impact area.
<i>Calidris acuminata</i>	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, salt pans and hypersaline salt lakes inland. They also occur in saltworks and sewage	Low-Moderate. This species has not previously been recorded in the NEBP area. Paddock areas within the works site provide some potential habitat for this

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Scientific Name	Common Name		
		farms. They use flooded paddocks, sedgeland 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.	species when flooded. However, the level of disturbance/slashing that occurs across these areas has substantially reduced the quality of this potential habitat.
<i>Calidris alba</i>	Sanderling	Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands. Generally occurs in small flocks, however, may associate freely with other waders. Individuals run behind receding waves, darting after insects, larvae and other small invertebrates in the sand, then dart back up the beach as each wave breaks.	Low. Suitable habitat for this species was not observed in the locality.
<i>Calidris canutus</i>	Red Knot [#]	In Australasia the Red Knot mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps (Higgins & Davies 1996).	Low. Suitable habitat for this species was not observed in the impact area.
<i>Calidris ferruginea</i>	Curlew Sandpiper [#]	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (Higgins & Davies 1996).	Low. Suitable habitat for this species was not observed in the impact area.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Calidris melanotos</i>	Pectoral Sandpiper	Outside breeding season, in variety of freshwater and brackish wetlands, both coastal and inland, including upland plateaux and <i>puna</i> zone at 3500-4500 m, in saltmarshes, swamps, lakes, floodplains, wet grasslands, sewage farms, commercial saltworks, golf courses, coastal lagoons and bays, but rarely on mudflats.	Low-Moderate. Suitable habitat for this species was observed in the impact area. However, the level of disturbance/slashing that occurs across these areas has substantially reduced the quality of this potential habitat.
<i>Calidris pugnax</i>	Ruff	In Australia the Ruff is found on generally fresh, brackish or 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. They are sometimes found on wetlands surrounded by dense vegetation including grass, sedges, saltmarsh and reeds. They have been observed on sand spits and other sandy habitats including shingles. The Ruff forages on exposed mudflats, in shallow water and occasionally on dry mud. They have been observed foraging in dry waterside plants and in swampy areas next to aeration tanks in sewage farms. They prefer to roost amongst shorter vegetation (Higgins & Davies 1996).	Low. Suitable habitat for this species was not observed in the impact area.
<i>Calidris ruficollis</i>	Red-necked Stint	Overall, away from the breeding grounds, the Red-necked Stint is mostly a bird of lightly or unvegetated coastal habitats, especially intertidal mudflats, but it is also sometimes found in wetlands near the coast or inland. In Australasia, it is found largely along sheltered inlets, bays, lagoons, and estuaries with intertidal mudflats, but it is also found on spits, islets, and protected sandy or coralline shores. Less frequently, the Red-necked Stint occurs there on exposed ocean beaches, stony or rocky shores, reefs and shoals, saltworks, sewage treatment plants, ephemeral or permanent shallow wetlands (both coastal and inland), flooded pastures, wet grasslands, and (rarely) dry gibber plains.	Low. Suitable habitat for this species was not observed in the impact area.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Calidris tenuirostris</i>	Great Knot [#]	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).	Low. Suitable habitat for this species was not observed in the impact area.
<i>Calyptorhynchus lathami lathami</i>	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.
<i>Chalinolobus dwyeri</i>	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 (<i>Hirundo ariel</i>) 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 characteristics are not very common in the landscape and therefore a limiting factor (Dept. Environment 2012).	Low. Suitable habitat for this species was not observed in the locality.
<i>Charadrius bicinctus</i>	Double-banded Plover	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	Low-Moderate. Suitable habitat for this species was not observed in the impact area. However, the level of disturbance/slashing that occurs across these areas has

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		and saltworks. It is also found on seagrass beds, especially <i>Zostera</i> , which, when exposed at low tide, remain heavily saturated or have numerous water-filled depressions. This species sometimes utilises kelp beds (R.J. Pierce in Marchant & Higgins 1993).	substantially reduced the quality of this potential habitat.
<i>Charadrius leschenaultii</i>	Greater Sand Plover [#]	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). Once, during a severe drought, the species was recorded in a poorly grassed paddock with large bare areas, more than 1 km from the nearest water (Eckert 1968).	Low. Suitable habitat for this species was not observed in the impact area.
<i>Charadrius mongolus</i>	Lesser Sand Plover [#]	In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves. The species also inhabits saltworks and near-coastal salt pans, brackish swamps and sandy or silt islands in river beds (Marchant & Higgins 1993). In north-western Australia, the species appears to use the Port Hedland saltworks in preference to nearby beaches (C. Minton 2002, pers. comm.). The species is seldom recorded away from the coast, at margins of lakes, soaks and swamps associated	Low. Suitable habitat for this species was not observed in the impact area.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		with artesian bores (Marchant & Higgins 1993). On its breeding grounds it occurs in alpine valleys (Dement'ev & Gladkov 1951).	
<i>Charadrius veredus</i>	Oriental Plover, Oriental Dotterel	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 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). At the onset of the Wet Season, some may move into lightly wooded grasslands (Storr 1977). Some remain in estuarine and littoral environments, and a few are occasionally recorded around terrestrial wetlands or flooded paddocks (Boekel 1980; Close 1982; McCrie 1984). Vagrants in southern Australia have been recorded in saltmarsh (Park 1983; Patterson 1983; Pedler 1982).	Low. Suitable habitat for this species was not observed in the impact area.
<i>Cherax robustus</i>	Sand Yabby	<i>Cherax robustus</i> is largely restricted to wallum areas, where it prefers acidic, soft, tannin-stained freshwater marsh, swamps, fens, lakes, and small creeks, often surrounded by <i>Melaleuca</i> (paperbark) and dominated by sedges (Davie 2007; Marshall et al. 2011) (Fig. 4). It is also found within the unique patterned fen ecosystem on the west coast of K'gari (Moss et al. 2016).	Low. Suitable habitat for this species was not observed in the impact area.
<i>Climacteris picumnus victoricae</i>	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	Low. Suitable habitat for this species was not observed in the locality.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) 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.	
<i>Coeranoscincus reticulatus</i>	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.
<i>Cuculus optatus</i>	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 impact area.
<i>Cyclopsitta diophthalma coxeni</i>	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 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;	Low. Suitable habitat for this species was not observed in the locality.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		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).	
<i>Dasyornis brachypterus</i>	Eastern bristlebird	This species inhabits 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 (<i>Sarga leiocladum</i>), Kangaroo grass (<i>Themeda triandra</i>) and Tussock grass (<i>Poa labillardieri</i>). 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.
<i>Dasyurus hallucatus</i>	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.
<i>Dasyurus maculatus maculatus</i>	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	Low. Suitable habitat for this species was not observed in the locality.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		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).	
<i>Delma torquata</i>	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 (<i>Themeda triandra</i>), Barbed-wire Grass (<i>Cymbopogon refractus</i>), Wiregrass (<i>Aristida</i> sp.) and Lomandra (<i>Lomandra</i> 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). Whilst Collared delmas are often found associated with small rocks, the presence of small rocks is not an essential habitat characteristic (Dept. Environment 2012).	Low. Suitable habitat for this species was not observed in the locality.
<i>Epinephelus daemeli</i>	Black rockcod	This is a marine species, inhabiting reefs and estuaries.	Low. Suitable habitat for this species was not observed on site.
<i>Erythrorchis radiatus</i>	Red goshawk	The Red goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia. Riverine	Moderate. Forested areas adjoining the works site provide

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Scientific Name	Common Name		
		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).	potential foraging habitat for this species. However, this species may also utilise scattered eucalypts within grazed areas to search for prey.
<i>Falco hypoleucos</i>	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.
<i>Furina dunmalli</i>	Dunmall's snake	Suitable habitat for this species includes forests and woodlands dominated by <i>Acacia harpophylla</i> 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.
<i>Gallinago hardwickii</i>	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.
<i>Gallinago megala</i>	Swinhoe's Snipe	During non-breeding period, found at edges of wetlands, including marshy areas, paddyfields, sewage farms and freshwater streams.	Low. Suitable habitat for this species was not observed within the works area.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Gallinago stenura</i>	Pin-tailed Snipe	Found in wide variety of wetland habitats, e.g. flooded paddyfields, wet grassland, seepage swamps and marshland.	Low. Suitable habitat for this species was not observed within the works area.
<i>Geophaps scripta scripta</i>	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.
<i>Grantiella picta</i>	Painted honeyeater	This species inhabits Acacia and Box-gum woodlands and Box-ironbark forests. A specialist feeder on mistletoes, particularly those of the genus <i>Amyema</i> (DOEH, 2016).	Low. Suitable habitat for this species was not observed in the locality.
<i>Haliaeetus leucogaster</i>	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 works area, however, is unlikely to nest or rely on resources within the works area.
<i>Hemiaspis damelii</i>	Grey Snake [#]	In Queensland, grey snake habitat is Brigalow <i>Acacia harpophylla</i> and Belah <i>Casuarina cristata</i> 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 <i>Dichanthium sericeum</i> and/or Mitchell grass <i>Astrebla spp.</i> 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 heavy clay soils which provide and cracks and crevices that the species uses in its hunting strategy and for shelter.	Low. Suitable habitat for this species was not observed in the locality.
<i>Hirundapus caudacutus</i>	White-throated needletail	This species occurs flying over most types of habitats, they are probably recorded most often above wooded areas, including open forest and	Moderate. This species may forage over the impact area.

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Scientific Name	Common Name		
		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).	
<i>Lathamus discolor</i>	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 (<i>E. crebra</i>), 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 impact area.
<i>Limnodromus semipalmatus</i>	Asian Dowitcher [#]	The species feeds on inter-tidal mudflats. This habitat is often vulnerable to pollution (e.g., oil spill and urban waste) especially in highly populated parts of Asia (Higgins & Davies 1996). During the non-breeding season, the bird roosts in sheltered coastal environments such as estuarine and intertidal mudflats, lagoons, creeks and saltworks.	Low. Suitable habitat for this species was not observed in the impact area.
<i>Limosa lapponica baueri</i>	Nunivak Bar-tailed Godwit [#]	It is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms. It often occurs around beds of seagrass, and sometimes in nearby saltmarsh or the outer margins of mangrove areas. It forages at low to mid tide in shallow water or along the water's edge on sandy substrates on intertidal flats, banks and beaches or on soft mud substrates.	Low. Suitable habitat for this species was not observed in the impact area.

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Scientific Name	Common Name		
<i>Limosa limosa</i>	Black-tailed Godwit [#]	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. The use of habitat often depends on the stage of the tide. It is also found in shallow and sparsely vegetated, near-coastal, wetlands; such as saltmarsh, saltflats, river pools, swamps, lagoons and floodplains. There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. They also use lagoons in sewage farms and saltworks (Higgins & Davies 1996).	Low. Suitable habitat for this species was not observed in the impact area.
<i>Litoria olongburensis</i>	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.
<i>Macroderma gigas</i>	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.
<i>Merops ornatus</i>	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.
<i>Mixophyes fleayi</i>	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.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Mixophyes iteratus</i>	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.
<i>Monarcha melanopsis</i>	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.
<i>Monarcha trivirgatus</i> / <i>Symposiachrus trivirgatus</i>	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.
<i>Myiagra cyanoleuca</i>	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.
<i>Nannoperca oxleyana</i>	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 impact area.
<i>Neoceratodus forsteri</i>	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 impact area.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Numenius madagascariensis</i>	Eastern Curlew [#]	It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures	Low. Suitable habitat for this species was not observed in the impact area.
<i>Numenius minutus</i>	Little Curlew, Little Whimbrel	Little Curlew favors relatively dry portions of short grasslands, sedgeland, floodplains, and black soil plains (with a penchant for areas that were recently burnt) as well as similar manmade habitats such as golf courses and lawns. It is less commonly found foraging in open woodlands with grassy or burnt understories, dry saltmarshes, coastal swamps, mudflats, or sandy stretches of protected estuaries and beaches (59, 60, 42, 8). In natural habitats, it prefers areas dominated by <i>Eleocharis</i>, <i>Hymenachne</i>, <i>Ludwigia</i>, <i>Pseudoraphis</i>, or <i>Iseilema</i>, typically where the vegetation is less than 20 cm in height and occupies 0 to 75% of the projected ground cover (42).	Low-Moderate. Suitable habitat for this species was observed in the locality.
<i>Numenius phaeopus</i>	Whimbrel	Mostly tidal flats (mud preferred over sand); also hard mudbanks in South America. To a lesser extent, coral reefs, lagoons, marshes, swamps, estuaries, sandy beaches, and rocky shores. Also mangroves (from Florida south and on Galapagos Is.), where birds forage in surrounding mud, roosting in trees at high tide. Also (especially at high tide) terrestrial habitats, including dunes, meadows, short grass, fields, and highland and alpine meadows.	Low. Suitable habitat for this species was not observed in the locality.

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Scientific Name	Common Name		
<i>Pandion haliaetus</i>	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 impact area, however, is unlikely to nest in the immediate locality.
<i>Petauroides volans</i>	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.
<i>Petaurus australis australis</i>	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.
<i>Phascolarctos cinereus</i>	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 across the site and may utilise habitat adjacent to the works area. Suitable habitat is not present within the works area.
<i>Phyllodes imperialis smithersi</i>	Pink underwing moth	This species is found at heights below 600m in subtropical rainforest environments. It is associated with the larval food plant <i>Carronia multiseppalea</i> (DoE, 2017).	Low. Suitable habitat for this species was not observed in the locality.

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Scientific Name	Common Name		
<i>Pluvialis fulva</i>	Pacific Golden Plover	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 seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in saltworks. The species is also sometimes recorded on islands, sand and coral cays and exposed reefs and rocks. They are less often recorded in terrestrial habitats, usually wetlands such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans, especially those with muddy margins and often with submerged vegetation or short emergent grass. Other terrestrial habitats inhabited include short (or, occasionally, long) grass in paddocks, crops or airstrips, or ploughed or recently burnt areas, and they are very occasionally recorded well away from water (Marchant & Higgins 1993). On its breeding grounds it occurs in tundra (Dement'ev & Gladkov 1951).	Low. Suitable habitat for this species was not observed in the locality.
<i>Pluvialis squatarola</i>	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.
<i>Potorous tridactylus tridactylus</i>	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	Low. Suitable habitat for this species was not observed in the locality.

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Scientific Name	Common Name		
		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).	
<i>Pseudomugil mellis</i>	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.
<i>Pteropus poliocephalus</i>	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 <i>Eucalyptus</i> 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. No roosting sites are known to occur in the vicinity of the works area. However, adjacent eucalypts provide potential feeding resources for this highly mobile species.
<i>Rhipidura rufifrons</i>	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 (<i>Eucalyptus microcorys</i>), Mountain grey gum (<i>E.</i>	Low. No suitable habitat for this species occurs within the impact area.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		<i>cypellocarpa</i>), Narrow-leaved peppermint (<i>E. radiata</i>), Mountain ash (<i>E. regnans</i>), Alpine ash (<i>E. delegatensis</i>), Blackbutt (<i>E. pilularis</i>) or Red mahogany (<i>E. resinifera</i>); 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 (<i>Acmena smithi</i>) rainforest, with Grey myrtle (<i>Backhousia myrtifolia</i>), Sassafras (<i>Doryphora sassafras</i>) and Sweet pittosporum (<i>Pittosporum undulatum</i>) 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 (<i>Eucalyptus maculata</i>), Yellow box (<i>E. melliodora</i>), 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 (<i>Melaleuca</i> spp.) (Dept. Environment 2012).	
<i>Rostratula australis</i>	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 <i>Muehlenbeckia</i> or canegrass or sometimes tea-tree (<i>Melaleuca</i>). 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-Moderate. This species has not previously been recorded in the NEBP area. Wet grassland areas near 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.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Saiphos reticulatus</i>	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.
<i>Stagonopleura guttata</i>	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 impact area. However, the level of slashing that occurs across the area has substantially reduced the quality of this potential habitat.
<i>Thiornis rubricollis rubricollis</i>	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.
<i>Tringa brevipes</i>	Grey-tailed Tattler	In non-breeding on sheltered coasts with reefs and rock platforms or with intertidal mudflats; also shores of rock, shingle, gravel or shells; often roosts in mangroves and may perch for roosting; prefers areas with dense beds of seagrass. On migration may occur at inland wetlands, such as paddyfields; exclusively coastal in Australia.	Low. Suitable habitat for this species was not observed in the locality.
<i>Tringa glareola</i>	Wood Sandpiper	Outside breeding season, generally not associated with woodlands; found in more open areas than those favoured by <i>T. ochropus</i> , including open margins of inland fresh waters, muddy marshes, grassy streambanks, sewage farms, wet paddyfields, dam lakes (2), tiny temporary pools and streams; only rarely in coastal habitats, such as channels of saltmarshes and mangrove swamps.	Low. Suitable habitat for this species was not observed in the locality.
<i>Tringa incana</i>	Wandering Tattler	Comparatively greater variety of habitats used on nonbreeding grounds throughout Oceania and mainland Asia. Along coast common on coral reefs and basalt platforms of most atolls and islands; but localized and	Low. Suitable habitat for this species was not observed in the locality.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		often extensive use made of soft substrates, especially at river mouths and along littoral margins of lagoons.	
<i>Tringa nebularia</i>	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.
<i>Tringa stagnatilis</i>	Marsh Sandpiper, Little Greenshank	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. In north Australia they prefer intertidal mudflats (Higgins & Davies 1996), although surveys in Kakadu National Park recorded more birds around shallow freshwater lakes than in areas influenced by tide (Bamford 1988). At the Top End they often use ephemeral pools on inundated freshwater and tidal floodplains (Higgins & Davies 1996).	Low-Moderate. Suitable habitat for this species was observed in the locality.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
<i>Turnix melanogaster</i>	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.
<i>Xenus cinereus</i>	Terek Sandpiper [#]	In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally roosts communally amongst mangroves or dead trees, often with related wader species. Breaks up into smaller flocks or even solitary birds when feeding in open intertidal mudflats.	Low. No suitable habitat for this species occurs within the impact area.
<i>Xeromys myoides</i>	Water Mouse [#]	In south-east Queensland, water mouse habitat includes mangrove communities and adjacent sedgeland, grasslands and freshwater wetlands. Mangrove communities in this region are typically comprised of <i>Avicenna marina</i> var. <i>australasica</i> , <i>Rhizophora stylosa</i> , <i>Bruguiera gymnorhiza</i> , <i>Aegiceras corniculatum</i> and <i>Ceriops tagal</i> var. <i>australis</i> (DoE 2016).	Low. No suitable habitat for this species occurs within the impact 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 impact site.

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MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
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 impact site.
<u>Notes:</u> # 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. * 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 5 of the LBEMP for MNES v3 (JWA 2021), 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 3 to 5 of Section 5 of the LBEMP for MNES v3 (JWA 2021).

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 10. The results of the risk assessment are documented in **TABLE 6** of this LBEMP Sub-Plan 10. 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.

Level	Descriptor	Qualitative Description
		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 10 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 10.

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	2	Low	n/a
	Damage to potential habitat for MNES flora and fauna intended to be retained.	All MNES flora and fauna.	D	2	Low	n/a
	Injury, death or displacement of MNES fauna, including the Koala	All terrestrial MNES fauna.	D	2	Low	n/a
	Removal of topsoil resulting in loss of seed bank / tubers of MNES flora.	All MNES flora.	D	2	Low	n/a
	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 traffic from construction vehicles.	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
	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.	C	2	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

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Hazard	Risk	MNES Potentially Impacted	Likelihood	Consequence	Risk Rating	Management Element Reference Section
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.	C	4	High	7
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	2	Low	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 10:

- 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 10.
- **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 10 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
The following vegetation types will be cleared as part of the current works program: • Coastal and subcoastal sandplain open forest - Callitris - 0.34 ha; • Regenerating coastal and subcoastal wallum heath/shrubland - 0.01 ha; • Disturbed wet-terrestrial grassland / sedgeland mosaic - 0.63 ha; and

Rationale	
Disturbed terrestrial grassland +/-disturbed wet-terrestrial grassland/ sedgeland mosaic - 33.91 ha. These communities are highly disturbed and 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 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 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 <i>Nature Conservation Act 1992</i>. - 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 Fauna Management Plan (JWA 2025a) (APPENDIX 2)	All works on the subject site must be completed in strict compliance with the requirements of the Fauna Management Plan (JWA 2025a) (APPENDIX 2).	At all times.
Identify and protect all vegetation and fauna habitats	Clearly define the limits of the approved clearance zones on all construction plans (refer to FIGURE 6). The approved clearance zone is	Prior to the commencement of

Management Measures		
Tasks	Actions	Timing
adjacent to the approved clearance zones.	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.	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 – 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	During all vegetation clearance works.

Management Measures		
Tasks	Actions	Timing
	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 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, plant and equipment on site.	Construction planning is to make appropriate provision for the safe movement of native fauna, including the MNES listed Koala, through the NEBP 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.	Ongoing during the construction phase.

Management Measures		
Tasks	Actions	Timing
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 • Queensland Department of Environment and Heritage Protection (DEHP) - Ph: 1300 130 372.	Ongoing during the construction phase.
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.	Ongoing

Management Measures		
Tasks	Actions	Timing
	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.	
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
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 10. 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;	Ongoing

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Management Measures		
Tasks	Actions	Timing
	• establishment of fauna exclusion fencing around the works site; • reductions in vehicular speed limits within the works site; or • environmental awareness training of personnel.	

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 Fauna Management Plan (JWA 2025a) (APPENDIX 2)	All works on the subject site must be completed in strict compliance with the requirements of the Fauna Management Plan (JWA 2025a) (APPENDIX 2)	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. Advise all construction personnel, including sub-contractors, of the approved clearance zones as part of the site induction.	Prior to the commencement of any vegetation clearance.

Management Measures		
Tasks	Actions	Timing
	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. 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.	During all vegetation clearance works.

Management Measures		
Tasks	Actions	Timing
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 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	Ongoing during the construction phase.

Management Measures		
Tasks	Actions	Timing
	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; - 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	Ongoing

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Management Measures		
Tasks	Actions	Timing
	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 10. 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	
The following vegetation types will be cleared as part of the current works program: - Coastal and subcoastal sandplain open forest - Callitris - 0.34 ha; - Regenerating coastal and subcoastal wallum heath/shrubland - 0.01 ha; - Disturbed wet-terrestrial grassland / sedgeland mosaic - 0.63 ha; and - Disturbed terrestrial grassland +/-disturbed wet-terrestrial grassland/ sedgeland mosaic - 33.91 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 Vegetation Management Plan (JWA 2025b) (APPENDIX 3)	All works on the subject site must be completed in strict compliance with the requirements of the Vegetation Management Plan (JWA 2025b) (APPENDIX 3)	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.

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Management Measures		
Tasks	Actions	Timing
Conduct clearance of vegetation in a manner that minimises the potential for harm to native fauna.	Implement an appropriate program of controls based on Element 2 - Fauna of this LBEMP Sub-Plan 10.	Ongoing during vegetation clearance works.
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 <i>Nature Conservation Act 1992</i> (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.

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Management Measures		
Tasks	Actions	Timing
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). Manage cleared non-native vegetation in accordance with LBEMP Element 5. Reuse or dispose of cleared vegetation in accordance with local government requirements.	Ongoing during the construction phase.
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	Ongoing

Management Measures		
Tasks	Actions	Timing
	to relevant administering authorities upon request: • 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 10. 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 <i>Biosecurity Act 2014</i>, as listed below:			
Common Name	Scientific Name	Location on Site	Biosecurity Act Status
Asparagus fern	<i>Asparagus aethiopicus</i>	Scattered across site	Category 3
Broad-leaved Pepper Tree	<i>Schinus terebinthifolia</i>	Scattered across site and in disturbed riparian areas	Category 3
Camphor Laurel	<i>Cinnamomum camphor</i>	Within the retained habitat to the south of the works area	Category 3
Groundsel Bush	<i>Baccharis halimifolia</i>	Scattered across site	Category 3
Lantana	<i>Lantana camara</i>	Scattered across site	Category 3
Singapore Daisy	<i>Sphagneticola trilobata</i>	Within the retained habitat to the south of the works area	Category 3
Yellow bells	<i>Tecoma stans</i>	Scattered across site, particularly along Caboolture River in the north	Category 3
The works site is currently located within a Fire Ant Biosecurity Zone - Zone 2.			
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 Pest and Invasive Species Plan (JWA 2025c) (APPENDIX 4) 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 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. Monitor the area for new weed infestations or reinfestation in accordance with the Pest and Invasive Species Plan (JWA 2025c) (APPENDIX 4), 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 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 Pest and Invasive Species Plan (JWA 2025c) (APPENDIX 4). 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). 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.	Ongoing during the construction phase.

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Management Measures		
Tasks	Actions	Timing
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 10. 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 Pest and Invasive Species Plan (JWA 2025c) (APPENDIX 4); • 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 Pest and Invasive Species Plan (JWA 2025c) - APPENDIX 4) 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, including the Moreton Bay RAMSAR wetland. Appropriate erosion and sedimentation controls must be implemented to minimise the release of sediment and other contaminants generated by construction activities into downstream waterways. A Concept Erosion and Sediment Control Plan has been developed (SEE Civil 2025) (APPENDIX 5). The Concept Erosion and Sediment Control Strategy has included an erosion risk assessment in accordance with Best Practice Erosion and Sediment Control (IECA, 2008) and has determined that the proposed works represent a 'very low' erosion risk. Regardless, due to the location of the proposed works areas on the floodplain, and their proximity to the Caboolture River and associated RAMSAR wetland, specific management measures have been identified below in the event of an extreme weather event.
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.	The ESCP will be reviewed and certified by a CPESC prior to commencement of works. This review and certification will ensure the plan has been prepared to satisfy the intent and minimum standards nominated within the IECA (2008) Best Practice Erosion and Sediment Control Guideline.	Prior to the construction phase.
	The Concept ESCP shall be supplemented by Progressive Erosion and Sediment Control Plans (PESCP). PESCPs are to be developed to identify the specific location and, where required, additional erosion and sediment controls applicable to individual work stages. PESCPs shall be documented via mark ups to approved plans. Where a change in the level of sediment control standard is proposed in a PESCP, the PESCP shall be reviewed and approved by an appropriately qualified person prior to the change being implemented.	Prior to and ongoing during the construction phase.

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Management Measures		
Tasks	Actions	Timing
	Adhere to all water quality assurance measures in accordance with the Concept Erosion and Sediment Control Plan (SEE Civil 2025) (APPENDIX 5) including: - Minimise the extent and duration of disturbance, maintaining existing ground cover to the greatest extent possible. - Commissioning / decommissioning of plant and refuelling to be undertaken a minimum of 30m away from any watercourse/drainage line. - All ERSED controls to be inspected regularly (weekly, pre/post rainfall event i.e. forecast or actual rainfall of >10mm) with maintenance/repairs to be undertaken when necessary. - Revegetation of disturbed/bare areas to be progressively implemented. - Where clean water drains and sediment traps/sumps are necessary, all clean water drains and sediment traps and associated drainage must be installed and commissioned prior to the commencement of any grubbing works within the catchment area. - All controls must be installed within approved project footprint. - Ensure all site access is stabilised with rumble grid and clean rock.	Prior to and ongoing during the construction phase.
	Where topsoil stockpiles will remain undisturbed for greater than nominated erosion standard, apply seeding of a cover crop at the rate of 10kg/ha to topsoil stockpiles. Refer to revegetation specifications for seed mix. Where subsoil / spoil stockpiles will remain undisturbed for greater than nominated erosion standard, apply temporary cover or soil binder.	Prior to and ongoing during the construction phase.
	All drainage, erosion and sediment controls will be inspected daily when rain is occurring (if site access is available) weekly, prior to and following a rainfall event of sufficient intensity and duration to cause on site runoff immediately prior to and following periods of site shutdown.	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	Ongoing

Management Measures		
Tasks	Actions	Timing
	should be implemented in accordance with SECTION 5 of this LBEMP Sub-Plan 10 and the Concept Erosion and Sediment Control Strategy (SEE Civil 2025) (APPENDIX 5). Appropriate corrective actions in relation to this environmental management element are provided in the approved Erosion and Sediment Control Strategy and include, but are be limited to: • 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 proposed borrow area soils contain moderate levels of actual acid sulphate soils (ASS) within topsoil and underlying alluvial layers at strengths of up to 300 mol H+ per tonne. Disturbance of these soils will require management during excavation to neutralise existing acidity and mitigate environmental risk. High-risk potential ASS (PASS) occurs at depths of deeper than 3 m BGL (encountered in BH110 only) but is not predicted to be disturbed by the proposed works. The early release residential area has low levels of actual ASS present (up to 224 mol H+ per tonne), with no PASS present. The planned works will not significantly disturb underlying soils or alter groundwater conditions, posing minimal acid sulfate risk for this area. 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 (Tectonic 2025) (APPENDIX 6).
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 2025) (APPENDIX 6) has been prepared for the site.	Complete
	Implement the Acid Sulphate Soils Investigation and Management Plan (Tectonic 2025) (APPENDIX 6) to ensure that no environmental harm as defined under the <i>Environment Protection Act 1994</i> 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 10.	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 10 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 7**.

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 10 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

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Element	Monitoring Activity			Incident Response	Corrective Action
	What	When	Who		
					clearing procedure. The Fauna Management Plan (JWA 2025a) (APPENDIX 2) 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 Fauna Management Plan (JWA 2025a) (APPENDIX 2) 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.

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Element	Monitoring Activity			Incident Response	Corrective Action
	What	When	Who		
					Rehabilitation works will be necessary where significant vegetation degradation or loss has occurred. The Vegetation Management Plan (JWA 2025b) (APPENDIX 3) 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 Vegetation Management Plan (JWA 2025b) (APPENDIX 3) 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/Land scaper/ Bush rehabilitator	Contractor/ Ecologist/ Landscaper/ Bush Rehabilitator	Weed infestations are to be prevented and managed as outlined in the Pest and Invasive Species Plan (JWA 2025c) (APPENDIX 4). 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 Pest and Invasive Species Plan (JWA 2025c) (APPENDIX 4). If pests are recorded, measures contained in the Plan should be

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Element	Monitoring Activity			Incident Response	Corrective Action
	What	When	Who		
					reviewed and adapted based on the pest species and extent of presence.
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 Erosion and Sediment Control Strategy (SEE Civil 2025) (APPENDIX 5). 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 Erosion and Sediment Control Strategy (SEE Civil 2025) (APPENDIX 5). 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.

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Element	Monitoring Activity			Incident Response	Corrective Action
	What	When	Who		
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 Acid Sulphate Soils Investigation and Management Plan (Tectonic 2025) (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.

6 RECORD KEEPING

The Developer is to maintain appropriate records concerning all tasks and actions undertaken in accordance with this LBEMP Sub-Plan 10 including:

- copies of all relevant permits or approvals relevant to the works the subject of this LBEMP Sub-Plan 10;
- the name, qualifications and contact details of the suitably qualified ecologist engaged to the assist in the preparation of this LBEMP Sub-Plan 10;
- any records required to be kept in for specific environmental management elements as identified in **SECTION 4** of this LBEMP Sub-Plan 10; 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.

REFERENCES

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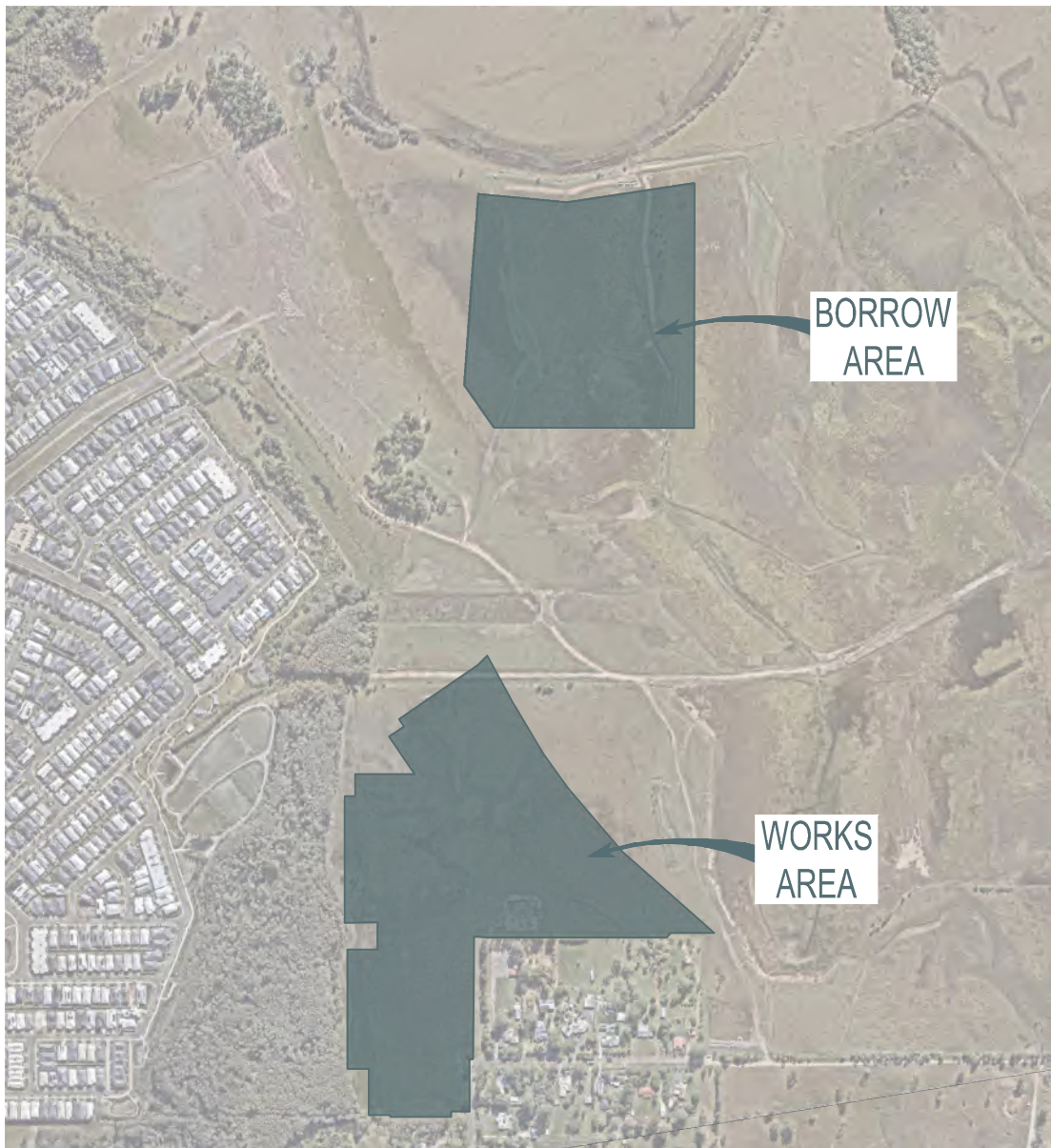
APPENDIX 1 - BULK EARTHWORKS PLANS (EGIS 2025)

NORTH HARBOUR

EARLY RELEASE

BULK EARTHWORKS

NORTH HARBOUR

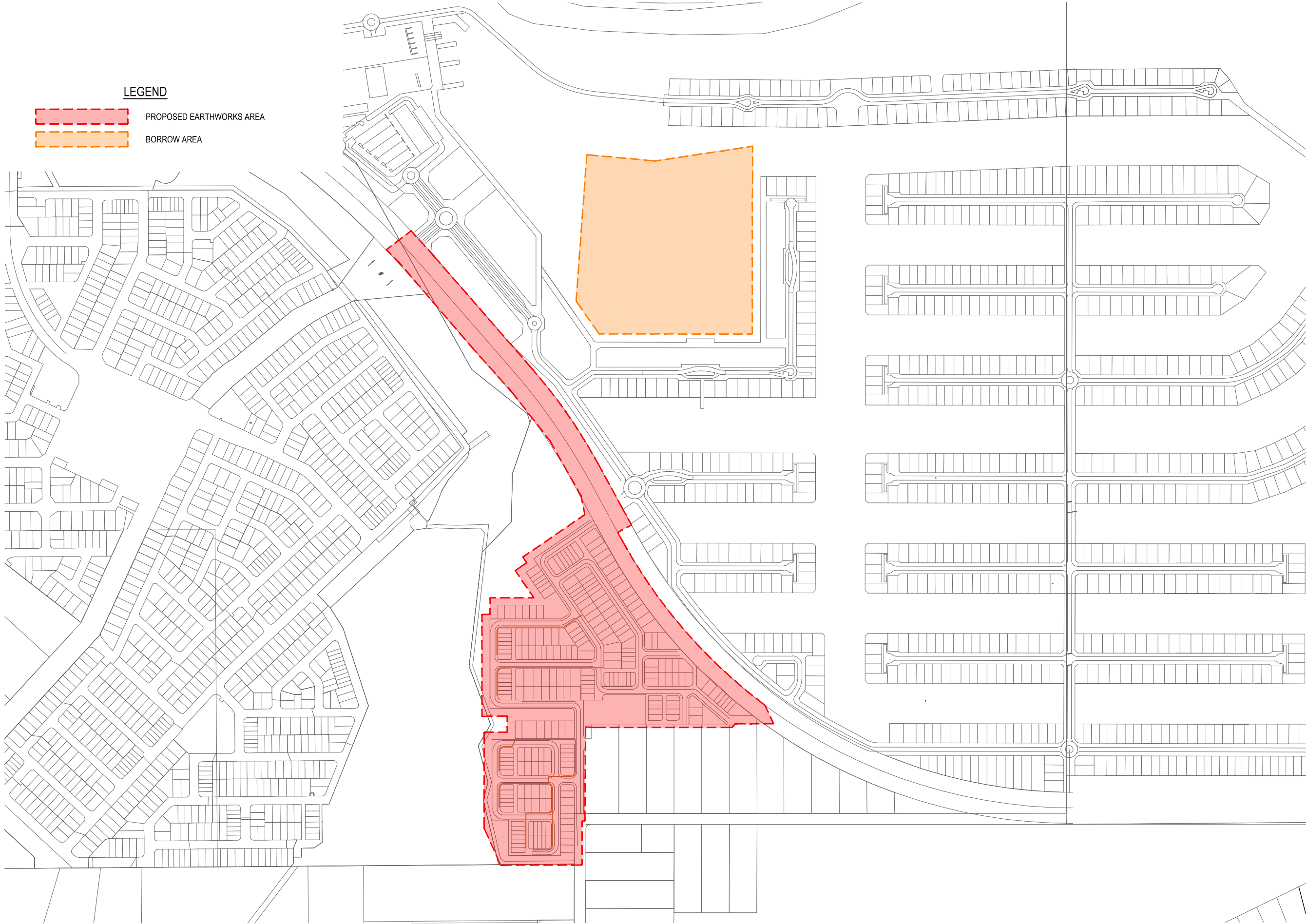


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000	A	COVER SHEET
010	A	BULK EARTHWORKS OVERALL LAYOUT
020	A	BULK EARTHWORKS LAYOUT PLAN SHEET 1 OF 2
021	A	BULK EARTHWORKS LAYOUT PLAN SHEET 2 OF 2
022	A	BORROW AREA LAYOUT PLAN
025	A	BULK EARTHWORKS TYPICAL SECTIONS SHEET 1 OF 2
026	A	BULK EARTHWORKS TYPICAL SECTIONS SHEET 2 OF 2
030	A	CUT AND FILL DEPTH PLAN

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LEGEND

- PROPOSED EARTHWORKS AREA
- BORROW AREA

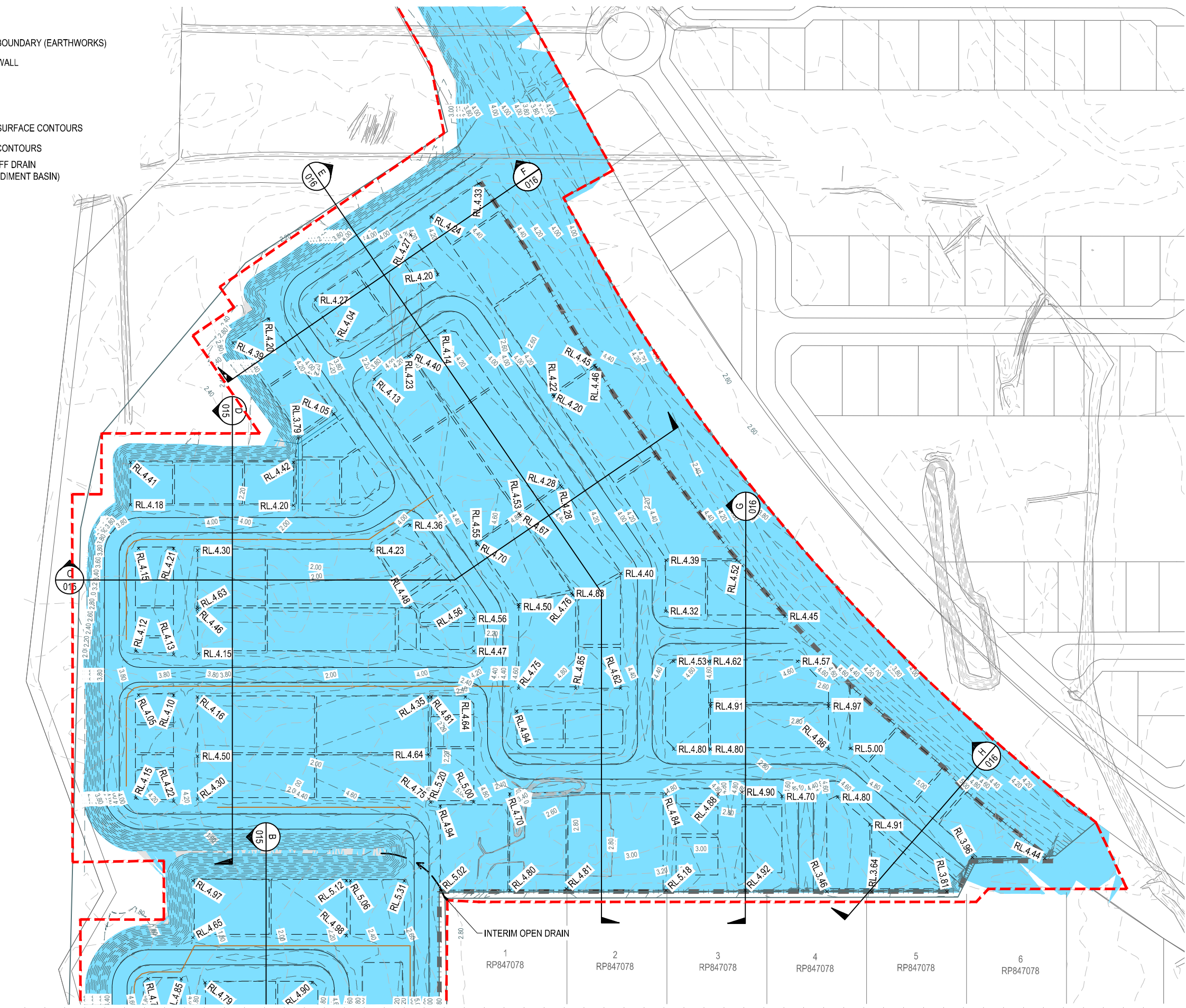


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							APPROVED BY: - RPEQ NO: - SIGN: DATE: 23.09.25				
									North Harbour		PROJECT No. 23-000077.03 010 DRAWING No. REVISION A

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LEGEND

-
-  PROPOSED WORKS BOUNDARY (EARTHWORKS)
 FUTURE RETAINING WALL
 AREA OF FILL
 AREA OF CUT
 PROPOSED DESIGN SURFACE CONTOURS
 EXISTING SURFACE CONTOURS
 CLEAN WATER CUTOFF DRAIN (DIRECT FLOW TO SEDIMENT BASIN)

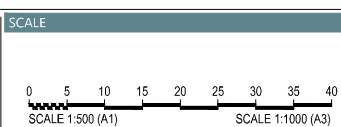


REFER SHEET 2 FOR CONTINUATION

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A	AT	JH	JM	SP	23.09.25	LOT BOUNDARIES AMENDED
AMENDMENTS						

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STATUS	
FOR APPROVAL	
APPROVED	
BY: -	RPEQ NO: -
SIGN:	DATE: 23.09.25



PROJECT

NORTH HARBOUR
EARLY RELEASE
BULK EARTHWORKS

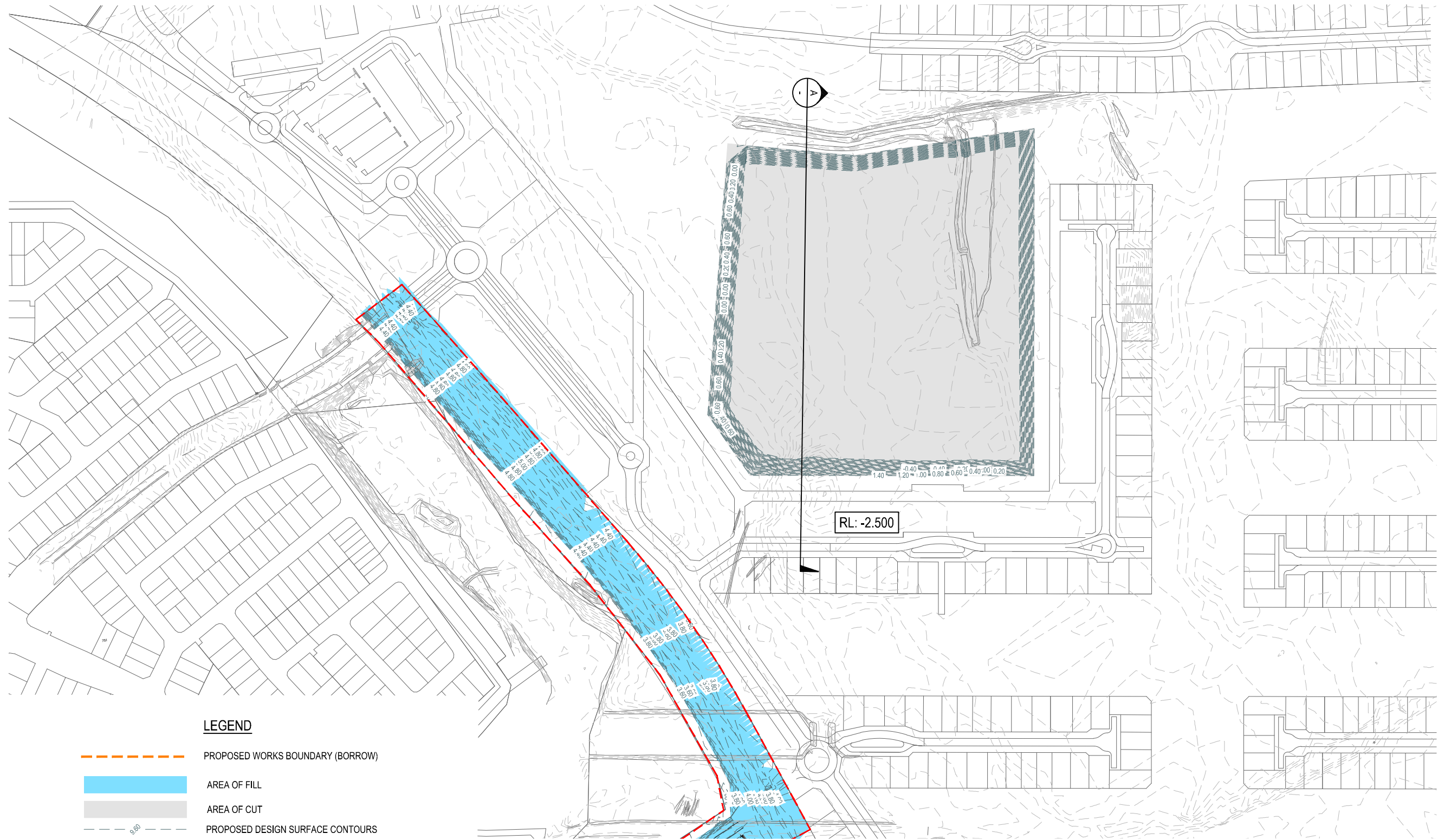
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BULK EARTHWORKS LAYOUT PLAN SHEET 1 OF 2		
PROJECT No.	DRAWING No.	REVISION
23-000077.03	020	A



-
-  PROPOSED WORKS BOUNDARY (EARTHWORKS)
 FUTURE RETAINING WALL
 AREA OF FILL
 AREA OF CUT
 PROPOSED DESIGN SURFACE CONTOURS
 EXISTING SURFACE CONTOURS
 CLEAN WATER CUTOFF DRAIN
(DIRECT FLOW TO SEDIMENT BASIN)

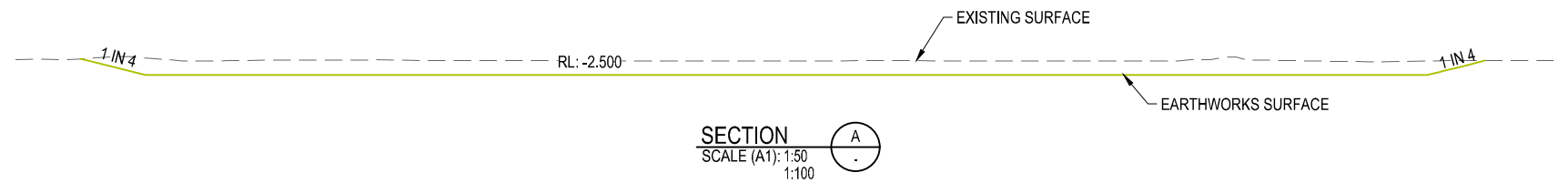
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		AT	JH	JM	SP	23.09.25		APPROVED					PROJECT No. 23-000077.03 DRAWING No. 021 REVISION A
								BY: -	RPEQ NO: -				
								SIGN:	DATE: 23.09.25				

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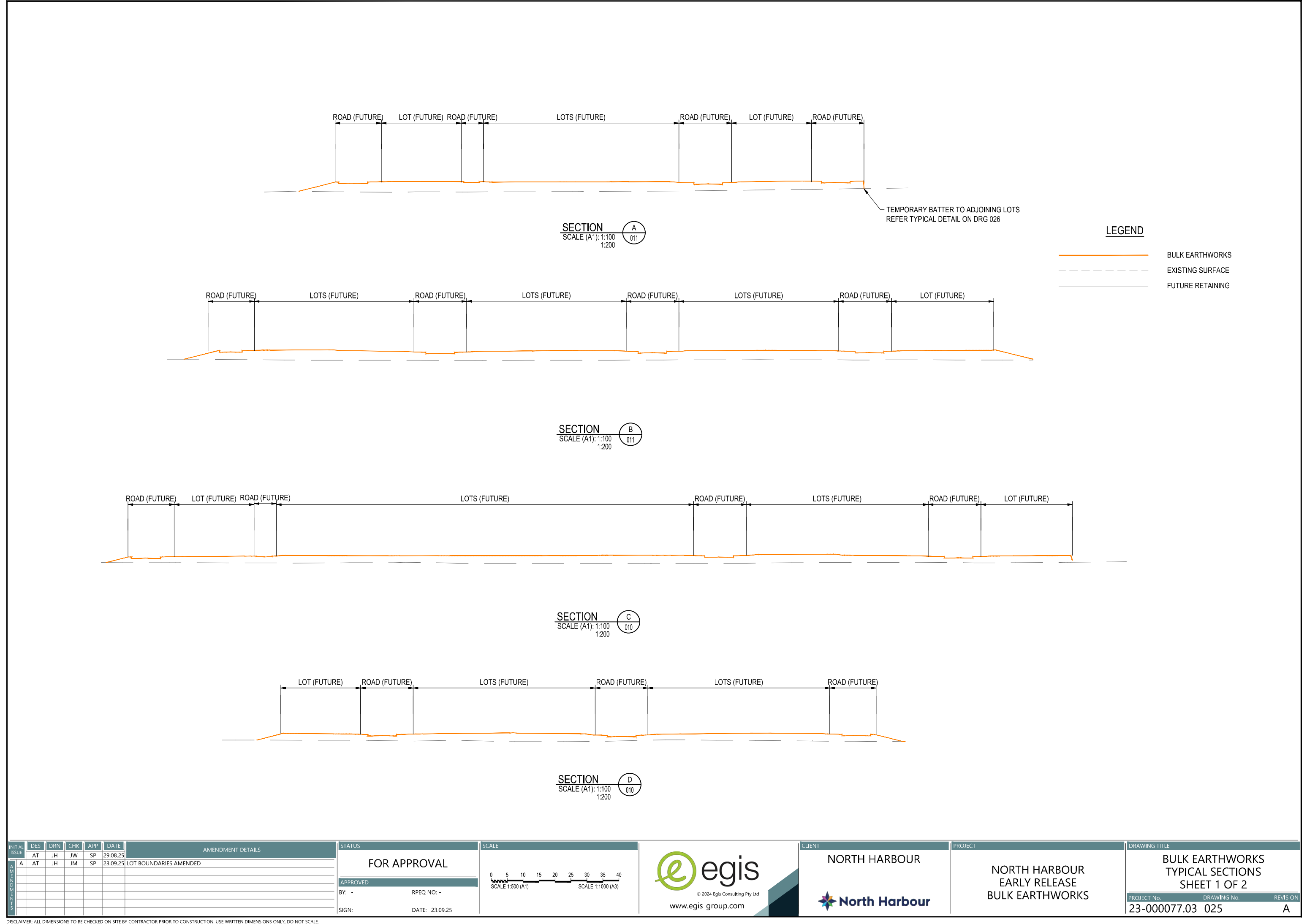
LEGEND

- PROPOSED WORKS BOUNDARY (BORROW)
- AREA OF FILL
- AREA OF CUT
- 9.80 --- PROPOSED DESIGN SURFACE CONTOURS
- 9.80 --- EXISTING SURFACE CONTOURS



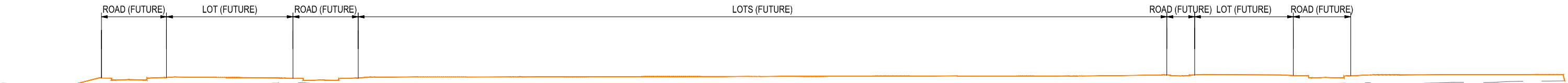
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	A	AT	JH	JM	SP	23.09.25	LOT BOUNDARIES AMENDED											
									APPROVED			 © 2024 Egis Consulting Pty Ltd www.egis-group.com				PROJECT No. 23-000077.03	DRAWING No. 022	REVISION A
									BY: -	RPEQ NO: -								
									SIGN:	DATE: 23.09.25								

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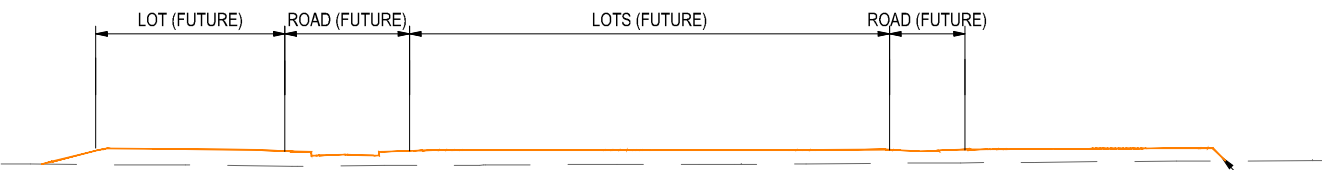
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							BY: - RPEQ NO: -				DRAWING No. 025
							SIGN: DATE: 23.09.25				REVISION A

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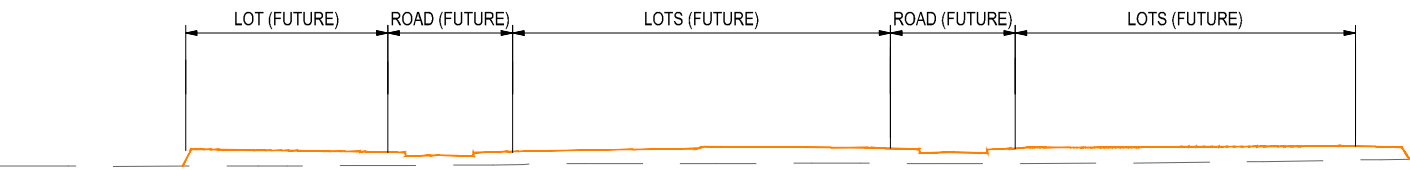
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1:200

- LEGEND
- BULK EARTHWORKS
 - EXISTING SURFACE
 - FUTURE RETAINING

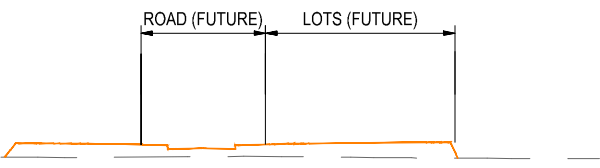


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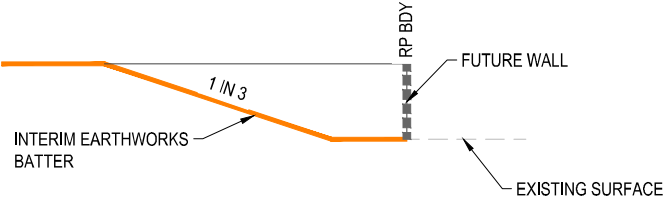
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SECTION G
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1:200



SECTION H
SCALE (A1): 1:100
1:200



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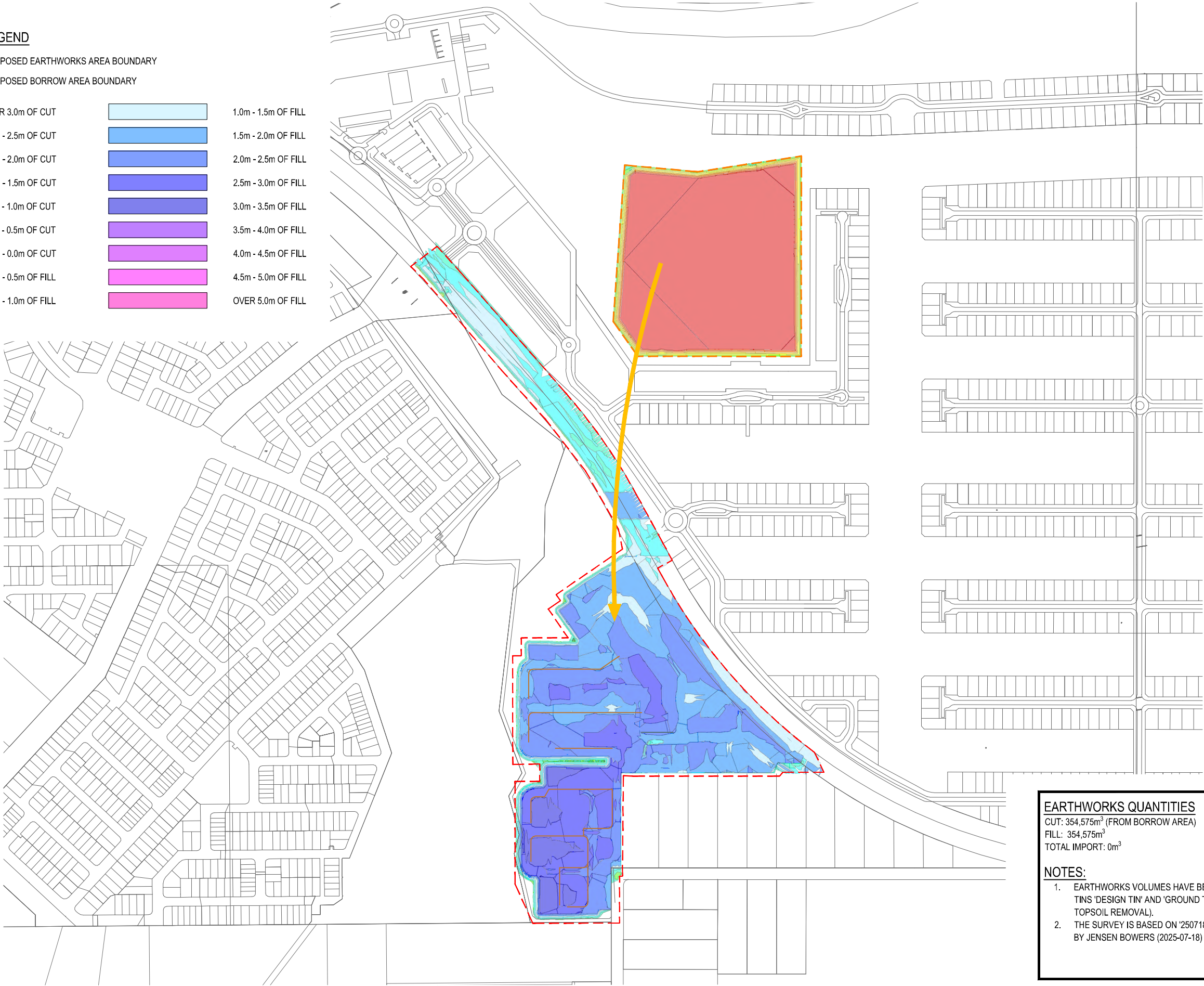
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FOR APPROVAL								APPROVED		NORTH HARBOUR		NORTH HARBOUR EARLY RELEASE BULK EARTHWORKS		BULK EARTHWORKS TYPICAL SECTIONS SHEET 2 OF 2	
BY: -								RPEQ NO: -		© 2024 Egis Consulting Pty Ltd www.egis-group.com		North Harbour		PROJECT No. 23-000077.03 026	
SIGN:								DATE: 23.09.25						REVISION A	

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LEGEND

	PROPOSED EARTHWORKS AREA BOUNDARY		
	PROPOSED BORROW AREA BOUNDARY		
	OVER 3.0m OF CUT		1.0m - 1.5m OF FILL
	3.0m - 2.5m OF CUT		1.5m - 2.0m OF FILL
	2.5m - 2.0m OF CUT		2.0m - 2.5m OF FILL
	2.0m - 1.5m OF CUT		2.5m - 3.0m OF FILL
	1.5m - 1.0m OF CUT		3.0m - 3.5m OF FILL
	1.0m - 0.5m OF CUT		3.5m - 4.0m OF FILL
	0.5m - 0.0m OF CUT		4.0m - 4.5m OF FILL
	0.0m - 0.5m OF FILL		4.5m - 5.0m OF FILL
	0.5m - 1.0m OF FILL		OVER 5.0m OF FILL



EARTHWORKS QUANTITIES

CUT: 354,575m³ (FROM BORROW AREA)
FILL: 354,575m³
TOTAL IMPORT: 0m³

NOTES:

- EARTHWORKS VOLUMES HAVE BEEN OBTAINED USING THE FOLLOWING TINS 'DESIGN TIN' AND 'GROUND TIN' (INCLUSIVE OF 300mm ASSUMED TOPSOIL REMOVAL).
- THE SURVEY IS BASED ON '250718 DTM' OVERALL DTM SURVEY PROVIDED BY JENSEN BOWERS (2025-07-18)

INITIAL	DES	DRN	CHK	APP	DATE	AMENDMENT DETAILS
AT	JH	JW	SP	29.08.25		
AT	JH	JM	SP	23.09.25		LOT BOUNDARIES AMENDED

STATUS	
FOR APPROVAL	
APPROVED	
BY: -	RPEQ NO: -
SIGN:	DATE: 23.09.25

SCALE	
0 5 10 15 20 25 30 35 40	
SCALE 1:500 (A1)	SCALE 1:1000 (A3)



CLIENT
NORTH HARBOUR

PROJECT
NORTH HARBOUR EARLY RELEASE BULK EARTHWORKS

DRAWING TITLE		
CUT AND FILL DEPTH PLAN		
PROJECT No.	DRAWING No.	REVISION
23-000077.03	030	A

APPENDIX 2 - FAUNA MANAGEMENT PLAN (JWA 2025)



FAUNA MANAGEMENT PLAN

North Harbour Priority Development Area - Precinct 1

Part of Lot 1 SP332514
Burpengary East

A Report Prepared for
North Harbour Holdings Pty Ltd

OCTOBER 2025

DOCUMENT CONTROL**Document**

Title	Fauna Management Plan - North Harbour Priority Development Area - Precinct 1
Job Number	Q15003
File Reference	2015 CLIENTS\Q15003_Northeast Business Park, Morayfield\Reports\LBEMP10_Early Works\Associated Management Plans
Version and Date	RW2 02/10/25
Client	North Harbour Holdings Pty Ltd

Revision History (office use only)

Issue	Version	Draft/ Final	Date	Distributed To	No. Copies	Media	Delivery Method
1	RW1	DRAFT	26/08/25	Client	1	.pdf	Email
2	RW2	FINAL	02/10/25	Client	1	.pdf	Email

Client Issue

Version	Date Sent	Author		Approved by	
		Name	Initials	Name	Initials
RW1	26/08/25	Nicole Davies	ND	Adam McArthur	AM
RW2	02/10/25	Nicole Davies	ND	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 early release phase earthworks, preceding proposed marina and waterfront residential development at North Harbour. The North Harbour marina and waterfront residential development covers approximately 181.3 hectares, Part of Lot 1 SP332514, bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East).

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. This FMP forms part of the LBEMP sub-plan 10 developed for the proposed bulk earthworks associated with the Early Release Works.

This FMP has been prepared to reflect the bulk earthworks design of the Early Release Area. 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.

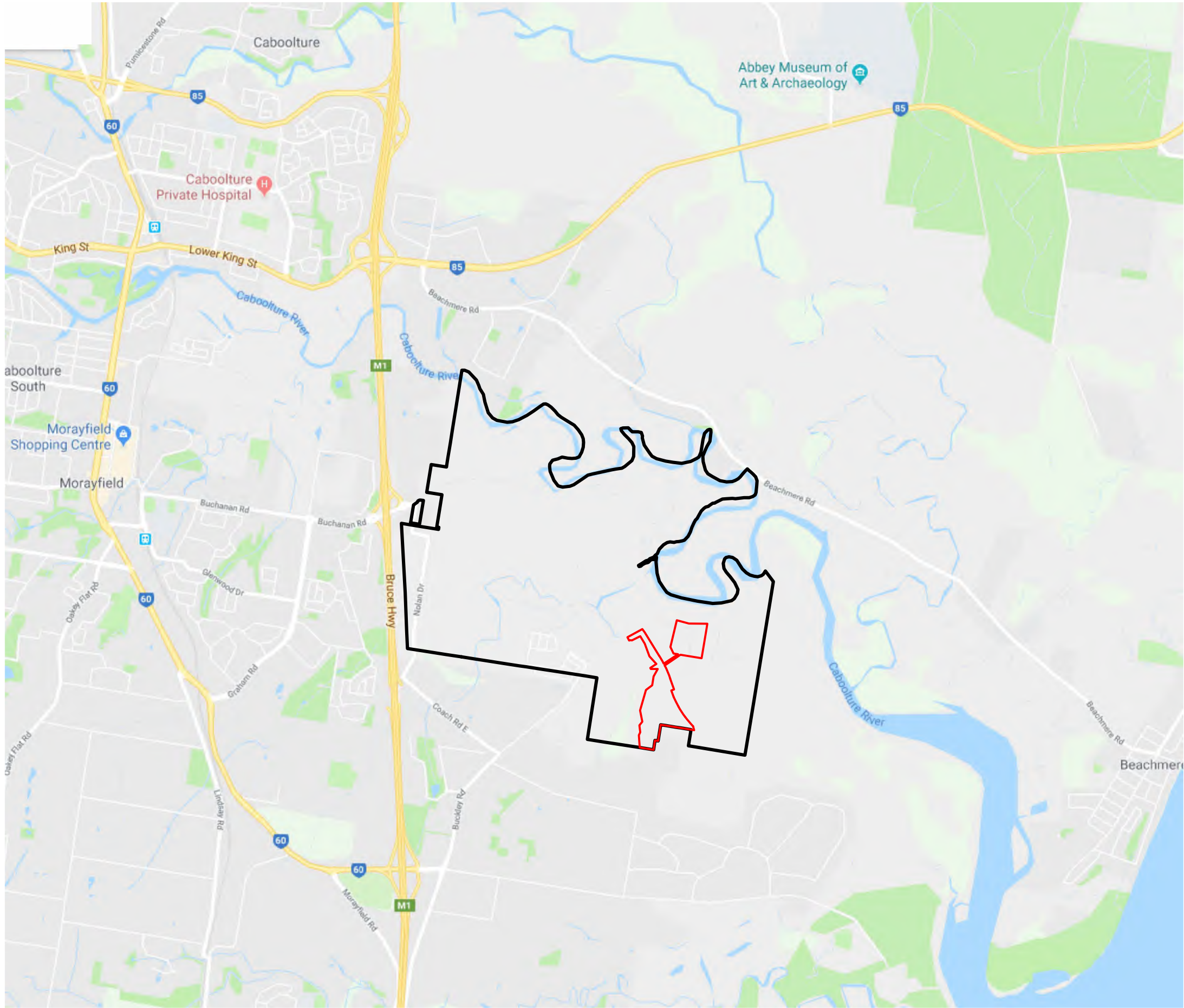
1.2 The Subject Site

For the purposes of this report the subject site comprises the proposed borrow area and early release residential land zones, located on the western side of the broader marina and waterfront residential. The North Harbour marina and waterfront residential development covers approximately 181.3 hectares, Part of Lot 1 SP332514, bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East) (**FIGURE 1**). An aerial photograph of the site is shown in **FIGURE 2**. The Early Release Area footprint is approximately 34.89 ha.

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

1.3 The Proposed Development

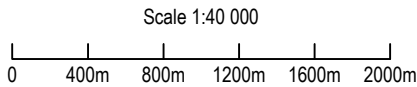
Proposed early release works will comprise excavation of approximately 354,575m³, from an approximate 10 ha borrow area (within the footprint of the proposed future marina) for placement as controlled fill across about 25 ha of proposed early release residential land. Excavations within the proposed borrow area will extend to a depth of about RL-2.5m (~3 m below ground level [BGL]) and are to be internally battered (at 1V:3H or sufficient safe angle). Works across the proposed early release residential land, will comprise placement and compaction of bulk fill. Excavations across this area, will be relatively minor, comprising stripping of topsoil and unsuitable subgrade material only. The extent of the early release works area is shown in **FIGURE 3**.



LEGEND

LBEMP Sub-plan 10 Site Boundary

NEBP Site Boundary



SOURCE: Google Maps	CLIENT North Harbour Holdings Pty Ltd PROJECT Fauna Management Plan Priority Development Area - Precinct 1 North Harbour, Burpengary East QLD City of Moreton Bay LGA	FIGURE 1	TITLE LOCALITY PLAN
SCALE: 1 : 40 000 @ A3		PREPARED: BW DATE: 2 October 2025 FILE: Q15003_LBEMP10_20251002.dwg	
JWA Pty Ltd Ecological Consultants			



LEGEND
 LBEMP Sub-plan 10 Site Boundary
 NEBP Site Boundary

Scale 1 : 6000
0 100m 200m 300m

SOURCE: Metro Maps Aerial dated 07/11/24

SCALE: 1 : 6000 @ A3

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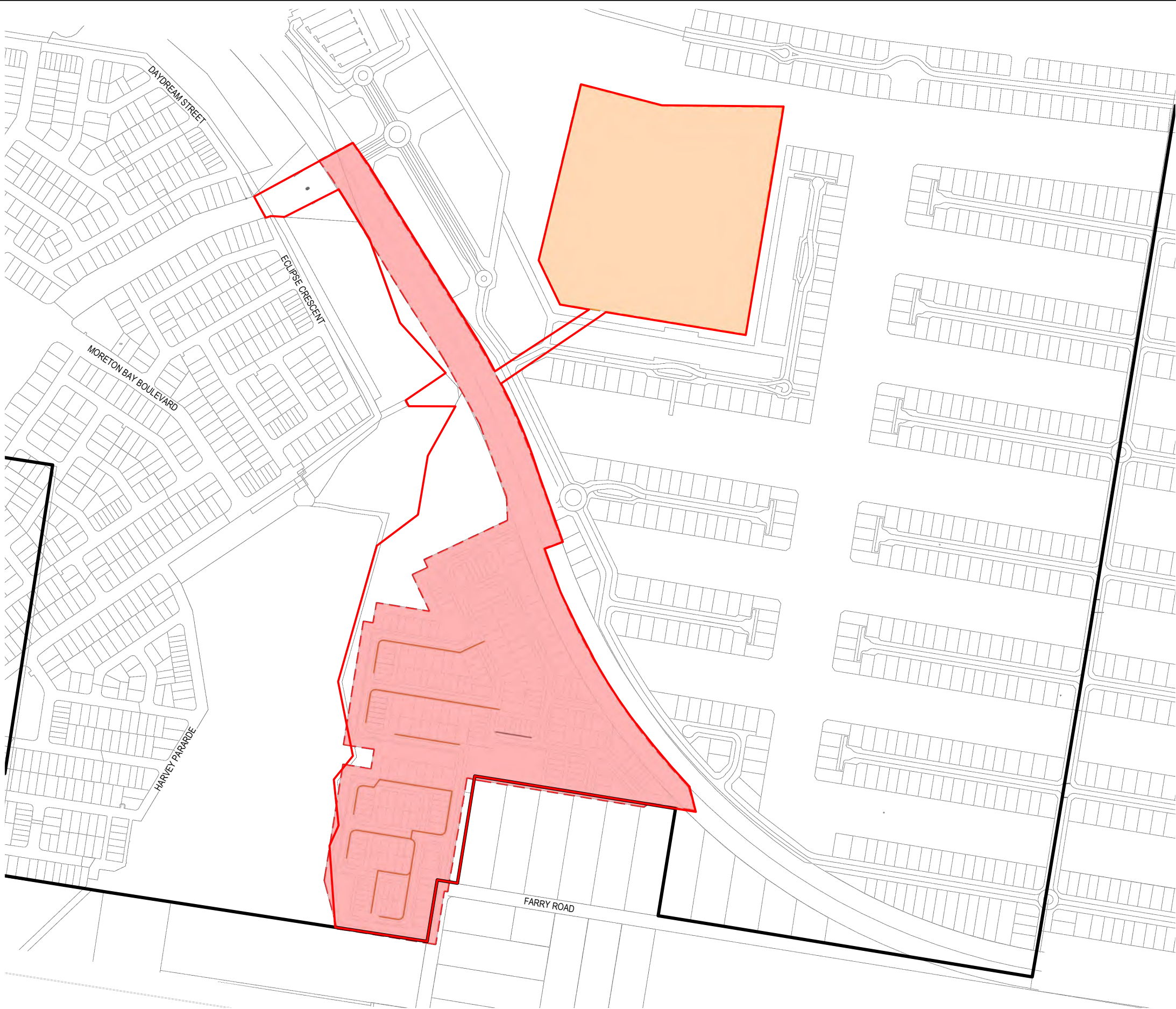
CLIENT
North Harbour Holdings Pty Ltd
PROJECT
Fauna Management Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 2

PREPARED: BW
DATE: 2 October 2025
FILE: Q15003_LBEMP10_20251002.dwg

TITLE

AERIAL
PHOTOGRAPH



LEGEND

LBEMP Sub-plan 10 Site Boundary

NEBP Site Boundary

Proposed Works

Proposed Earthworks Area

Proposed Borrow Area

Scale 1 : 6000

0 100m 200m 300m

SOURCE: Egis (Ref: 23-000077-BEW Full-Set.pdf)

SCALE: 1 : 6000 @ A3

JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd

PROJECT
Fauna Management Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 3

PREPARED: BW
DATE: 2 October 2025
FILE: Q15003_LBEMP10_20251002.dwg

TITLE

PROPOSED
WORKS

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 2025.

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			
<i>Arenaria interpres</i>	Ruddy turnstone	V	V
<i>Calidris acuminata</i>	Sharp-tailed sandpiper	V	V
<i>Calidris canutus</i>	Red knot	V	V
<i>Calidris ferruginea</i>	Curlew sandpiper	CE	CE
<i>Calidris tenuirostris</i>	Great knot	V	V
<i>Charadrius leschenaultii</i>	Greater sand plover	V	V
<i>Charadrius mongolus</i>	Lesser sand plover	E	E
<i>Erythrotriorchis radiatus</i>	Red goshawk	E	E
<i>Esacus magnirostris</i>	beach stone-curlew	-	V
<i>Gallinago hardwickii</i>	Latham's snipe	V	V
<i>Hirundapus caudacutus</i>	White-throated needletail	V	V
<i>Limosa lapponica baueri</i>	Bar-tailed godwit	E	E
<i>Limosa limosa</i>	Black-tailed godwit	E	E
<i>Ninox strenua</i>	powerful owl	-	V
<i>Numenius madagascariensis</i>	Eastern curlew	CE	CE
<i>Pluvialis squatarola</i>	Grey plover	V	V
<i>Rostratula australis</i>	Australian painted snipe	E	E
<i>Sterna albifrons</i>	Little tern	V	-
<i>Tringa nebularia</i>	Common greenshank	E	E
<i>Turnix melanogaster</i>	Black-breasted button-quail	V	V

Scientific Name	Common Name	EPBC#	NCAR*
<i>Xenus cinereus</i>	Greek sandpiper	V	V
Frogs			
<i>Adelotus brevis</i>	Tusked frog	-	V
<i>Crinia tinnula</i>	Wallum froglet	-	V
<i>Litoria alongburensis</i>	Wallum sedge frog	V	V
<i>Mixophyes fleayi</i>	Fleay's frog	E	E
<i>Mixophyes iteratus</i>	Giant barred frog	V	V
Insects			
<i>Argynnis hyperbius inconstans</i>	Australian fritillary	CE	E
Mammals			
<i>Chalinolobus dwyeri</i>	Large-eared pied bat	E	E
<i>Dasyurus hallucatus</i>	Northern quoll	E	-
<i>Dasyurus maculatus maculatus</i>	Spot-tailed quoll	E	E
<i>Macroderma gigas</i>	Ghost bat	V	E
<i>Petauroides volans</i>	Greater glider	E	E
<i>Petaurus australis australis</i>	Yellow-bellied glider (south-eastern)	V	V
<i>Phascolarctos cinereus</i>	Koala	E	E
<i>Potorous tridactylus tridactylus</i>	Long-nosed potoroo	V	V
<i>Pteropus poliocephalus</i>	Grey-headed flying-fox	V	-
<i>Xeromys myoides</i>	Water mouse	V	V
Reptiles			
<i>Coeranoscincus reticulatus</i>	Three-toed snake-tooth skink	V	-
<i>Delma torquata</i>	Collared delma	V	V
<i>Furina dunmalli</i>	Dunmall's snake	V	V
<i>Hemiaspis damelii</i>	Grey Snake	E	E
Fish/Crayfish			
<i>Cherax robustus</i>		V	V
<i>Nannoperca oxleyana</i>	Oxleyan Pygmy perch	E	E
<i>Pseudomugil mellis</i>	Honey blue eye	E	E
<i>Tenuibranchiurus glypticus</i>	Swamp crayfish	-	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 SPECIES
WITHIN 5KM OF THE SITE

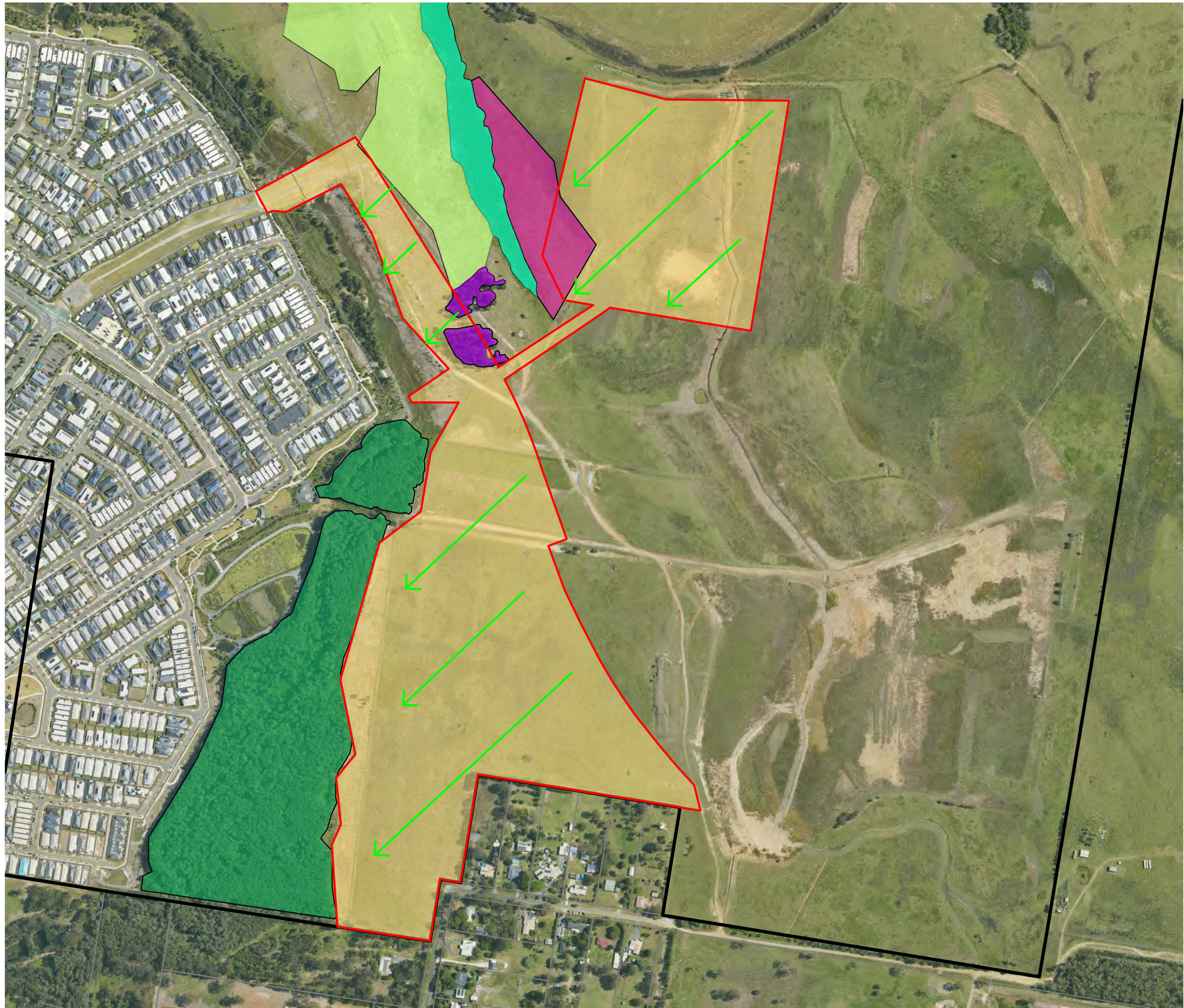
Scientific Name	Common Name	Status#
<i>Actitis hypoleucos</i>	Common Sandpiper	M
<i>Apus pacificus</i>	Fork-tailed swift	M
<i>Arenaria interpres</i>	Ruddy Turnstone	M, V
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	M
<i>Calidris alba</i>	Sanderling	M
<i>Calidris canutus</i>	Red Knot, Knot	E, M
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE, M
<i>Calidris melanotos</i>	Pectoral Sandpiper	M

Scientific Name	Common Name	Status#
<i>Calidris ruficollis</i>	Red-necked Stint	M
<i>Calidris pugnax</i>	Ruff	M
<i>Calidris tenuirostris</i>	Great Knot	CE, M
<i>Charadrius bicinctus</i>	Double-banded Plover	M
<i>Charadrius leschenaultii</i>	Greater Sand Plover, Large Sand Plover	V, M
<i>Charadrius mongolus</i>	Lesser Sand Plover, Mongolian Plover	E, M
<i>Charadrius veredus</i>	Oriental Plover, Oriental Dotterel	M
<i>Cuculus optatus</i>	Oriental Cuckoo, Horsfield's Cuckoo	M
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	M
<i>Gallinago megala</i>	Swinhoe's Snipe	M
<i>Gallinago stenura</i>	Pin-tailed Snipe	M
<i>Hirundapus caudacutus</i>	White-throated Needletail	V, M
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	M
<i>Limnodromus semipalmatus</i>	Asian Dowitcher	M
<i>Limosa lapponica</i>	Bar-tailed Godwit	M
<i>Limosa limosa</i>	Black-tailed Godwit	M
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew	CE, M
<i>Numenius minutus</i>	Little Curlew, Little Whimbrel	M
<i>Numenius phaeopus</i>	Whimbrel	M
<i>Pandion haliaetus</i>	Osprey	M
<i>Pluvialis fulva</i>	Pacific Golden Plover	M
<i>Pluvialis squatarola</i>	Grey Plover	M, V
<i>Sternula albifrons</i>	Little tern	M, V
<i>Tringa brevipes</i>	Grey-tailed Tattler	M
<i>Tringa glareola</i>	Wood Sandpiper	M
<i>Tringa incana</i>	Wandering Tattler	M
<i>Tringa nebularia</i>	Common Greenshank, Greenshank	M
<i>Tringa stagnatilis</i>	Marsh Sandpiper, Little Greenshank	M
<i>Xenus cinereus</i>	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

Three (3) vegetation types occur within the footprint of the Early Release Area (**FIGURE 4**):

- Vegetation Community 1 - Coastal and subcoastal sandplain open forest - Callitris;
- Vegetation Community 4 - Regenerating coastal and subcoastal wallum heath/shrubland;
- Vegetation Community 5 - Disturbed wet-terrestrial grassland/sedgeland mosaic; and
- Vegetation Community 6 - Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/sedgeland mosaic.



LEGEND

LBEMP Sub-plan 10 Site Boundary

NEBP Site Boundary

→ Direction of Clearing

Vegetation Communities

Community 1: Coastal and subcoastal sandplain open forest - Callitris

Community 2: Coastal and subcoastal wet heath / sedge swamp

Community 3: Coastal and subcoastal floodplain tree swamps - Melaleuca and Eucalypt

Community 4: Regenerating coastal and subcoastal wallum heath / shrubland

Community 5: Disturbed wet-terrestrial grassland / sedgeland mosaic

Community 6: Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland / sedgeland mosaic

Scale 1 : 6000
0 100m 200m 300m

SOURCE: JWA Site Investigations;
Metro Maps Aerial dated 07/11/24

SCALE: 1 : 6000 @ A3

JWA Pty Ltd
Ecological Consultants

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North Harbour Holdings Pty Ltd

PROJECT
Fauna Management Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 4

PREPARED: BW
DATE: 2 October 2025
FILE: Q15003_LBEMP10_20251002.dwg

TITLE
VEGETATION
COMMUNITIES &
DIRECTION OF
CLEARING

Retained vegetation adjoining the works area consists of the following vegetation communities (**FIGURE 4**):

- Vegetation Community 1 - Coastal and subcoastal sandplain open forest - Callitris;
- Vegetation Community 2 - Coastal and subcoastal wet heath/sedge swamp;
- Vegetation Community 3 - Coastal and subcoastal floodplain tree swamps - Melaleuca and Eucalypt;
- Vegetation Community 4 - Regenerating coastal and subcoastal wallum heath/shrubland;
- Vegetation Community 5 - Disturbed wet-terrestrial grassland/sedgeland mosaic; and
- Vegetation Community 6 - Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/sedgeland mosaic.

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 the drainage line that runs through the impact footprint is subject to tidal influences. 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 and only 0.01 ha of mapped habitat will be impacted.

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 retained vegetation adjacent to the Early Release Area footprint.

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 amicala*) 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 occurs on or adjacent to the site include sedgeland, grasslands, floodplain tree swamps, 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 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.

Roost sites for flying foxes do not occur on the subject site.

Potential habitat for the Water mouse (*Xeromys myoides*) occurs in mangrove communities on site, however suitable habitat is not present within the footprint of the Early Release Area.

2.5 Tree Hollows Within the Development Area

A targeted survey for potential habitat trees was completed within Vegetation Community 4, the other vegetation communities within the footprint do not have trees present. 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; and
- Bird nests or dreys.

The type of all potential habitat features was recorded, and the results are provided in **APPENDIX 1**. In total, seven (7) potential habitat trees/stags were recorded (**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 within the retained vegetation (Vegetation Community 7) west of the impact area.

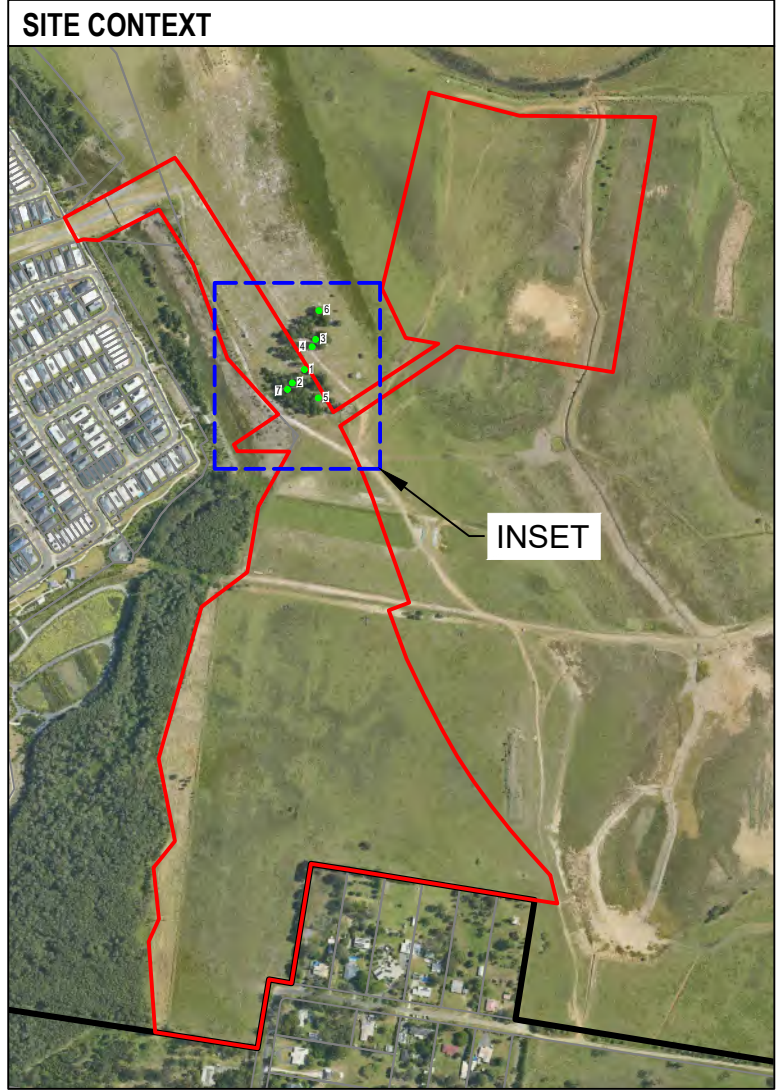
2.6 Threatened Species Considered Possible Occurrences on the Subject Site

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 1**). Six (6) Threatened fauna species were known to occur or considered possible occurrences within or directly adjacent to the footprint of the Early Release Area, including:

- Australian painted snipe (*Rostratula australis*);
- Diamond Firetail (*Stagonopleura guttata*);
- Grey-headed flying-fox (*Pteropus poliocephalus*) - RECORDED;



- LEGEND**
- LBEMP Sub-plan 10 Site Boundary
 - NEBP Site Boundary
 - Habitat Features
 - Habitat Trees



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations;
Metro Maps Aerial dated 07/11/24

SCALE: 1 : 2000 @ A3

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Ecological Consultants

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PROJECT
Fauna Management Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 5

PREPARED: BW
DATE: 2 October 2025
FILE: Q15003_LBEMP10_20251002.dwg

TITLE

HABITAT
FEATURES

- Koala (*Phascolarctos cinereus*) - RECORDED;
- Red goshawk (*Erythrorhynchus radiatus*);
- Sharp-tailed sandpiper (*Calidris acuminata*); and
- White-throated needletail (*Hirundapus caudacutus*)

Eleven (11) migratory fauna species were also considered to be possible occurrences on the subject site:

- Broad-billed sandpiper (*Limicola falcinellus*);
- Common Sandpiper (*Actitis hypoleucos*);
- Double-banded plover (*Charadrius bicinctus*);
- Fork-tailed swift (*Apus pacificus*);
- Cattle egret (*Ardea ibis/ Bubulcus ibis*);
- Great egret (*Ardea alba*);
- Little curlew (*Numenius minutus*);
- Marsh sandpiper (*Tringa stagnatilis*);
- Osprey (*Pandion haliaetus*);
- Pectoral sandpiper (*Calidris melanotos*); and
- Rainbow bee-eater (*Merops ornatus*).

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 licensed 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 to 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 be 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 Harbour Pty Ltd to complete a Fauna Management Plan (FMP) for the proposed bulk earthworks associated with the Early Release Area within the North Harbour 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 as required as part of the Land Based Environmental Management Plan (LBEMP) sub-plan 10 (JWA 2025).

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 - 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
<i>Actitis hypoleucos</i>	Common Sandpiper	Possible	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).
<i>Adelotus brevis</i>	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).
<i>Anseranas semipalmata</i>	Magpie Goose	Unlikely	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. Suitable habitat for this species was not observed in the locality.
<i>Anthochaera phrygia</i>	Regent Honey-eater	Unlikely	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

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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 (<i>Eucalyptus robusta</i>) or Spotted Gum (<i>Corymbia maculata</i>) (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.). Suitable habitat for this species was not observed in the locality.
<i>Apus pacificus</i>	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).

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
<i>Ardea alba</i>	Great egret	Possible	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). A small amount of foraging habitat for this species may occur within the open paddocks when wet.
<i>Ardea ibis/ Bubulcus ibis</i>	Cattle egret	Possible	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). Foraging habitat for this species may occur within the open paddocks.
<i>Arenaria interpres</i>	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.
<i>Argynnis hyperbius inconstans</i>	Australian fritillary	Unlikely	They are restricted to open, swampy, coastal areas where the larval food plant, <i>Viola betonicifolia</i> , grows as a small,

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			insignificant ground herb in association with <i>Lomandra longifolia</i> (long leaved matrush) and grasses, especially the grass <i>Imperata cylindrica</i> (blady grass). Habitat does not occur on the site.
<i>Botaurus poiciloptilus</i>	Australian bittern	Possible	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 and/or reeds (e.g. <i>Phragmites</i>, <i>Cyperus</i>, <i>Eleocharis</i>, <i>Juncus</i>, <i>Typha</i>, <i>Baumea</i>, <i>Bolboschoenus</i>) or cutting grass (<i>Gahnia</i>) growing over muddy or peaty substrate (Dept. Environment 2012). Potential habitat for this species may be found within vegetation associated with the creek west of works area, however dense aquatic vegetation (sedges, rushes) was not present in the vicinity of the impact area.
<i>Calidris acuminata</i>	Sharp-tailed sandpiper	Possible	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). Paddock areas within the works site provide some potential habitat for this species when flooded. However, the level of

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			disturbance/slashing that occurs across these areas has substantially reduced the quality of this potential habitat.
<i>Calidris alba</i>	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.
<i>Calidris canutus</i>	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).
<i>Calidris ferruginea</i>	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).
<i>Calidris melanotos</i>	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.
<i>Calidris pugnax</i>	Ruff	Unlikely	Outside breeding season, prefers muddy margins of lakes, pools, ponds, rivers, marshes and flooded areas, including brackish, saline or alkaline waters.
<i>Calidris ruficollis</i>	Red-necked Stint	Unlikely	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, 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

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			recorded on dry gibber plains, with little or no perennial vegetation (Higgins & Davies 1996).
<i>Calidris tenuirostris</i>	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).
<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo [#]	Unlikely	This species is associated with woodland or open sclerophyll forests with populations of <i>Allocasuarina</i> , which comprise its exclusive diet. They require large old trees with hollows for nesting. Suitable habitat for this species was not observed in the locality.
<i>Chalinolobus dwyeri</i>	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 (<i>Hirundo ariel</i>), 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.
<i>Charadrius bicinctus</i>	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. Suitable habitat for this species was not observed in the impact area.

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
<i>Charadrius leschenaultii</i>	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).
<i>Charadrius mongolus</i>	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.
<i>Charadrius veredus</i>	Oriental Plover, Oriental Dotterel	Unlikely	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 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).

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			Suitable habitat for this species was not observed in the impact area.
<i>Cherax robustus</i>		Unlikely	<i>Cherax robustus</i> is largely restricted to wallum areas, where it prefers acidic, soft, tannin-stained freshwater marsh, swamps, fens, lakes, and small creeks, often surrounded by <i>Melaleuca</i> (paperbark) and dominated by sedges (Davie 2007; Marshall et al. 2011) (Fig. 4). It is also found within the unique patterned fen ecosystem on the west coast of K'gari (Moss et al. 2016).
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper [#]	Unlikely	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 (<i>Eucalyptus camaldulensis</i>) 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. Suitable habitat for this species was not observed in the locality.
<i>Coeranoscincus reticulatus</i>	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.
<i>Crinia tinnula</i>	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

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			acid sandy (Wallum) soils, warm temperate grassland or near the edge of ponds.
<i>Cuculus optatus</i>	Oriental Cuckoo, Horsfield's Cuckoo	Unlikely	<i>Cuculus optatus</i> (also known as <i>C. saturatus optatus</i>) 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).
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's fig-parrot	Unlikely	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 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). Suitable habitat for this species was not observed in the locality.
<i>Dasyornis brachypterus</i>	Eastern bristlebird	Unlikely	This species inhabits 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

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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 (<i>Sarga leiocladum</i>), Kangaroo grass (<i>Themeda triandra</i>) and Tussock grass (<i>Poa labillardieri</i>). The presence of mature Wild sorghum tussocks is thought to be a good indicator of high-quality bristlebird habitat (DEHP 2013).
<i>Dasyurus hallucatus</i>	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).
<i>Dasyurus maculatus maculatus</i>	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 patches and are generally only recorded from forested areas of the Great Dividing Range.
<i>Delma torquata</i>	Collared delma	Unlikely	The Collared Delma normally inhabits eucalypt-dominated woodlands and open-forests
<i>Epinephelus daemeli</i>	Black rockcod	Unlikely	This is a marine species, inhabiting reefs and estuaries.
<i>Erythroriorchis radiatus</i>	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).

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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.
<i>Esacus magnirostris</i>	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.
<i>Falco hypoleucos</i>	Grey Falcon [#]	Unlikely	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. This species is extremely rare and suitable habitat for this species was not observed in the locality.
<i>Furina dunmali</i>	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 (<i>Acacia harpophylla</i>), other Wattles (<i>A. burowii</i>, <i>A. deanii</i>, <i>A. leioclyx</i>), native Cypress (<i>Callitris spp.</i>) or Bull-oak (<i>Allocasuarina luehmannii</i>) (Brigalow Belt Reptiles Workshop 2010; Covacevich et al. 1988; Stephenson & Schmida 2008). • Various Blue Spotted Gum (<i>Corymbia citriodora</i>), Ironbark (<i>Eucalyptus crebra</i> and <i>E. melanophloia</i>), White Cypress Pine (<i>Callitris glaucophylla</i>) and Bulloak open forest and woodland associations on sandstone derived soils

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			(Brigalow Belt Reptiles Workshop 2010; Stephenson & Schmida 2008, Threatened Species Network 2008).
<i>Gallinago hardwickii</i>	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.
<i>Gallinago megala</i>	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.
<i>Gallinago stenura</i>	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).
<i>Geophaps scripta scripta</i>	Squatter pigeon	Unlikely	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). Suitable habitat for this species was not observed in the locality.
<i>Grantiella picta</i>	Painted honeyeater	Unlikely	This species inhabits Acacia and Box-gum woodlands and Box-ironbark forests. A specialist feeder on mistletoes, particularly those of the genus <i>Amyema</i> (DOEH, 2016). Suitable habitat for this species was not observed in the locality.
<i>Haliaeetus leucogaster</i>	White-bellied sea-eagle	Unlikely	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).

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			This species may fly over the works area, however, is unlikely to nest or rely on resources within the works area.
<i>Hemiaspis damelii</i>	Grey Snake	Unlikely	Favours woodlands (typically brigalow (<i>Acacia harpophylla</i> and <i>belah Casuarina cristata</i>), 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).
<i>Hirundapus caudacutus</i>	White-throated needletail	Possible	The White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. 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). This species may forage over the impact area.
<i>Lathamus discolor</i>	Swift Parrot	Unlikely	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 (<i>E. crebra</i>), Forest Red Gum forests and Yellow Box forest are commonly utilised (DoE 2016). The fragmented nature of local habitat reduces the likelihood that this species will utilise the area, and suitable habitat does not occur within the impact area

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
<i>Limicola falcinellus</i>	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.
<i>Limnodromus semipalmatus</i>	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
<i>Limosa lapponica baueri</i>	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 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).
<i>Limosa limosa</i>	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.
<i>Litoria olongburensis</i>	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

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			paperbark swamps and sedge swamps of the coastal 'wallum' country. Terrestrial grassland within the works site is highly disturbed and is unlikely to provide potential habitat for this species
<i>Macroderma gigas</i>	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).
<i>Merops ornatus</i>	Rainbow bee-eater	KNOWN	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).
<i>Mixophyes fleayi</i>	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.
<i>Mixophyes iteratus</i>	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.
<i>Monarcha melanopsis</i>	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,

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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). Suitable habitat for this species was not observed in the locality.
<i>Monarcha trivirgatus/ Symposiachrus trivirgatus</i>	Spectacled monarch	Unlikely	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). Suitable habitat for this species was not observed in the locality.
<i>Myiagra cyanoleuca</i>	Satin flycatcher	Unlikely	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). Suitable habitat for this species was not observed in the locality.
<i>Nannoperca oxleyana</i>	Oxleyan Pygmy perch	Unlikely	The species is found in habitat defined to have the following characteristics: • freshwater systems draining through sandy coastal lowland 'wallum' ecosystems including riverine, palustrine and lacustrine environments; • slow-flowing pools and backwaters of river channels and drainage lines; • water bodies with structural aquatic vegetation in the form of beds of emergent or submerged plants;

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			• presence of steep/undercut banks fringed with semi-submerged branches, and fine rootlets of riparian vegetation or leaf litter and snags; • oligotrophic waters: and • clear waters (pH 6 to 6.5) to darkly stained acidic waters (pH 4 to 6).
<i>Neoceratodus forsteri</i>	Australian lungfish	Unlikely	This species occurs in a number of aquatic habitats, from streams through to altered and artificial habitats such as dams and reservoirs (DoE, 2017). No suitable watercourse occurs within the vicinity of the impact area.
<i>Ninox strenua</i>	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 well as in remnant bushland patches. Needs old growth trees to nest.
<i>Numenius madagascariensis</i>	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.
<i>Numenius minutus</i>	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).
<i>Numenius phaeopus</i>	Whimbrel	Unlikely	The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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).
<i>Pandion haliaetus</i>	Osprey	Possible	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). This species may fly over the impact area, however, is unlikely to nest in the immediate locality.
<i>Petauroides volans</i>	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.
<i>Petaurus australis australis</i>	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

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein.
<i>Phascolarctos cinereus</i>	Koala	Possible	The Koala occurs in Eucalypt woodlands and forests throughout eastern Australia. They inhabit areas where there are appropriate food trees. Evidence of koala activity has previously been recorded across the site and may utilise habitat adjacent to the works area. Suitable habitat is not present within the works area.
<i>Phyllodes imperialis smithersi</i>	Pink underwing moth	Unlikely	This species is found at heights below 600m in subtropical rainforest environments. It is associated with the larval food plant <i>Carronia multisepealea</i> (DoE, 2017). Suitable habitat for this species was not observed in the locality.
<i>Pluvialis fulva</i>	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 <i>Sarcocornia</i> , or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in saltworks.
<i>Pluvialis squatarola</i>	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).
<i>Potorous tridactylus tridactylus</i>	Long-nosed potoroo	Unlikely	This species inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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.
<i>Pseudomugil mellis</i>	Honey blue eye	Unlikely	Honey blue eye typically inhabits slightly acidic (pH 4.4-6.8) dune lakes, coastal heath wetlands, and streams with dense aquatic vegetation (Arthington & Marshall 1995; Tappin 2011). While coastal heathland is a restricted largely dystrophic habitat, honey blue eye is also found in clear waterbodies such as creeks (Tappin 2011).
<i>Pteropus poliocephalus</i>	Grey-headed flying-fox	Possible	This species occurs from central eastern Qld south to Victoria. 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. No roosting sites are known to occur in the vicinity of the works area. However, adjacent eucalypts provide potential feeding resources for this highly mobile species.
<i>Rhipidura rufifrons</i>	Rufous fantail	Unlikely	In east and south-east Australia, the Rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (<i>Eucalyptus microcorys</i>), Mountain grey gum (<i>E. cypellocarpa</i>), Narrow-leaved peppermint (<i>E. radiata</i>), Mountain ash (<i>E. regnans</i>), Alpine ash (<i>E. delegatensis</i>), Blackbutt (<i>E. pilularis</i>) or Red mahogany (<i>E. resinifera</i>); 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 (<i>Acmena smithii</i>) rainforest, with Grey myrtle (<i>Backhousia myrtifolia</i>), Sassafras (<i>Doryphora sassafras</i>) and Sweet pittosporum (<i>Pittosporum undulatum</i>) subdominants. They

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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 (<i>Eucalyptus maculata</i>), Yellow box (<i>E. melliodora</i>), 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 (<i>Melaleuca</i> spp.) (Dept. Environment 2012). No suitable habitat for this species occurs within the impact area.
<i>Rostratula australis</i>	Australian painted snipe	Unlikely	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.
<i>Saiphos reticulatus</i>	Three-toed snake-tooth skink	Unlikely	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). Suitable habitat for this species was not observed in the locality.
<i>Stagonopleura guttata</i>	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).

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			This species may forage over the impact area. However, the level of slashing that occurs across the area has substantially reduced the quality of this potential habitat.
<i>Sternula albifrons</i>	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).
<i>Tenuibranchiurus glypticus</i>	Swamp crayfish	Unlikely	Swamp crayfish inhabit coastal wallum heathland, melaleuca swamps and adjoining melaleuca forest. Suitable habitat not present within the impact area.
<i>Thiornis rubricollis rubricollis</i>	Hooded plover (eastern)	Unlikely	This species is mostly seen on ocean beaches, however, may also occur on near-coastal lakes and lagoons and estuaries.
<i>Tringa brevipes</i>	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.
<i>Tringa glareola</i>	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
<i>Tringa incana</i>	Wandering Tattler	Unlikely	The Wandering Tattler is generally found on rocky coasts with reefs and platforms, points, spits, piers, offshore islands and

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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).
<i>Tringa nebularia</i>	Common Greenshank, Greenshank	Unlikely	This species is known to occupy habitat associated with estuaries.
<i>Tringa stagnatilis</i>	Marsh Sandpiper, Little Greenshank	Possible	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, salt pans, 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. Suitable habitat for this species was not observed in the locality.
<i>Turnix melanogaster</i>	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.
<i>Xenus cinereus</i>	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 (<i>Halosarcia</i> spp.). Birds are seldom near the edge of water, however, birds may wade into the water (Marchant & Higgins 1993).
<i>Xeromys myoides</i>	Water mouse	Unlikely	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 and the associated saltmarsh, sedgelands, clay pans, heathlands

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			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. No suitable habitat for this species occurs within the impact area.

APPENDIX 3 - VEGETATION MANAGEMENT PLAN (JWA 2025)



VEGETATION MANAGEMENT PLAN

North Harbour Priority Development Area - Precinct 1

Part of Lot 1 SP332514
Burpengary East

A Report Prepared for
North Harbour Holdings Pty Ltd

OCTOBER 2025

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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 Early Release Area preceding the proposed marina and waterfront residential development at North Harbour. The North Harbour marina and waterfront residential development covers approximately 181.3 hectares, Part of Lot 1 SP332514, bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East).

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. This VMP forms part of the LBEMP sub-plan 10 developed for the proposed bulk earthworks associated with the Early Release Works.

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.

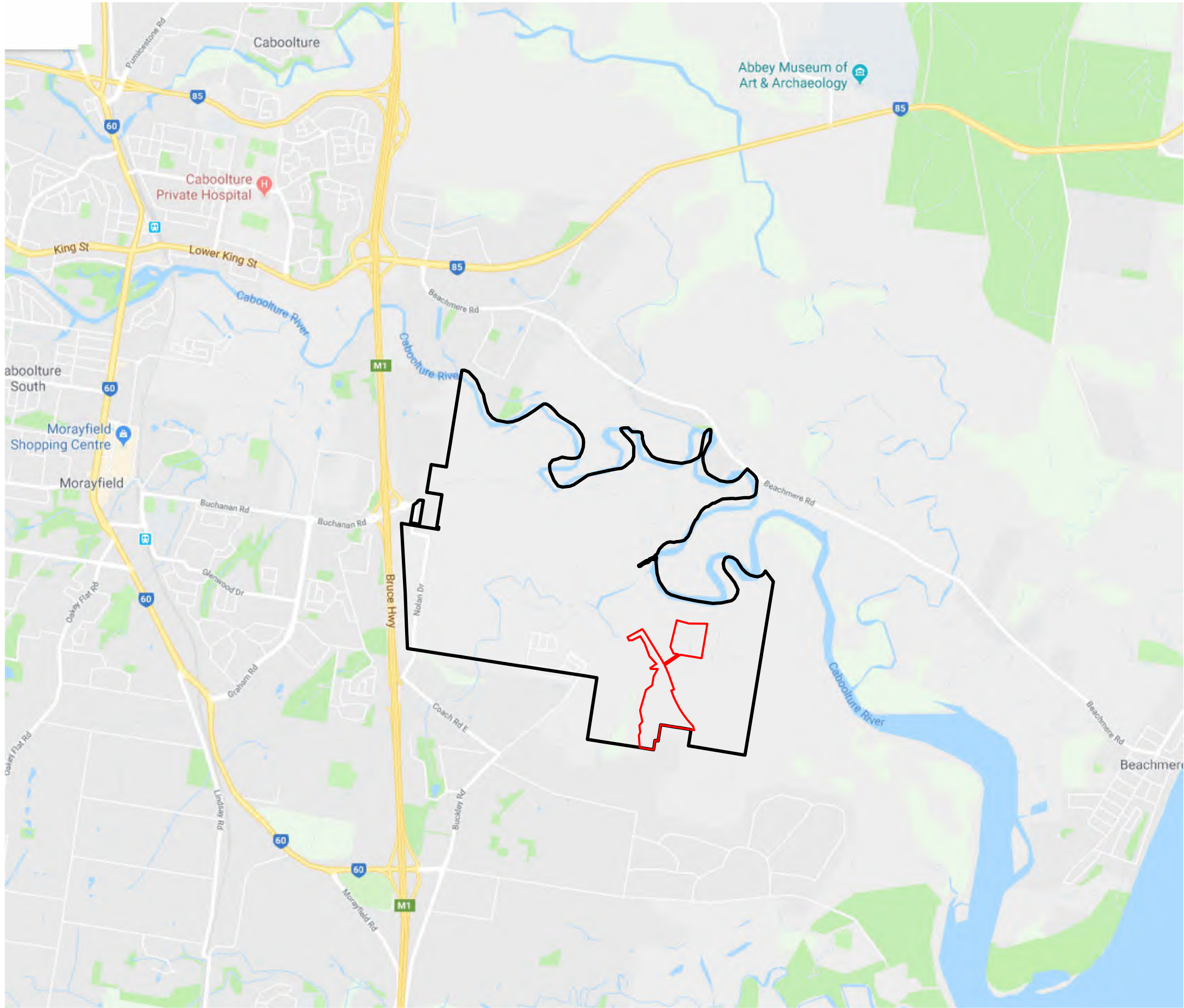
1.2 The Subject Site

The North Harbour marina and waterfront residential development covers approximately 181.3 hectares, Part of Lot 1 SP332514, bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East) (**FIGURE 1**). An aerial photograph of the site is shown in **FIGURE 2**. The Early Release Area footprint is approximately 34.89 ha.

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

1.3 The Proposed Development

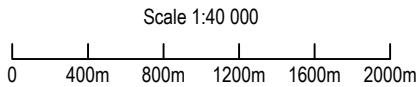
Proposed early release works will comprise excavation of approximately 354,575m³, from an approximate 10 ha borrow area (within the footprint of the proposed future marina) for placement as controlled fill across about 25 ha of proposed early release residential land. Excavations within the proposed borrow area will extend to a depth of about RL-2.5m (~3 m below ground level [BGL]) and are to be internally battered (at 1V:3H or sufficient safe angle). Works across the proposed early release residential land, will comprise placement and compaction of bulk fill. Excavations across this area, will be relatively minor, comprising stripping of topsoil and unsuitable subgrade material only. The extent of the early release works area is shown in **FIGURE 3**.



LEGEND

LBEMP Sub-plan 10 Site Boundary

NEBP Site Boundary



SOURCE: Google Maps
SCALE: 1 : 40 000 @ A3
JWA Pty Ltd Ecological Consultants

CLIENT North Harbour Holdings Pty Ltd
PROJECT Vegetation Management Plan Priority Development Area - Precinct 1 North Harbour, Burpengary East QLD City of Moreton Bay LGA

FIGURE 1
PREPARED: BW DATE: 2 October 2025 FILE: Q15003_LBEMP10_20251002.dwg

TITLE
LOCALITY PLAN



LEGEND
 LBEMP Sub-plan 10 Site Boundary
 NEBP Site Boundary

Scale 1 : 6000
0 100m 200m 300m

SOURCE: Metro Maps Aerial dated 07/11/24

SCALE: 1 : 6000 @ A3

JWA Pty Ltd
Ecological Consultants

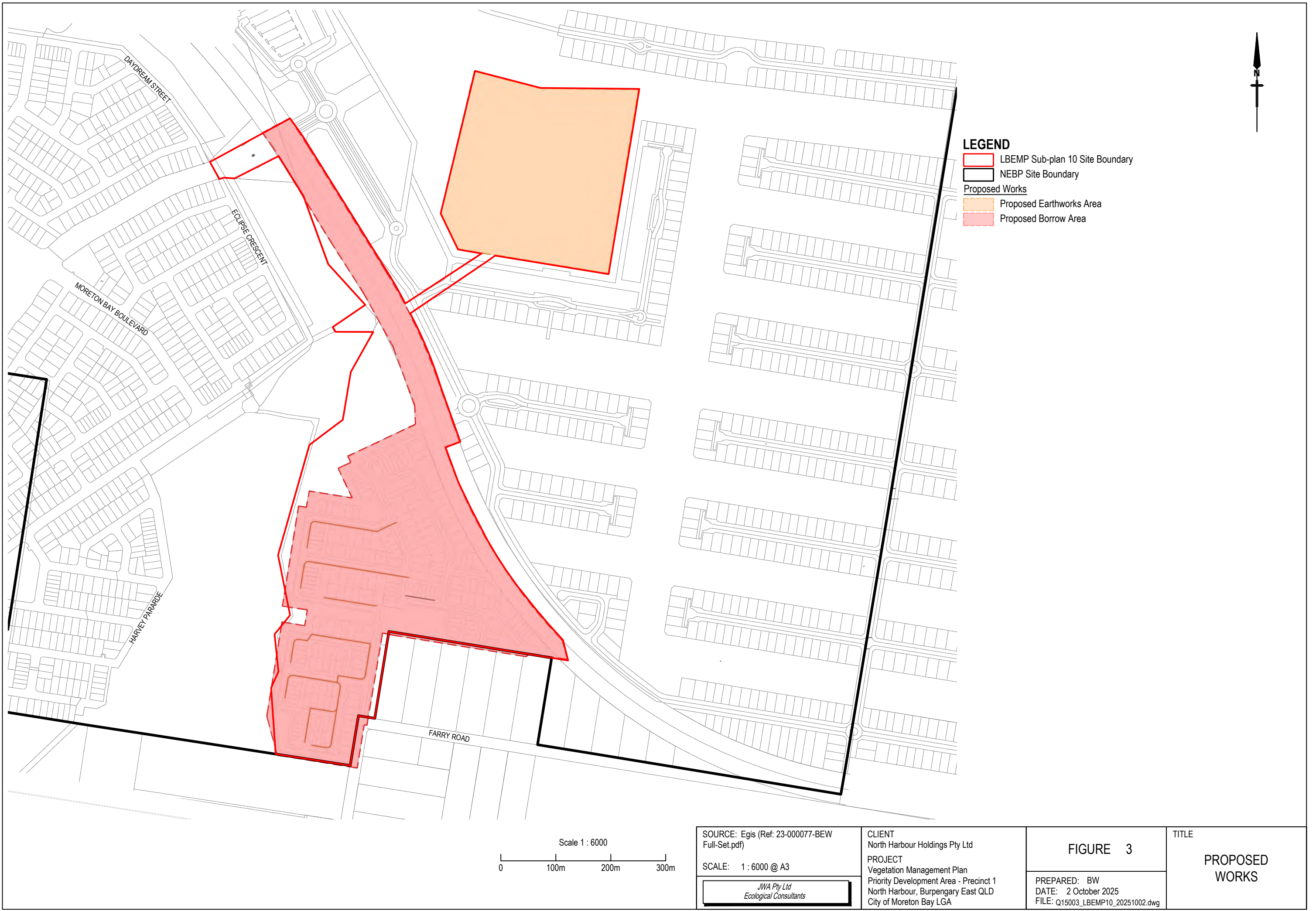
CLIENT
North Harbour Holdings Pty Ltd
PROJECT
Vegetation Management Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 2

PREPARED: BW
DATE: 2 October 2025
FILE: Q15003_LBEMP10_20251002.dwg

TITLE

AERIAL
PHOTOGRAPH



1.4 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 2025).
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

All trees within the extent of works are to be removed (**FIGURE 4**). Community 1 - Coastal and subcoastal sandplain open forest - Callitris contains trees to be removed - approximately 0.34 ha of this community will be impacted. This includes three (3) stags and two (2) mature Callitris with habitat features (**FIGURE 4**).

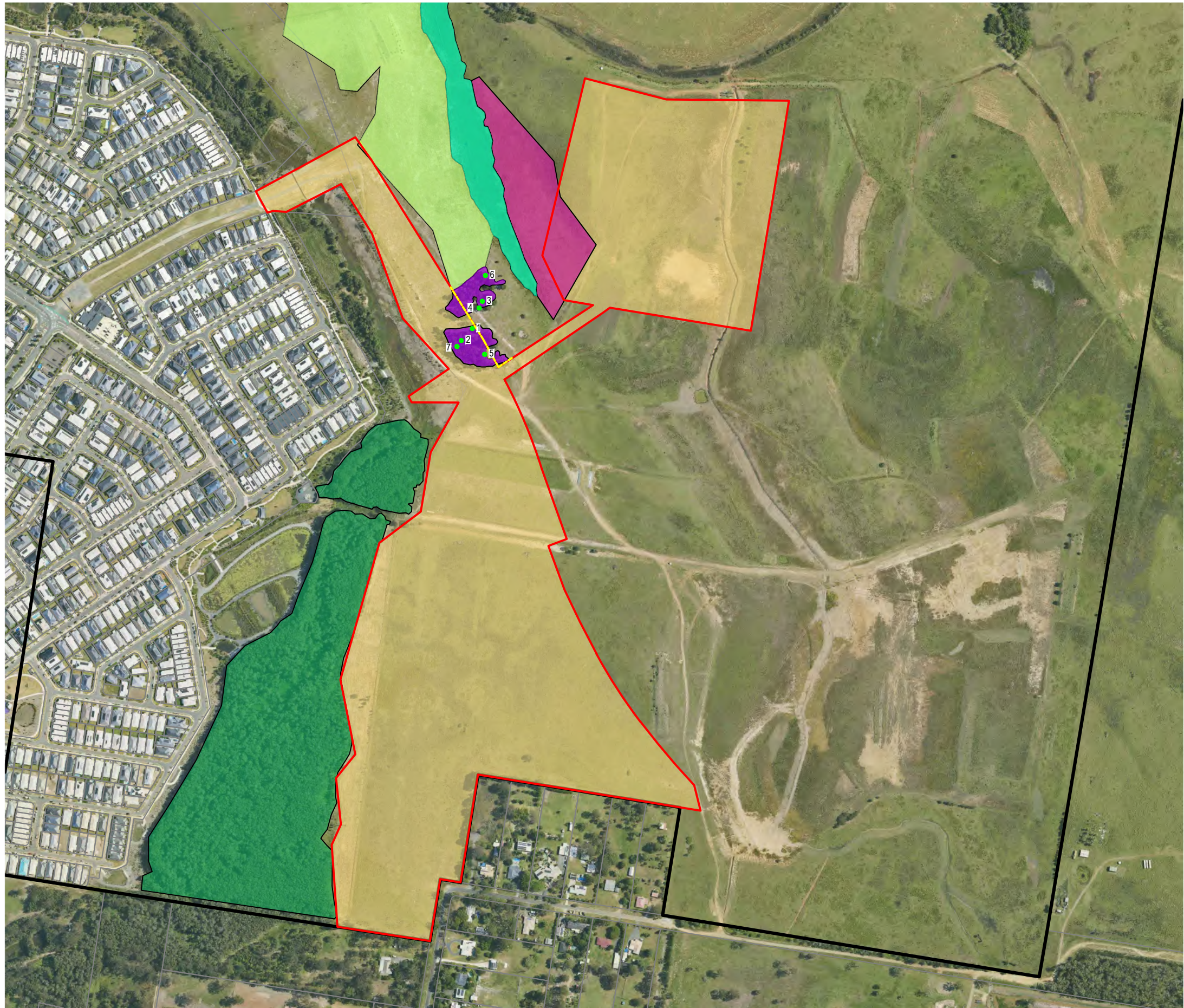
Areas of retained vegetation and individual trees will be identified and demarcated prior to the commencement of site preparation works. All retained trees that have the potential to be impacted by development works will be fenced prior to construction works. Tree protection fences shall be installed 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.

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:



LEGEND

LBEMP Sub-plan 10 Site Boundary

NEBP Site Boundary

● Habitat Trees

Protection Fencing

Vegetation Communities

Community 1: Coastal and subcoastal sandplain open forest - Callitris

Community 2: Coastal and subcoastal wet heath / sedge swamp

Community 3: Coastal and subcoastal floodplain tree swamps - Melaleuca and Eucalypt

Community 4: Regenerating coastal and subcoastal wallum heath / shrubland

Community 5: Disturbed wet-terrestrial grassland / sedgeland mosaic

Community 6: Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland / sedgeland mosaic

Scale 1 : 6000
0 100m 200m 300m

SOURCE: JWA Site Investigations;
Metro Maps Aerial dated 07/11/24

SCALE: 1 : 6000 @ A3

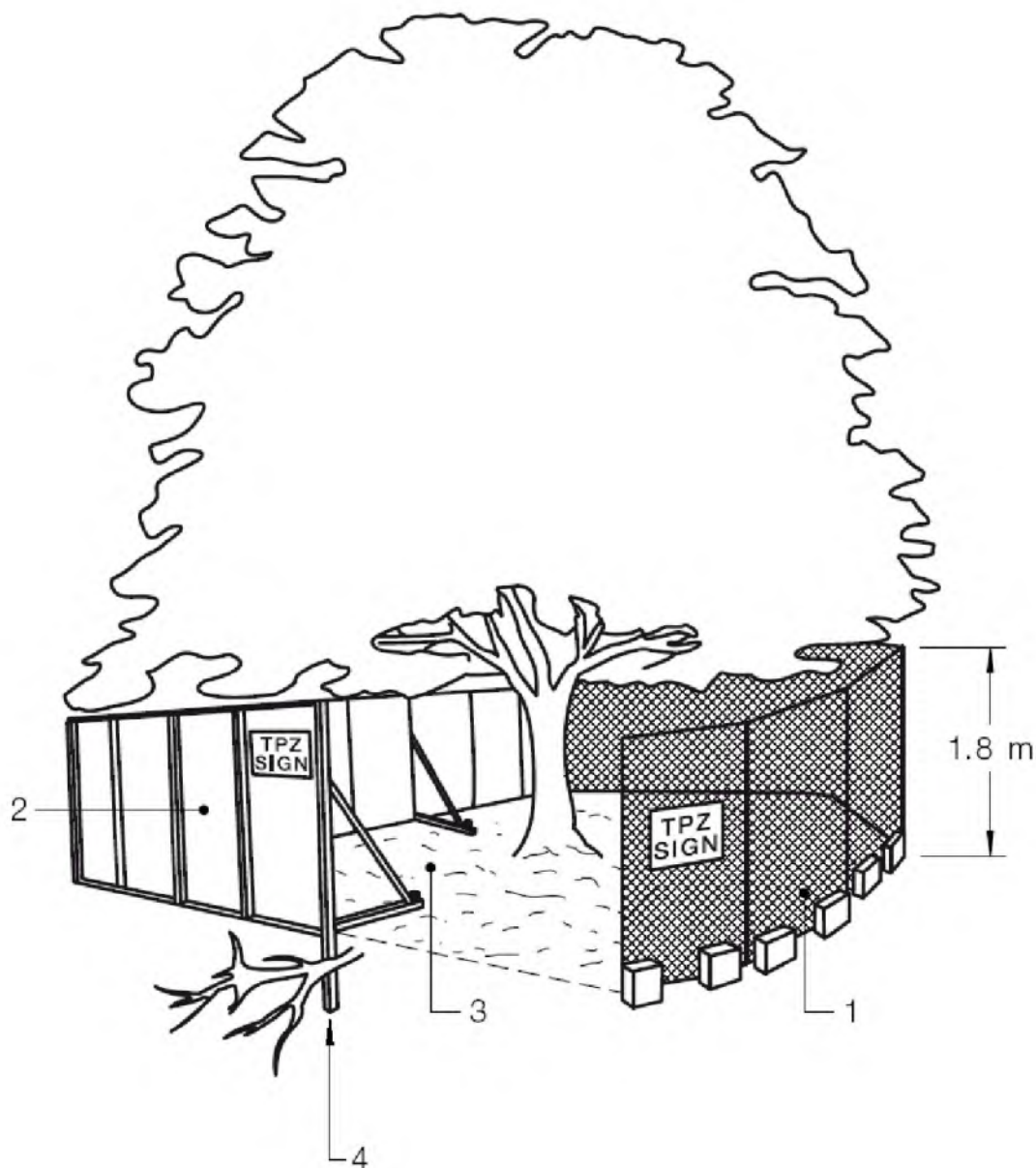
JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd
PROJECT
Vegetation Management Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 4

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DATE: 2 October 2025
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TITLE
VEGETATION
COMMUNITIES,
HABITAT TREES &
PROTECTION FENCING



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 arborist). 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

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Vegetation Management Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 5

PREPARED: BW
DATE: 2 October 2025
FILE: Q15003_LBEMP10_20251002.dwg

TITLE

TREE
PROTECTION
FENCING

- 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 or 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 Early Release Area at the North East Business Park (NEBP) site.

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 4 - PEST AND INVASIVE SPECIES PLAN (JWA 2025)



PEST AND INVASIVE SPECIES PLAN

North Harbour Priority Development Area - Precinct 1

Part of Lot 1 SP332514
Burpengary East

A Report Prepared for
North Harbour Holdings Pty Ltd

OCTOBER 2025

DOCUMENT CONTROL

Document

Title	Pest and Invasive Species Plan, North Harbour Priority Development Area - Precinct 1
Job Number	Q15003
File Reference	2015 Clients\15003_North East Business Park, Morayfield\Reports\LBEMP10 - Early Works\Associated Management Plans
Version and Date	RW2 02/10/25
Client	North Harbour Holdings Pty Ltd

Revision History (office use only)

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1	RW1	DRAFT	26/08/25	Client	1	.pdf	Email
2	RW2	FINAL	02/10/25	Client	1	.pdf	Email

Client Issue

Version	Date	Author		Approved by	
		Name	Initials	Name	Initials
RW1	26/08/25	Nicole Davies	ND	Adam McArthur	AM
RW2	02/10/25	Nicole Davies	ND	Adam McArthur	AM

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1 INTRODUCTION

1.1 Background

JWA Pty Ltd has been 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 10 developed for the proposed bulk earthworks associated with the Early Release Works, preceding proposed marina and waterfront residential development at North Harbour.

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 North Harbour marina and waterfront residential development covers approximately 181.3 hectares, Part of Lot 1 SP332514, bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East) (**FIGURE 1**). An aerial photograph of the site is shown in **FIGURE 2**. The Early Release Area footprint is approximately 34.89 ha.

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

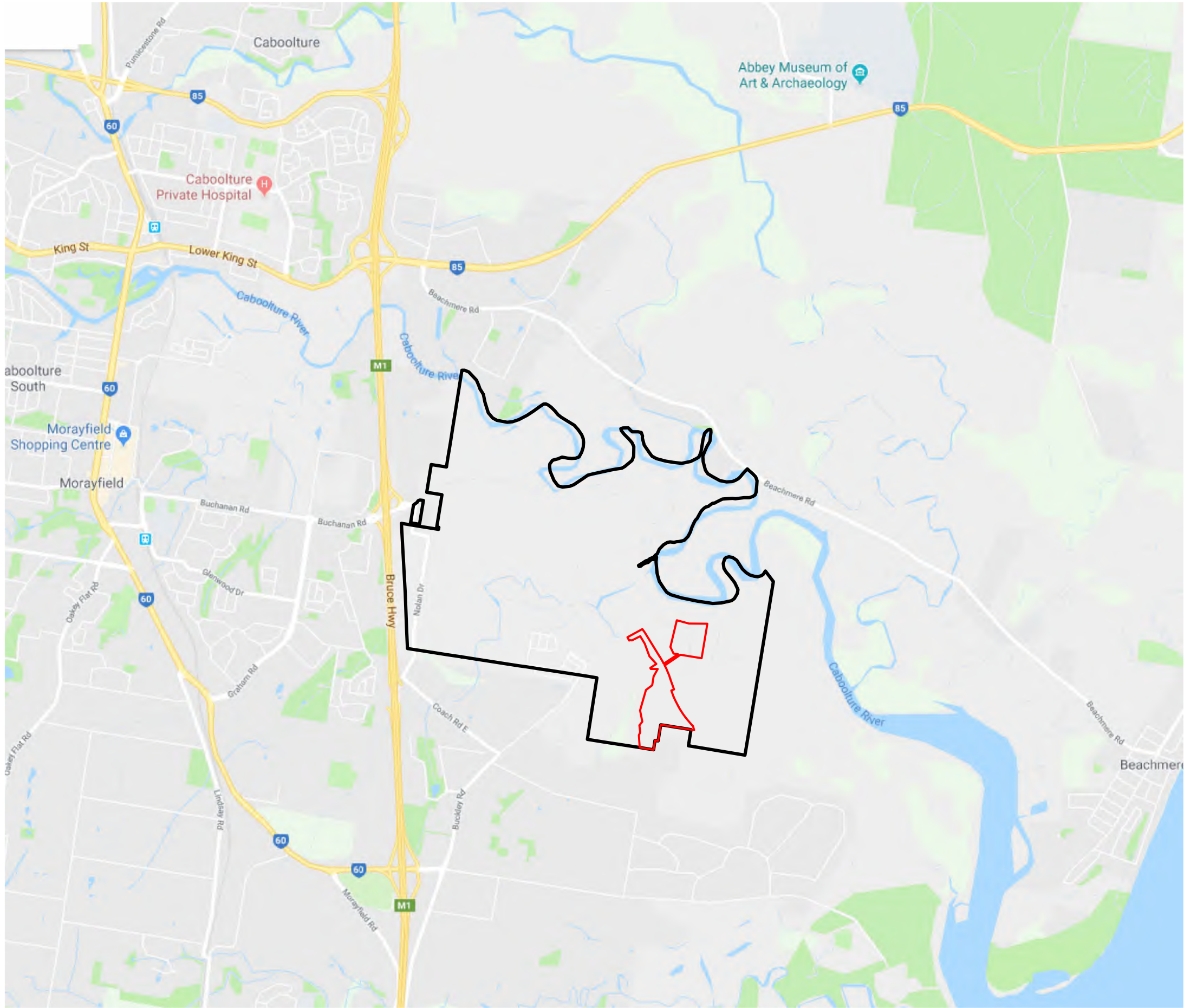
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Proposed early release works will comprise excavation of approximately 354,575m³, from an approximate 10 ha borrow area (within the footprint of the proposed future marina) for placement as controlled fill across about 25 ha of proposed early release residential land. Excavations within the proposed borrow area will extend to a depth of about RL-2.5m (~3 m below ground level [BGL]) and are to be internally battered (at 1V:3H or sufficient safe angle). Works across the proposed early release residential land, will comprise placement and compaction of bulk fill. Excavations across this area, will be relatively minor, comprising stripping of topsoil and unsuitable subgrade material only. The extent of the early release works area is shown in **FIGURE 3**.

1.4 Objectives

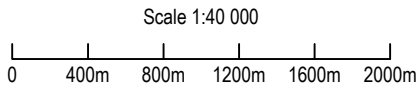
The PISP is intended to assist North Harbour Holdings Pty Ltd in managing the impacts of pest and invasive species (flora and fauna) before, during, and after construction.

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 MBA site.



LEGEND

- LBEMP Sub-plan 10 Site Boundary
- NEBP Site Boundary



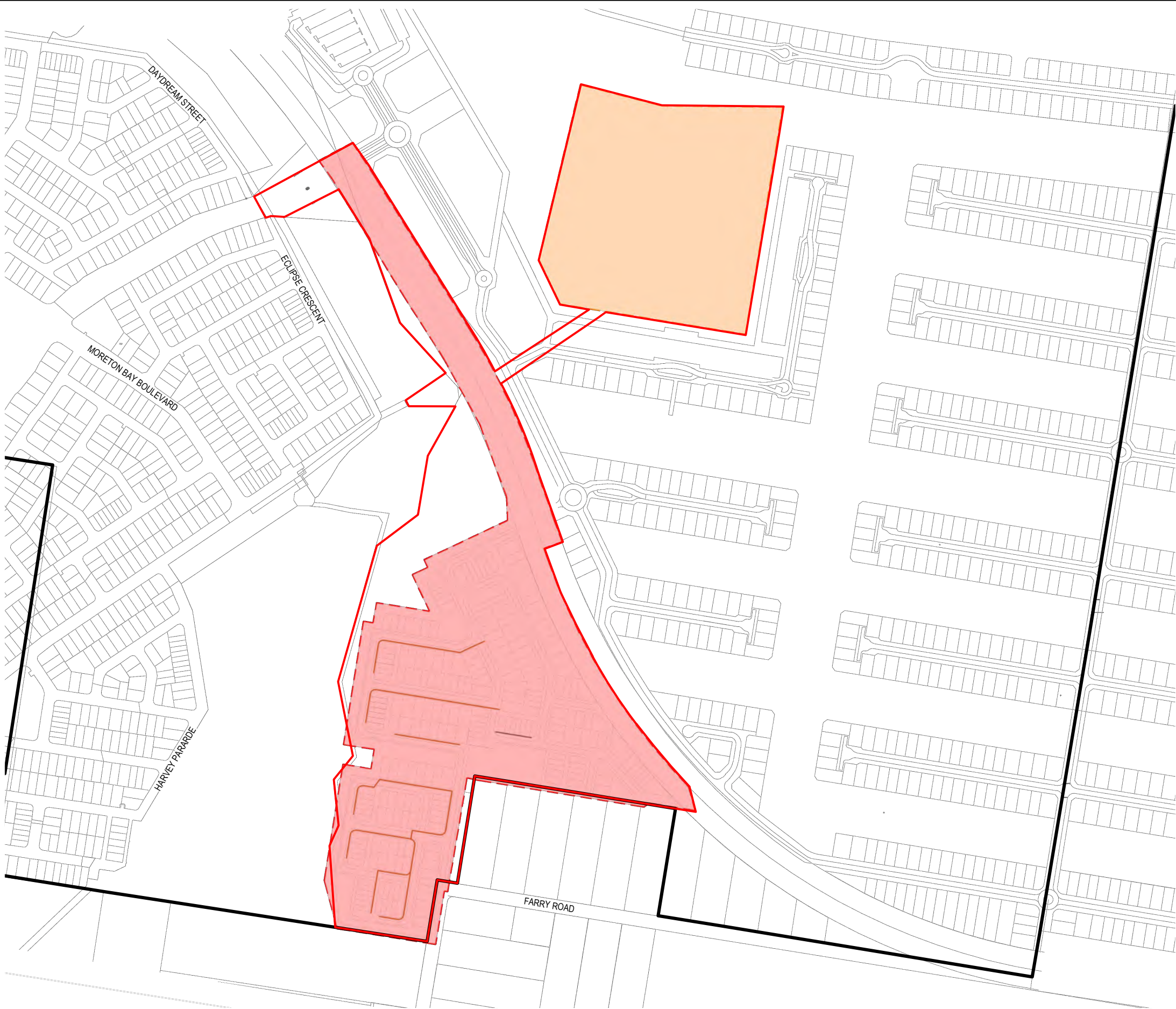
SOURCE: Google Maps	CLIENT North Harbour Holdings Pty Ltd	FIGURE 1		TITLE LOCALITY PLAN
SCALE: 1 : 40 000 @ A3		PROJECT Pest and Invasive Species Plan Priority Development Area - Precinct 1 North Harbour, Burpengary East QLD City of Moreton Bay LGA		
JWA Pty Ltd Ecological Consultants		PREPARED: BW DATE: 2 October 2025 FILE: Q15003_LBEMP10_20251002.dwg		



LEGEND
 LBEMP Sub-plan 10 Site Boundary
 NEBP Site Boundary

Scale 1 : 6000
0 100m 200m 300m

SOURCE: Metro Maps Aerial dated 07/11/24 SCALE: 1 : 6000 @ A3 <i>JWA Pty Ltd</i> <i>Ecological Consultants</i>	CLIENT North Harbour Holdings Pty Ltd PROJECT Pest and Invasive Species Plan Priority Development Area - Precinct 1 North Harbour, Burpengary East QLD City of Moreton Bay LGA	FIGURE 2 PREPARED: BW DATE: 2 October 2025 FILE: Q15003_LBEMP10_20251002.dwg	TITLE AERIAL PHOTOGRAPH
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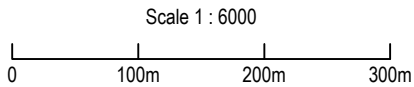
LBEMP Sub-plan 10 Site Boundary

NEBP Site Boundary

Proposed Works

Proposed Earthworks Area

Proposed Borrow Area



SOURCE: Egis (Ref: 23-000077-BEW Full-Set.pdf)

SCALE: 1 : 6000 @ A3

*JWA Pty Ltd
Ecological Consultants*

CLIENT
North Harbour Holdings Pty Ltd

PROJECT
Pest and Invasive Species Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 3

PREPARED: BW
DATE: 2 October 2025
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TITLE

PROPOSED
WORKS

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 Ecological Values;
3. Weed Management;
4. Pest Control; and
5. Monitoring and Reporting.

2 EXISTING ECOLOGICAL VALUES

2.1 Background

The Early Release 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); and
- Ecological Assessment Report: NEBP - Balance Land (JWA 2015).

These assessments included identification of vegetation communities and threatened flora on site, along with a brief fauna survey.

2.2 Vegetation Communities

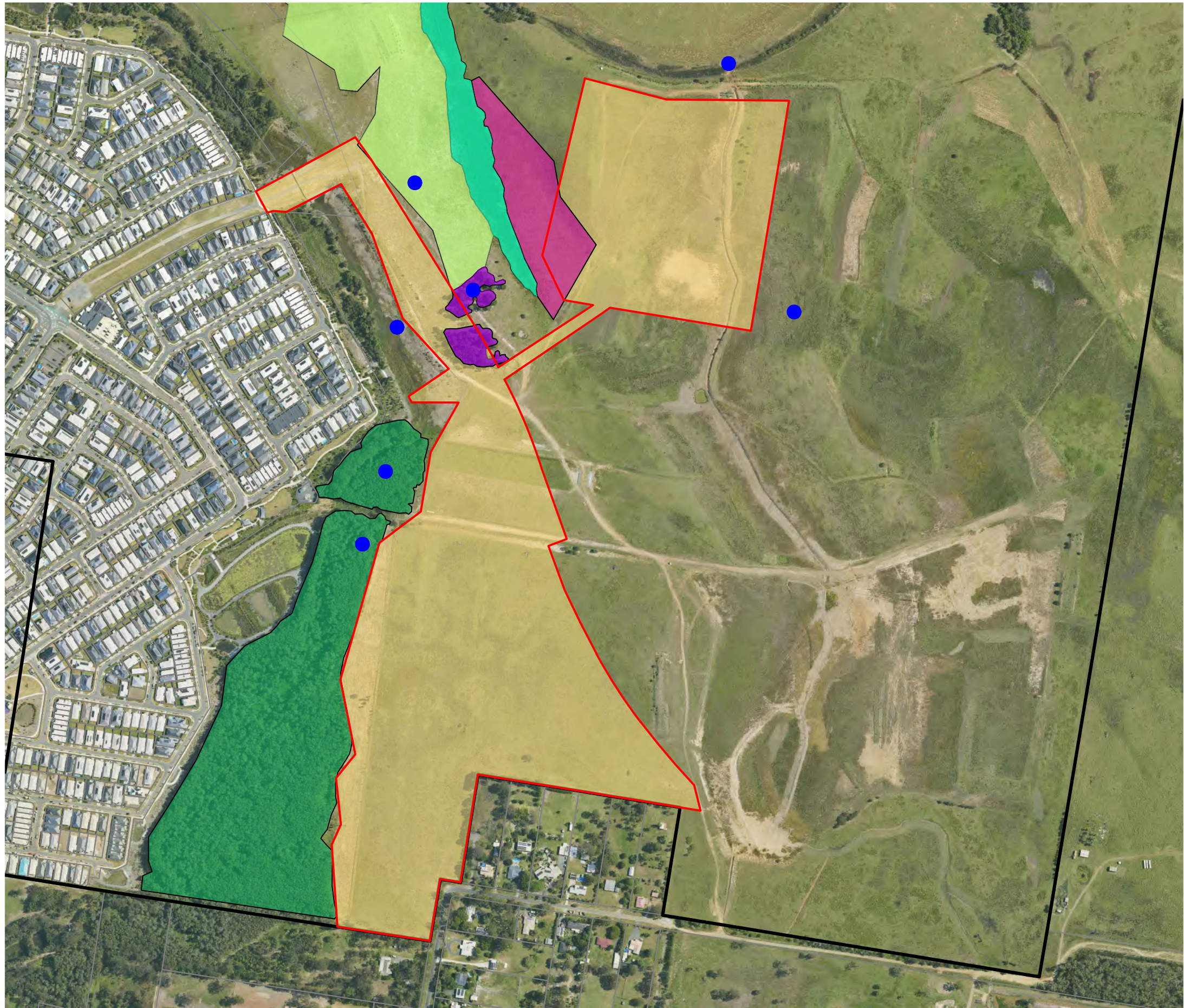
2.2.1 Introduction

Three (3) vegetation types occur within the footprint of the Early Release Area (**FIGURE 4**):

- Vegetation Community 1 - Coastal and subcoastal sandplain open forest - Callitris;
- Vegetation Community 4 - Regenerating coastal and subcoastal wallum heath/shrubland;
- Vegetation Community 5 - Disturbed wet-terrestrial grassland/sedgeland mosaic; and
- Vegetation Community 6 - Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/sedgeland mosaic.

Retained vegetation adjoining the works area consists of the following vegetation communities (**FIGURE 4**):

- Vegetation Community 1 - Coastal and subcoastal sandplain open forest - Callitris;
- Vegetation Community 2 - Coastal and subcoastal wet heath/sedge swamp;
- Vegetation Community 3 - Coastal and subcoastal floodplain tree swamps - Melaleuca and Eucalypt;
- Vegetation Community 4 - Regenerating coastal and subcoastal wallum heath/shrubland;
- Vegetation Community 5 - Disturbed wet-terrestrial grassland/sedgeland mosaic; and
- Vegetation Community 6 - Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland/sedgeland mosaic.



LEGEND

-  LBEMP Sub-plan 10 Site Boundary
-  NEBP Site Boundary
-  Indicative Monitoring Locations

Vegetation Communities

-  Community 1: Coastal and subcoastal sandplain open forest - Callitris
-  Community 2: Coastal and subcoastal wet heath / sedge swamp
-  Community 3: Coastal and subcoastal floodplain tree swamps - Melaleuca and Eucalypt
-  Community 4: Regenerating coastal and subcoastal wallum heath / shrubland
-  Community 5: Disturbed wet-terrestrial grassland / sedgeland mosaic
-  Community 6: Disturbed terrestrial grassland +/- disturbed wet-terrestrial grassland / sedgeland mosaic

Scale 1 : 6000
0 100m 200m 300m

SOURCE: JWA Site Investigations;
Metro Maps Aerial dated 07/11/24

SCALE: 1 : 6000 @ A3

JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd
PROJECT
Pest and Invasive Species Plan
Priority Development Area - Precinct 1
North Harbour, Burpengary East QLD
City of Moreton Bay LGA

FIGURE 4

PREPARED: BW
DATE: 2 October 2025
FILE: Q15003_LBEMP10_20251002.dwg

TITLE VEGETATION
COMMUNITIES &
INDICATIVE
MONITORING
LOCATIONS

This section provides a description of the vegetation community and a discussion of the condition and conservation status. The conservation status of vegetation communities is discussed with reference to the Regional Ecosystem Description Database (Queensland Herbarium 2019) and the Queensland *Vegetation Management (VM) Act 1999* where appropriate.

Community 1: Coastal and Subcoastal Sandplain Open Forest - *Callitris*

Location and Area

This wetland community occurs in two isolated patches on an Aeolian sand dune which occur in the north-western portion of the site (**FIGURE 4**).

Description

This community is comprised almost entirely of mature White cypress-pine (*Callitris columellaris*) with scattered occurrences of Slash pine (*Pinus elliottii**). The midstorey in this community has generally been removed. The groundcover is comprised of pasture grass species.

Condition

The condition of this community is generally poor due to grazing impacts. Mature *Callitris* trees are considered to have an elevated conservation significance.

Conservation Status

This area is not mapped as remnant vegetation and has no conservation status under the *VMA (1999)*.

Community 2: Coastal and Subcoastal Wet Heath/Sedge Swamp

Location and Area

This wetland community is located low lying areas and within drainage lines beyond the tidal influence (**FIGURE 4**).

Description

This is a native regrowth community. Characteristic species include *Cyperus polystachyos*, *Cyperus haspan*, *Philydrum lanuginosum*, *Eleocharis* spp., *Leersia hexandra*, *Triglochin procerum*, *Nymphaea* spp., *Nymphoides indica*, *Fimbristylis ferruginea*, *Fimbristylis autumnalis*, *Fimbristylis miliacea*, *Fuirena* sp., *Juncus* spp., *Centella asiatica*, *Goodenia paniculata*, *Persicaria decipiens*, *Calochlaena dubia*, *Lomandra longifolia*, *Ludwigia octovalis*, and *Blechnum indicum*. Introduced species include fleabane (*Conyza* sp.*), green couch (*Cynodon dactylon**) and *Paspalum* sp.* pasture grasses.

Condition

This community is in very poor condition with grazing impacts highly evident. This community would originally have supported *Melaleuca quinquenervia* forests.

Conservation Status

This area is not mapped as remnant vegetation and has no conservation status under the *VMA (1999)*.

Community 3: Coastal and Subcoastal Floodplain Tree Swamps - *Melaleuca* and *Eucalypt*

Location and Area

This wetland community is located along the unnamed waterway that forms the western boundary of the site, beyond the tidal influence (**FIGURE 4**).

Description

This community contains mature remnant vegetation. The vegetation is dominated by broad-leaved paperbark (*Melaleuca quinquenervia*). Canopy species include *Melaleuca quinquenervia*, Queensland blue gum (*Eucalyptus tereticornis*), grey ironbark (*Eucalyptus siderophloia*) and swamp box (*Lophostemon suaveolens*), swamp mahogany (*Eucalyptus robusta*) to 16-20 m. Sometimes the Eucalypts are emergent. The understorey is dominated by a combination of native species and introduced plants. Native species include *Trema tomentosa*, *Parsonia straminea*, *Melaleuca linariifolia*, *Melicope elleryana*, *Glochidion sumatranum*, *Stephania japonica*, *Pittosporum revolutum*, and *Alphitonia excelsa*. Introduced species include Camphor laurel (*Cinnamomum camphora**), Groundsel bush (*Baccharis halimifolia**), and Wild tobacco (*Solanum mauritianum**).

Groundcover include some exotic pasture herbs and grasses but mostly native species. Native species include Dusky Coral Pea (*Kennedia rubicunda*), Frogsmouth (*Philydrum lanuginosum*), Saw sedge (*Gahnia sieberiana*), Smartweed (*Persicaria* sp.), Soft bracken (*Calochlaena dubia*), *Lomandra longifolia*, *Ludwigia octovalis*, *Blechnum indicum*, and *Phragmites australis* (can have a weedy habit). Introduced species include Water hyacinth (*Eichhornia crassipes**), Fleabane (*Conyza* sp.*), and white passion flower (*Passiflora subpeltata**).

Phragmites australis, *Gahnia sieberiana* and *Blechnum indicum* become locally dominant in some areas of the community when associated with the drainage lines.

Condition

The majority of this community is in moderate to good condition with some grazing impacts evident. The creek banks have been trampled in some areas and water plants grazed.

Conservation Status

This area is not mapped as remnant vegetation and therefore has no conservation status under the VMA (1999).

Community 4: Regenerating Coastal and Subcoastal Wallum Heath/Shrubland

Location and Area

This community is located in the north-western portion of the site in association with an Aeolian sand dune (**FIGURE 4**).

Description

This vegetation community is comprised of a mixture of Bracken (*Pteridium esculentum*) and regenerating wallum heath species including Weeping baeckea (*Baeckea frutescens*), *Leptospermum* spp., Blue dampiera (*Dampiera stricta*), Swamp water fern (*Blechnum*

indicum), Tassel cord rush (*Baloskion tetraphyllum*), Saw sedge (*Gahnia sieberiana*), Thyme honey myrtle (*Melaleuca thymifolia*), Hairy bush pea (*Pultenaea villosa*) and *Lomandra longifolia*. There are also areas of pasture grasses encroaching into this community.

Condition

The condition of this community is generally moderate to poor due to grazing impacts and incursions by pasture grass species.

Conservation Status

This area is not mapped as remnant vegetation and therefore has no conservation status under the VMA (1999).

Community 5: Disturbed Wet-terrestrial Grassland/Sedgeland Mosaic

Location and Area

This community is located in areas below the Q100 flood contour (excluding areas mapped as other wetlands) surrounding drainage lines beyond the tidal influence (FIGURE 4).

Description

This community contains regrowth vegetation. This community is primarily grazing pasture with less than 50% cover of wetland indicator species. Groundcovers include both exotic pasture herbs and grasses and native species. Native species include *Cyperus polystachyos*, *Kennedia rubicunda*, *Persicaria* sp., *Lomandra longifolia*, Pink Swamp Lily (*Murdannia graminea*), *Tricoryne elatior*, *Triglochin procera*, feathered yellow-eye (*Xyris complanata*), *Blechnum indicum*, blady grass (*Imperata cylindrica*), Bracken (*Pteridium esculentum*) and *Paspalum* sp. pasture grasses. Introduced species include rat's tail grass (*Sporobolus* sp.*), *Cynodon dactylon**, *convolvulus* sp.*, *Lepidium* sp.*, *Conyza* sp.*, and *Passiflora subpeltata*.

Condition

This vegetation community is in poor condition given the lack of a shrub or tree layer. Grazing impacts are evident.

Conservation Status

This area is not mapped as remnant vegetation and has no conservation status under the VMA (1999).

Community 6: Disturbed Terrestrial Grassland +/- Disturbed Wet-terrestrial Grassland/Sedgeland Mosaic

Location and Area

This community is located over the majority of the site (FIGURE 4).

Description

This community is comprised of open pasture with the occasional regrowth *Acacia* spp., Paperbark or clump of Lantana. Low lying wetter areas and the occasional melon hole are populated with sedges such as *Cyperus polystachyos*, *Fimbristylis* spp., *Juncus* spp., and

Frogsmouth (*Philydrum lanuginosum*). Pasture grasses include *Paspalum* sp.* and *Cynodon dactylon**. Introduced species include rat's tail grass (*Sporobolus* sp.*), *Convolvulus* sp.*, *Lepidium* sp.*, *Conyza* sp.*, and *Passiflora subpeltata*.

Condition

As grazing pasture this community is in good condition with only light grazing impacts. As a vegetation community it is in poor condition given the lack of a shrub or tree layer.

Conservation Status

This area is not mapped as remnant vegetation and has no conservation status under the VMA (1999).

2.3 Significant Flora and Fauna Species

No flora or fauna species listed as threatened under either the Commonwealth *Environment Protection Biodiversity and Conservation (EPBC) Act (1999)* or Queensland *Nature Conservation (NC) Act (1992)* were recorded on the subject site in previous assessments (JWA 2021). Koala and Grey-headed flying-fox have since been opportunistically recorded within the retained and rehabilitated vegetation along the Caboolture River.

2.4 Fauna Habitat

Habitat suitability assessments of the threatened and migratory fauna species that are known to occur or are considered possible occurrences in the locality determined that the following threatened species had reasonable potential to be present within or directly adjacent to the impact area:

Threatened

- Australian painted snipe (*Rostratula australis*);
- Diamond Firetail (*Stagonopleura guttata*);
- Grey-headed flying-fox (*Pteropus poliocephalus*) - RECORDED;
- Koala (*Phascolarctos cinereus*) - RECORDED;
- Red goshawk (*Erythrorhynchus radiatus*);
- Sharp-tailed sandpiper (*Calidris acuminata*); and
- White-throated needletail (*Hirundapus caudacutus*)

Migratory

- Broad-billed sandpiper (*Limicola falcinellus*);
- Common Sandpiper (*Actitis hypoleucos*);
- Double-banded plover (*Charadrius bicinctus*);
- Fork-tailed swift (*Apus pacificus*);

- Cattle egret (*Ardea ibis/ Bubulcus ibis*);
- Great egret (*Ardea alba*);
- Little curlew (*Numenius minutus*);
- Marsh sandpiper (*Tringa stagnatilis*);
- Osprey (*Pandion haliaetus*);
- Pectoral sandpiper (*Calidris melanotos*); and
- Rainbow bee-eater (*Merops ornatus*).

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:

- Lantana* (*Lantana camara*) - Weed of National Significance (WoNS), Class 3 declared weed;
- Annual ragweed* (*Ambrosia artemisiifolia*)- Class 3 declared weed;
- Broadleaved pepper tree* (*Schinus terebinthifolia*)- Class 3 declared weed;
- Groundsel bush* (*Baccharis halimifolia*)- Class 3 declared weed; and
- Rat's tail grass* (*Sporobolus* sp.) - Class 3 declared weed.

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 North Harbour 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*, *Ochlerotatus 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.

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 4. 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.

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	<i>Gomphocarpus physocarpus</i> <i>Ageratina adenophora</i> <i>Ageratum houstonianum</i> <i>Ambrosia artemisiifolia</i> <i>Paspalum</i> spp. <i>Pennisetum clandestinum</i> <i>Sporobolus africanus</i> <i>Andropogon virginicus</i>	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	<i>Baccharis halimifolia</i> <i>Chrysanthemoides monilifera</i>	Hand Weeding for all specimens where the soil is moist. Dispose of removed plants. Cut stump and apply with 1 part Roundup Biactive: 100 parts water

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Common Name	Scientific Name	Control Method
Singapore daisy Coastal morning glory	<i>Wedelia trilobata</i> <i>Ipomoea cairica</i>	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	<i>Senna pendula</i>	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	<i>Pinus elliottii</i> <i>Cinnamomum camphora</i> <i>Lantana camara</i> <i>Solanum mauritianum</i> <i>Corymbia torrelliana</i> <i>Schefflera actinophylla</i> <i>Ricinus communis</i> <i>Schinus terebinthifolius</i>	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: ▪ <i>Defender Home and Garden</i>™ ▪ <i>Roundup Biactive</i>™ / <i>Roundup</i>™ ▪ <i>Zero</i>™ Example of Registered Metasulfuron Herbicide: ▪ <i>Brush - Off</i>™		

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 an 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 an 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			
<i>Details of native plant species present and their abundance within the work area</i>			
Stratum	Native Plants		Abundance
	Common Name	Scientific Name	
Lower			

Pest and Invasive Species Plan
North Harbour - Priority Development Area - Precinct 1

Mid			
Upper			

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

HABITAT FEATURES			
Fauna observed: <i>e.g. Turkey mound present on site.</i>			
Fauna habitat features present on site: ☐ Hollows in trees ☐ Mature or over-mature trees ☐ Dead standing trees ☐ Rocks and boulders ☐ Fallen logs ☐ Caves, mineshafts or overhangs ☐ Springs ☐ Lagoons ☐ Pools ☐ Watercourses / gullies ☐ Riparian areas ☐ Wet or damp areas (including soaks / springs) ☐ Leaf litter ☐ Native grasses, rushes and sedges ☐ Fleshy fruited trees and shrubs ☐ Nectar bearing trees and shrubs ☐ Dense understorey shrubs ☐ Prickly understorey shrubs ☐ Seasonal cracks in the soil ☐ Other (please specify):			
Comments:			
ENVIRONMENTAL WEED SPECIES LIST			
<i>Details of weed species present and their abundance within the work area</i>			
Stratum	Major Environmental Weeds		Percentage Cover %
	Common Name	Scientific Name	
Lower			

Pest and Invasive Species Plan
North Harbour - Priority Development Area - Precinct 1

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	
<i>EXAMPLES: Good seed source for native recruitment. Some native regeneration occurring.</i>	
Restoration Objectives for Work Area	
<i>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.</i>	

APPENDIX 5 - EROSION AND SEDIMENT CONTROL PLAN (HALL CIVIL 2025)



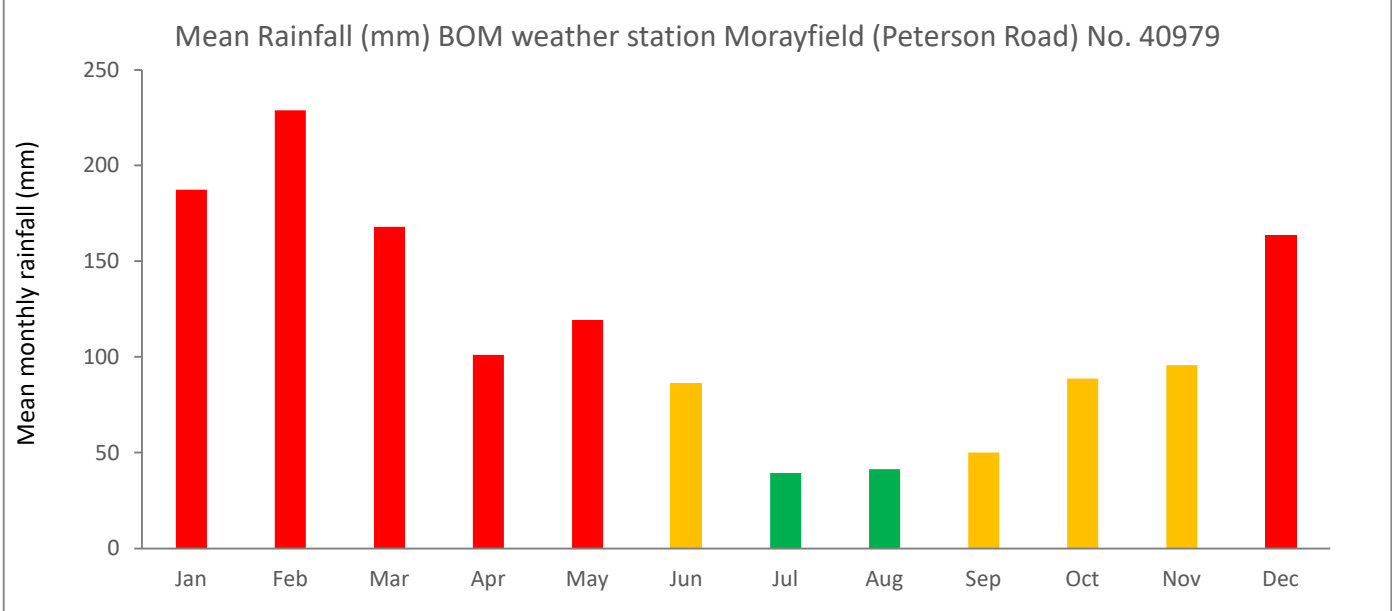
Concept Erosion & Sediment Control Plan

North Harbour – Early Release Bulk Earthworks

SEE Civil Pty Ltd
108 Siganto Drive Helensvale QLD 4212
ABN 88 115 963 427

Revision No	Date	Prepared by	Reviewed By	Approval
0	10/09/2025	Sarah Dalton (Environmental Advisor)	Morgan Hamilton (Environmental Manager)	Morgan Hamilton (Environmental Manager)

Environmental Representative	David Sprott	0427 067 928
Project Manager	Greg Busse	0451 777 313
CPESC	Matt McDermott	0432 797 430

1. SCOPE This Erosion and Sediment Control Plan (ESCP) has been developed for the North Harbour Bulk Earthworks (Early release) in Morayfield, QLD for SEE Civil. 1.1 Guidelines This ESCP has been prepared in accordance with the following document(s): Best Practice Erosion and Sediment Control (IECA, 2008) 1.2 Certification This ESCP will be reviewed and certified by a CPESC prior to commencement of works. This review and certification will ensure the plan has been prepared to satisfy the intent and minimum standards nominated within the IECA (2008) Best Practice Erosion and Sediment Control Guideline.	2.1.1 Scope of Works The scope of works is as follows: Bulk Earthworks 3. SITE DESCRIPTION 3.1 Climate & Rainfall risk Historic rainfall data Morayfield (Peterson Road, No. 40979) the closest gauging station to the site, is illustrated in Figure 2. Relatively wetter conditions typically occur from December to May and drier conditions tend to persist from June to November. The corresponding Erosion Risk Rating (rainfall depth) is colour coded from Table 1 (Based on IECA Table 4.4.2).																																						
2. PROJECT DESCRIPTION 2.1 Location & Land use The subject site is part of the North Harbour greenfield development east of the Bruce Highway in Morayfield, Queensland (Figure 1). 	<table><caption>Mean Rainfall (mm) BOM weather station Morayfield (Peterson Road) No. 40979</caption><thead><tr><th>Month</th><th>Mean monthly rainfall (mm)</th></tr></thead><tbody><tr><td>Jan</td><td>185</td></tr><tr><td>Feb</td><td>225</td></tr><tr><td>Mar</td><td>165</td></tr><tr><td>Apr</td><td>100</td></tr><tr><td>May</td><td>115</td></tr><tr><td>Jun</td><td>85</td></tr><tr><td>Jul</td><td>40</td></tr><tr><td>Aug</td><td>40</td></tr><tr><td>Sep</td><td>50</td></tr><tr><td>Oct</td><td>85</td></tr><tr><td>Nov</td><td>95</td></tr><tr><td>Dec</td><td>160</td></tr></tbody></table> Figure 2: Mean Rainfall data, Morayfield (Peterson Road) Weather Station #40979 Table 1: Erosion Risk Rating Categories (rainfall depth) as per Table 4.4.2, IECA, 2008 <table><tr><th>Erosion Risk Rating</th><th>Average Monthly rainfall depth (mm)</th></tr><tr><td>Very Low</td><td>0 to 30</td></tr><tr><td>Low</td><td>30+ to 45</td></tr><tr><td>Moderate</td><td>45+ to 100</td></tr><tr><td>High</td><td>100+ to 225</td></tr><tr><td>Extreme</td><td>>225</td></tr></table> 3.2 Topography and drainage Based on existing levels presented in project drawings: - Borrow Area: The existing ground surface levels are relatively flat, sloping inwards towards a central open drain which extends north. The area has maximum slopes of 3.5%. - Proposed Earth Works Area: relatively flat, with maximum slopes of 3.5% towards an existing creek line to the West.	Month	Mean monthly rainfall (mm)	Jan	185	Feb	225	Mar	165	Apr	100	May	115	Jun	85	Jul	40	Aug	40	Sep	50	Oct	85	Nov	95	Dec	160	Erosion Risk Rating	Average Monthly rainfall depth (mm)	Very Low	0 to 30	Low	30+ to 45	Moderate	45+ to 100	High	100+ to 225	Extreme	>225
Month	Mean monthly rainfall (mm)																																						
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High	100+ to 225																																						
Extreme	>225																																						

3.3 Soils

Based on the August 2025 Acid Sulfate Soil (ASS) Investigation and Management Plan by Tectonic:

- Subsurface conditions in the borrow area comprised mostly of very stiff sandy and silty clays and loose to dense clayey and silty sands.
- Subsurface conditions in the proposed earthworks area consisted of mostly firm sandy and silty clays and medium dense sands.

4. RISK ASSESSMENT

4.1 IECA Soil loss assessment

Based on the requirements of IECA (2008), an erosion risk assessment has been conducted using the Revised Universal Soil Loss Equation (RUSLE). The calculated soil loss is then used to determine the level of sediment control required.

A = K x R x LS x P x C

Equation 1 (IECA 2008)

Where:

- A is the predicted soil loss (t/Ha/yr)
- K is the soil erodibility factor
- R is the rainfall erosivity factor
- LS is the slope length/gradient factor
- P is the erosion control practice factor
- C is the ground cover and management factor

4.1.1 K - Factor - Soils

Soils located onsite consist clayey and silty sands and sandy and silty clays. No Emerson Class tests were undertaken as part of the ASS report, however a 20% increase to the k-factor will be applied as a conservative measure. This has resulted in an adopted **K factor of 0.03** (20% increase to account for potentially dispersive soils, from initial 0.025 K-factor derived from ‘clayey sand’ of Table E4 IECA 2008).

4.1.2 R - Factor - Rainfall

An annual erosivity factor of 4218 has been adopted based on a 2-year, 6-hour rainfall intensity of 13.9mm/hr and the following equation from section E3.2 of IECA (2008). Monthly R-factor is presented in **Table 3**.

R = 164.74 (1.1177)^S S^{0.6444}

Table 3: Monthly R-factor values for the site

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
722	635	565	220	183	158	162	100	141	303	399	560	4218

4.1.3 LS – Slope Length

As described in Section 3.2, the topography of the site comprises of gentle slopes with a maximum of 3.5%. Both sites have adopted an LS-factor of 0.91, based on a maximum slope grade of 3.5% and length of 80 m.

4.1.4 Cover (C) and Practice (P) Factors

A C factor of 1 has been adopted in accordance with industry practice to reflect the worst-case level of cover offered during the proposed development activities.

The P factor represents the combined effect of management practices and structural methods to control erosion. An industry default P factor value of 1.3 has been applied to the risk assessment, which is recommended for the construction phase condition (per table E11 of IECA, 2008).

4.1.5 Estimated Soil Loss

Results of the erosion risk assessment are presented in **Table 4**. Sediment control type derived from IECA (2008) Table 4.5.1

Table 2: Estimated soil loss from each site catchment

Catchment	Disturbed Area (HA)	R	K	LS	P	C	A (t/ha/yr)	A (t/yr)	Adopted control
Borrow Site	11.3	4218	0.03	0.91	1.3	1	106.9	1208	Type 1
Earthworks North	9.31	4218	0.03	0.91	1.3	1	106.9	995	Type 1
Earthworks South	3.7	4218	0.03	0.91	1.3	1	106.9	396	Type 1

Due to an estimated soil loss of a maximum of 106.9 t/ha/yr) based on worst case soil loss, the Erosion risk is nominated as Very Low in accordance with Table 4.4.3 of IECA (**Table 6**).

Erosion and sediment control will be installed for the project in accordance with the risk profile and specific constraints of the site (**Table 6**).

Table 3: Erosion risk rating based on estimated soil loss rate (as per Table 4.4.3 IECA 2008)

Erosion Risk Rating*	Soil loss (t/ha/yr)
Very Low ✓	0 to 150
Low	150+ to 225
Moderate	225+ to 500
High	500+ to 1500
Extreme	>1500

Table 4: Erosion Control Standards

Erosion Risk as per Table 4.4.7 of IECA	Limit of forward Clearing	Stabilisation – Temporary	Stabilisation – Permanent
All	All reasonable and practicable steps taken to apply best practice erosion control measures to completed earth works, or otherwise stabilise such works, prior to anticipated rainfall-including existing unstable, undisturbed, soil surfaces under the management or control of the building/construction works.		
Low	Clearing and stripping is limited to 8 weeks prior to the scheduled commencement of bulk earthworks	Unfinished earthworks are suitably stabilised if disturbance is expected to be suspended for a period exceeding 30 days	Disturbed soil surfaces are stabilised with a minimum 70% cover within 30 days of the completion of works within any area of a work site.
Moderate	Clearing and stripping is limited to 6 weeks prior to the scheduled commencement of bulk earthworks	Unfinished earthworks are suitably stabilised if disturbance is expected to	Disturbed soil surfaces are stabilised with a minimum 70% cover within 20

		be suspended for a period exceeding 20 days.	days of the completion of works within any area of a work site.
High	Clearing and stripping is limited to 4 weeks prior to the scheduled commencement of bulk earthworks	Soil Stockpile & unfinished earthworks are suitably stabilised if rainfall is reasonably possible, and disturbance is expected to be suspended for a period exceeding 10 days.	Disturbed soil surfaces are stabilised with a minimum 75% cover within 10 days of the completion of works within any area of a work site

5. GENERAL NOTES

- This Erosion and Sediment Control Plan (ESCP) has been prepared to provide a site specific ESCP to demonstrate the management of erosion and sediment control in accordance with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008).
- This ESCP shall be supplemented by Progressive Erosion and Sediment Control Plans (PESCP). PESCPs are to be developed to identify the specific location and, where required, additional erosion and sediment controls applicable to individual work stages. PESCPs shall be documented via mark ups to approved plans. Where a change in the level of sediment control standard is proposed in a PESCP, the PESCP shall be reviewed and approved by an appropriately qualified person prior to the change being implemented.
- Minimise the extent and duration of disturbance, maintaining existing ground cover to the greatest extent possible.
- Commissioning / decommissioning of plant and refuelling to be undertaken a minimum of 30m away from any watercourse/drainage line.
- All ERSED controls to be inspected regularly (weekly, pre/post rainfall event i.e. forecast or actual rainfall of >10mm) with maintenance/repairs to be undertaken when necessary
- Revegetation of disturbed/bare areas to be progressively implemented
- Where clean water drains and sediment traps/sumps are necessary, all clean water drains and sediment traps and associated drainage must be installed and commissioned prior to the commencement of any grubbing works within the catchment area
- All controls must be installed within approved project footprint.
- Ensure all site access is stabilised with rumble grid and clean rock.

6. DEWATERING AND WATER QUALITY

- Basins/sumps to be dewatered prior to rain event that is likely to produce runoff; however, during dry conditions water may be retained in the settling pond as a source of construction water (i.e. dust suppression).
- If possible, it is recommended that dewatering/spread of collected runoff from basins be applied to well vegetated lands at least 40m away from any waterway to allow it to infiltrate within the site boundary, if this is done, ensure water is applied slowly and in a manner that avoids concentrated surface runoff and/or erosion.
- If actively discharging (pumping or siphoning) the water out of the basin, water must be treated to achieve, pH 6.5-8.5, <10mg/L oil and grease and no visible trace and a standard 90%ile total suspended solids

concentration not exceeding 50mg/L or 50%ile NTU reading (as per IECA Best Practice Erosion and Sediment Control Guidelines Appendix B) and no more than a 10% increase in background conditions.

- Where captured basin water is to be used onsite for dust suppression or construction purposed, water does not require testing or treatment.

7. DESILTING

- Install an appropriate painted desilting marker in the basin to indicate top of sediment storage zone. Basin must be desilted if the next storm event is likely to cause sediment to rise above this marker point; or if sediment is already above the marker; or if the sediment has exceeded 90% of the nominated sediment storage volume.
- Removal of all sediment/materials collected from the basin to be disposed of in a suitable manner that will not cause an erosion or pollution/environmental hazard.
- Refer to ESCP for recommended volume and dimensions for proposed sediment basin. Note that all dimensions are approximate and subject to verification with review of detailed ground survey and alignment.
- All earthen embankments (for basins or otherwise) greater than 1m in height to be certified by a qualified geotechnical specialist to ensure structural integrity for the desired design criteria and anticipated period of operation
- Upon decommissioning of sediment basins, all water contained within must be removed and disposed of appropriately before the removal of any basin embankments

8. OVERVIEW OF KEY ESC TECHNIQUES

Drainage Controls – Catch Drains (CD) and Diversion Banks (DB)

This ESCP identifies the location of catch drains and diversion banks required to divert upslope clean water away from areas of soil disturbance, stockpiles and excavations, and to collect dirty runoff water from disturbed areas and stockpiles and direct it to a sediment trap and to control water flow through the worksite to avoid damage to unfinished areas of earthworks and infrastructure.

Sediment Controls

The following key sediment controls are specified in this plan and have been applied to individual catchments based on the results of the RUSLE soil loss predictions (Section 3.5).

Sediment basin (Type 1) – Due to the size of site water catchments Type 1 sediment basins have been nominated to capture and treat site runoff in applicable catchments.

Rock Checks/Filter Dam – Where drainage topography allows, rock checks would be utilised to slow the velocities of site dirty water.

Sediment fence (Type/3) –Type 3/perimeter controls may be constructed from sediment fence unless site mulch is available.

Site Exit / Entry - To prevent sediment tracking onto public roads, stabilised rock pad entry locations will be identified and constructed at the interface of any public roads. Adjacent roads should be inspected regularly,

and any sediment deposited on public roads should be removed in a safe manner and disposed of to an approved disposal facility

9. STOCKPILE MANAGEMENT

Place stripped soil at approved stockpile locations

Stockpile topsoil at a height no greater than 2m.

Stockpile any excess subsoil or spoil separately from topsoils and at designated stockpile locations upslope of sediment traps.

Install non-woven sediment fence (bidim A34 or equiv) around stockpiles as per SD-FF-1

Where topsoil stockpiles will remain undisturbed for greater than nominated erosion standard, apply seeding of a cover crop at the rate of 10kg/ha to topsoil stockpiles. Refer to revegetation specifications for seed mix.

Where subsoil / spoil stockpiles will remain undisturbed for greater then nominated erosion standard, apply temporary cover or soil binder.

Temporary Stabilisation Erosion Standard

Month	Temporary Stabilisation Erosion Standard
Dec, Jan, Feb	10 days
Mar – Jun, Oct – Nov	20 days
July – Sept	30 days

10. INSPECTIONS & MONITORING

All erosion and sediment control measures, including drainage measures, will be always maintained and in proper working order during their operational life.

All drainage, erosion and sediment controls will be inspected daily when rain is occurring (if site access is available) weekly, prior to and following a rainfall event of sufficient intensity and duration to cause on-site runoff immediately prior to and following periods of site shutdown.

Inspections will include checks of all drainage, erosion and sediment control measures including site discharge points for:

- evidence of excessive sediment transport and or deposition either on or off site
- evidence of excessive erosion either on site or immediately downstream
- treatment and de-watering requirements for sediment basins / sediment traps
- the progress and stability of site rehabilitation and revegetation works.

Where inspections identify a non-conforming control measure, or issues that are likely to prevent the achievement of the erosion and sediment control objectives, corrective or preventative actions will be developed and implemented as necessary to achieve the required erosion and sediment control performance standards.

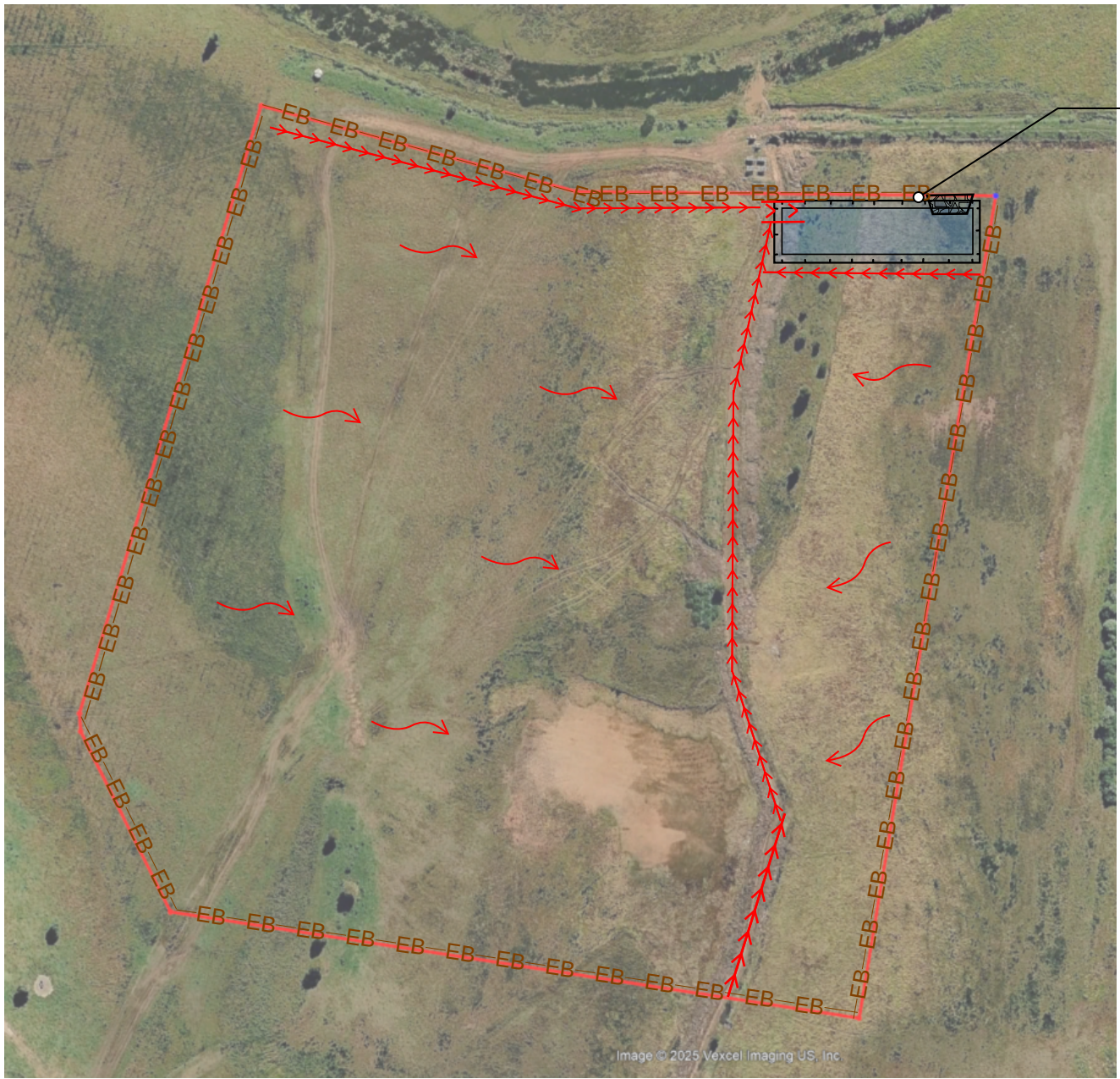
A written record / register of monitoring observations and maintenance tasks will be kept on site and available for inspection.

11. SITE REHABILITATION

Once bulk earthworks are completed, stabilisation will be applied in line with the approved surface treatment plan/s unless further works are planned to commence within the nominated timeframes in Table 5.

	CONCEPT EROSION & SEDIMENT CONTROL PLAN	Rev: 0
	North Harbour Bulk Earthworks (Early Release), Morayfield	Date: 10/09/2025

Appendix A : Progressive Erosion and Sediment Control Drawings



Sediment Basin 1 - Borrow Area

Catchment Area: 11.3 ha

Type-B Basin Volume: 7840 m³

Target Dimensions:
157 m (L) x 52 m (W) x 1.2m (D)

PESCP LEGEND

- Site Water Flow
- Clean Water Flow
- Site Water Drain
- Earth Bund
- Sediment Basin (Type 1)
- Rock Spillway
- Inlet protection
- Proposed disturbance footprint

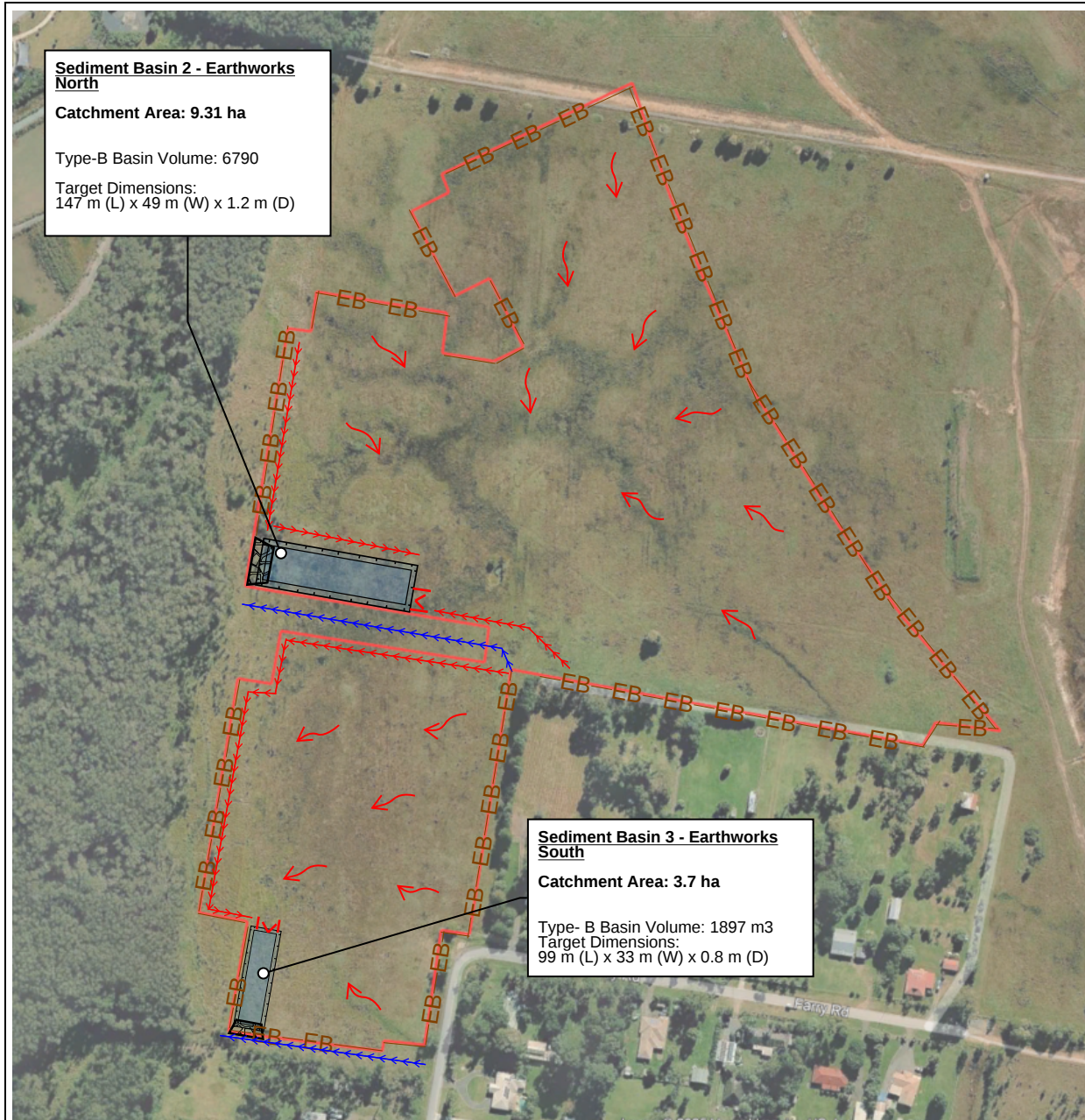
PESCP METHODOLOGY

1. Identified disturbance limits and construct any required access tracks.
2. Strip topsoil to form site/clean water diversion drains and construct sediment basins to the specified dimensions.
3. Undertake borrow bulk earthworks including any required acid sulfate soil treatments.
4. Undertake stabilisation works in accordance with approved design i.e. topsoil re-spread and drillseed or polymer application.

Rev	Date	Details	Prepared by	Approved
0	08/09/2025	Concept ESCP - For earthworks approval	SD	MH

Project/plan	Drawing Number
North Harbour - Early Release Earthworks Erosion and Sediment Control Plan	NHERBEW-PLN-ESCP-001





PESCP LEGEND

Site Water Flow	
Clean Water Flow	
Site Water Drain	
Earth Bund	
Sediment Basin (Type 1)	
Rock Spillway	
Inlet protection	
Proposed disturbance footprint	

PESCP METHODOLOGY

1. Identified disturbance limits and construct any required access tracks.
2. Strip topsoil to form site/clean water diversion drains and construct sediment basins to the specified dimensions.
3. Undertake fill bulk earthworks
4. Undertake stabilisation works in accordance with approved design i.e. topsoil re-spread and drillseed or polymer application.

Rev	Date	Details	Prepared by	Approved
0	08/09/2025	Concept ESCP - For earthworks approval	SD	MH



Project/plan
North Harbour - Early Release Earthworks Erosion and Sediment Control Plan

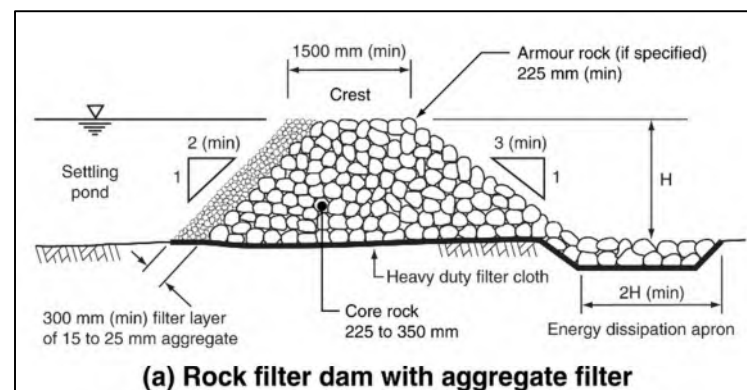
Drawing Number
NHERBEW-PLN-ESCP-002

Appendix B : Standard Drawings and Calculations

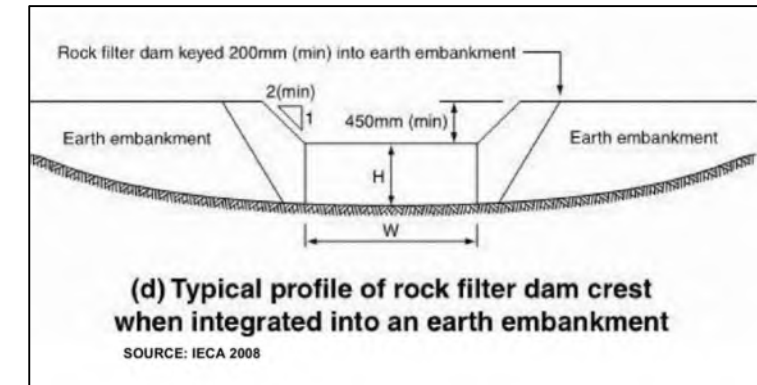
Design standard	Critical sediment size (mm)	Surface area of settling pond per unit discharge (m ² /m ³ /s) ^[1]			Allowable through-velocity (m/s)
		10° C ^[2]	15° C ^[2]	20° C ^[2]	
Type 3 sediment trap	0.50	6	5.2	4.6	0.3
	0.20	38	33	29	0.3
	0.15	67	60	52	0.3
Type 2 sediment trap	0.10	150	130	115	0.2
	0.05	600	525	460	0.2
Type 1 sediment trap	0.04	940	820	720	0.2
	0.02	3700	3230	2860	0.2

[1] Pond area is based on a rectangular pond operating with uniform inflow conditions across its width.

[2] Assume a pond temperature the same as the typical rainwater temperature during the time of year when the pond is likely to be operating at capacity.

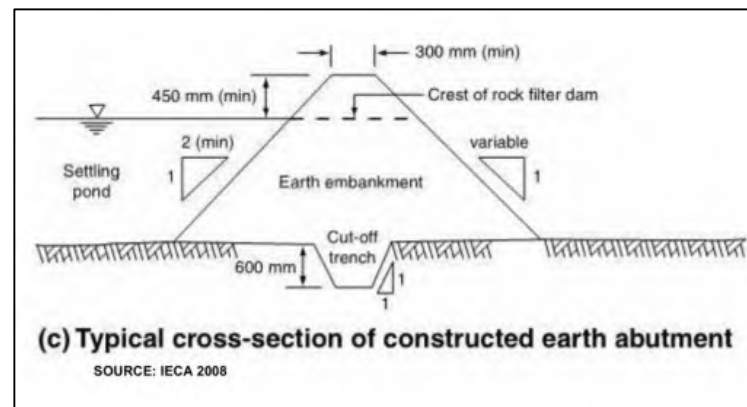


(a) Rock filter dam with aggregate filter



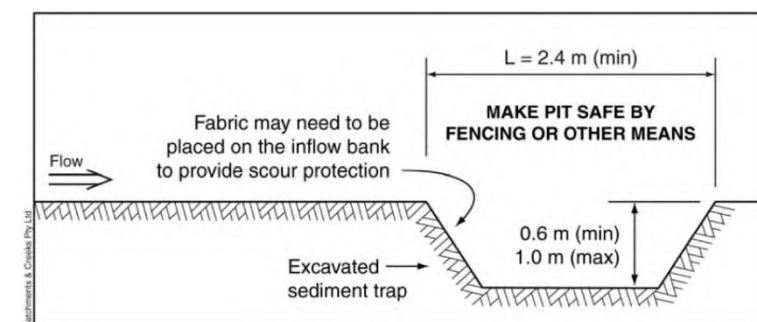
(d) Typical profile of rock filter dam crest when integrated into an earth embankment

SOURCE: IECA 2008



(c) Typical cross-section of constructed earth abutment

SOURCE: IECA 2008



DIVERSION BUND SECTION

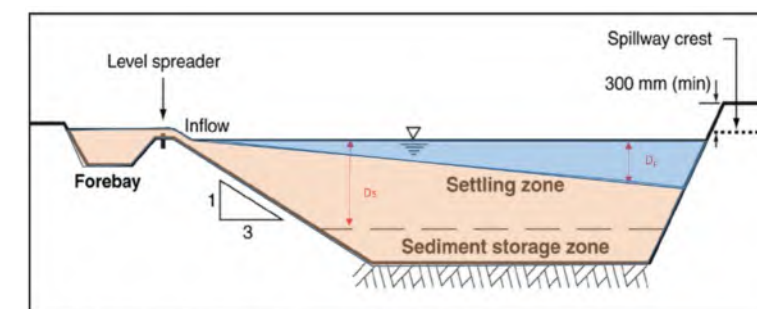
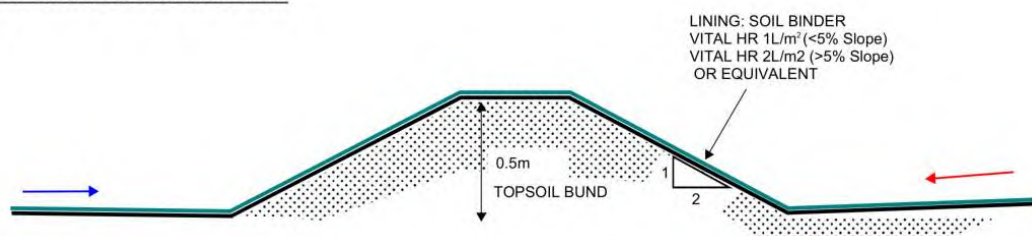
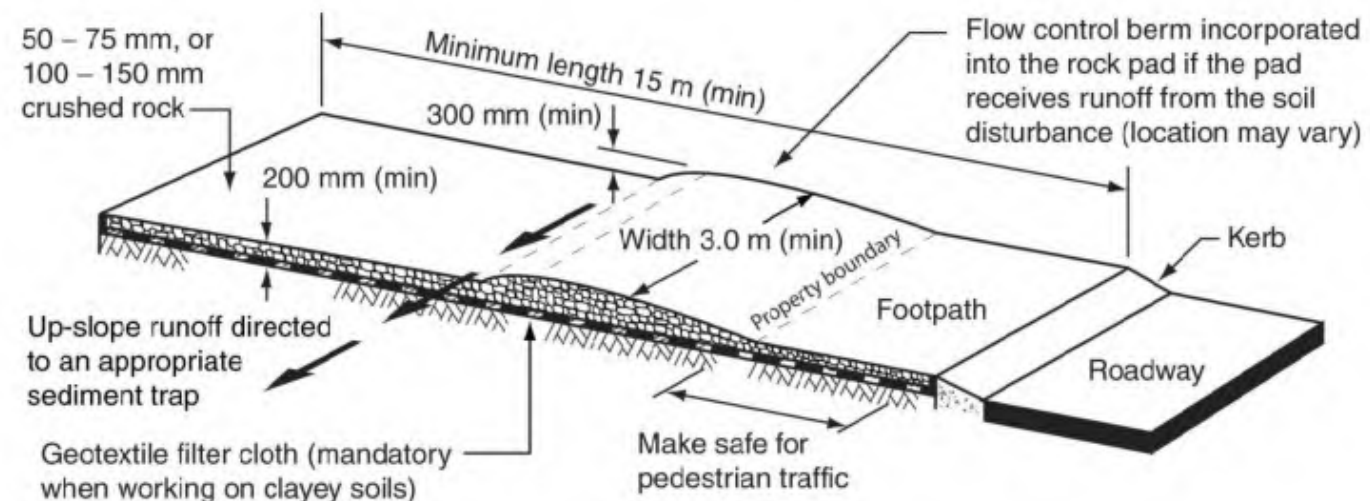


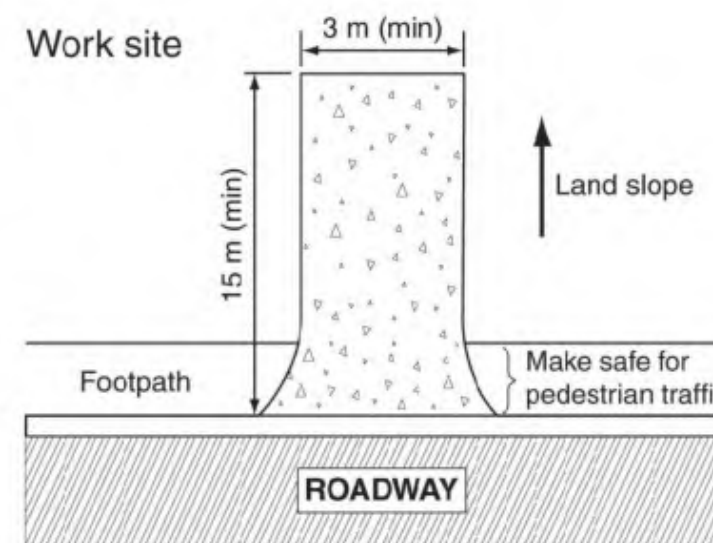
Figure B6 – Long-section of a typical Type B basin

														SEDIMENT STORAGE					APPROX. DIMENSIONS				
BASIN ID	CATCH AREA (HA)	BATTERS (1 IN X)	L:W RATIO	SETTLING DEPTH D _s (m)	C ₁	TIME OF CONC (MINS)	I ₁ (mm/hr)	0.5Q ₁ (m³/s)	JAR TEST SETTLE AFTER 15 MINUTES (mm)	FLOC SETTLE DEPTH D _F (m)	MINIMUM A _s (m²)	ACTUAL V _s (m³)	SCOUR CHECK	SED STORAGE OPTION?	RUSLE SOIL LOSS (t/ha/yr)	CLEAN OUT FREQUENCY (MONTHS)	MIN SED. STORAGE VOLUME (m³)	APPROX. REQ SED STORAGE DEPTH (m)	APPROX. LENGTH AT SPILLWAY (m)	APPROX. WIDTH AT SPILLWAY (m)	APPROX. DEPTH AT SPILLWAY (m)	SETTLING VOLUME (m³)	TOTAL VOLUME SPILLWA (m³)
Borrow Area	11.3	2	3	1.00	0.56	20	72	0.635	100	1.00	7615	7615	OK	RUSLE	150	2	226	0.2	157.1	52.4	1.2	7615	7840
Earthworks North	9.31	2	3	1.00	0.56	18	76	0.550	100	1.00	6604	6604	OK	RUSLE	150	2	186	0.2	146.8	48.9	1.2	6604	6790
Earthworks South	3.7	2	3	0.60	0.56	13	88	0.253	100	0.60	3039	1823	OK	RUSLE	150	2	74	0.2	99.1	33.0	0.8	1823	1897

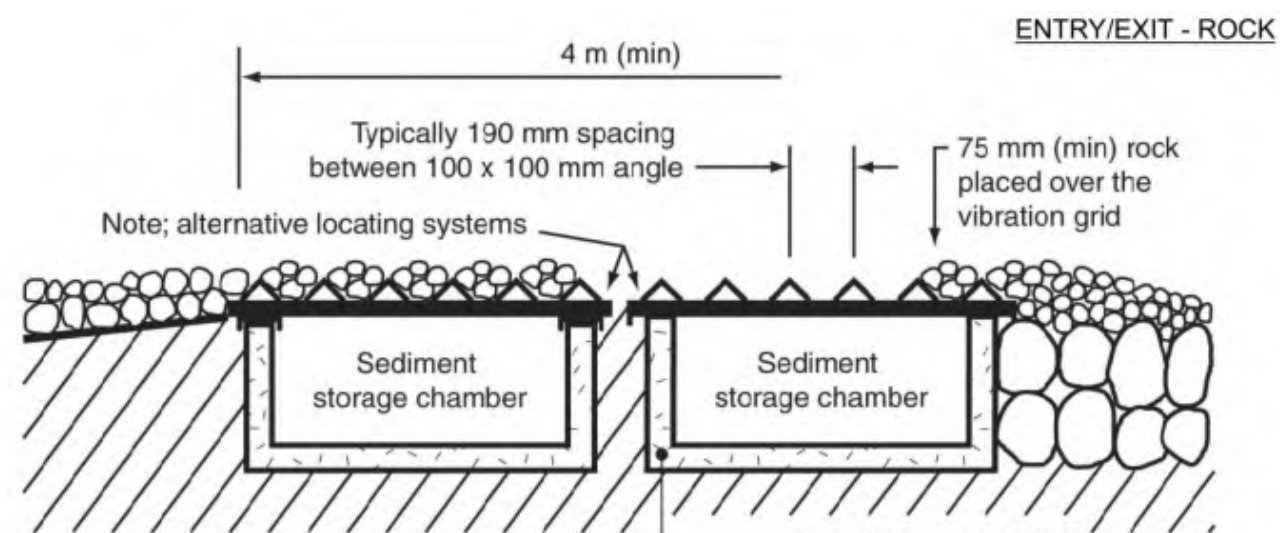
Site access Arrangement



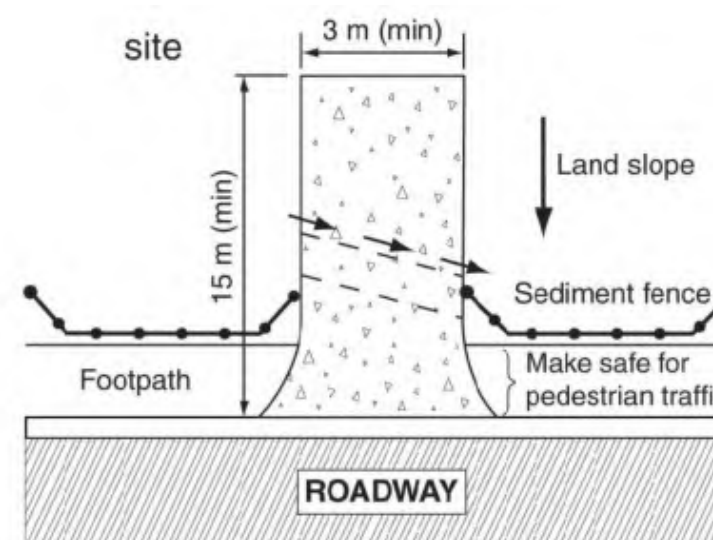
ENTRY/EXIT - ROCK



ENTRY/EXIT - ROCK
(SLOPING AWAY FROM ROAD)



ENTRY/EXIT - VIBRATION GRID



ENTRY/EXIT - ROCK
(SLOPING TOWARD ROAD)

APPENDIX 6 - ACID SULPHATE SOIL INVESTIGATION AND MANAGEMENT PLAN (TECTONIC GEOTECHNICAL 2025)



Acid Sulfate Soil Investigation & Management Plan

Early Release Phase – North Harbour Marina, North Harbour



Document Review

Doc No.	Revision	Prepared By	Reviewed By	Date Issued
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Executive Summary

This report has been prepared to identify the risks associated with potential disturbance of acid sulfate soil (ASS) and provides management strategies during proposed cut/fill earthworks, as part of proposed early release phase works for the North Harbour Marina and Waterfront Residential Development.

Proposed early release works will comprise excavation of about 250,000 m³, from an approximate 10-hectare borrow area (within the footprint of the proposed future marina) for placement as controlled fill across about 25-hectares of proposed early release residential land. Excavations within the proposed borrow area will extend to a depth of about RL-2.5 m (~3 m below ground level [BGL]). Works across the proposed early release residential land, will comprise placement and compaction of bulk fill, with relatively minor excavations (i.e. stripping of topsoil and unsuitable subgrade material).

A site investigation has been undertaken incorporating a review of published geological and ASS risk mapping information, existing site data, and completion of site sampling and analysis, to identify and characterise the presence or absence of ASS across the subject site, and to quantify potential risks based on the proposed works. Site data, comprising up to 55 investigation boreholes, with analytical testing including up to 346 pH field screen tests and 97 chromium reducible sulfur tests, were reviewed as part of our assessment.

Subsurface conditions across the borrow area, typically consisted interlayered alluvial soils, mostly comprising firm to very stiff sandy and silty clays and loose to dense clayey and silty sands, generally extending to the limit of investigation. A ridge of very dense/hard, indurated or cemented material, was encountered at between 2 m to 3 m BGL, extending into the borrow area from the north-west. This layer may also have been underlain by residual soils or weathered sandstone at relatively shallow depth. A layer of soft organic silt was also encountered at a depth of 3 m to 3.2 m BGL in BH110, located in the south-eastern corner of the borrow area. This dark grey/brown layer corresponds with high PASS results but was not consistently encountered across any other boreholes.

Subsurface conditions encountered across the early release residential area, consisted interlayered alluvial soils, mostly comprising firm (or stiffer), sandy and silty clays and medium dense (or denser) sands, typically underlain by over consolidated stiff (or stiffer) sandy clays and inferred residual soil comprising stiff silty/sandy clay and dense clayey sands. Depth to such residual soil was generally shallower across the southern and northern extents of the proposed residential fill zone.

A relatively consistent groundwater table exists within the more permeable sandy layers, at depths of 1 m to 3 m BGL, typically present across areas of lower elevation (including the borrow area), and may be either perched or confined, above and/or below, less permeable clay layers. Groundwater is expected to fluctuate with prevailing weather conditions and levels are likely to exhibit low gradients towards internal drainage features.

Site investigation involving quantitative laboratory analysis confirms that the proposed borrow area soils contain moderate levels of actual ASS within topsoil and underlying alluvial layers at strengths of up to 300 mol H⁺ per tonne. Disturbance of these soils will require management during excavation to neutralise existing acidity and mitigate environmental risk. High-risk PASS occurs at depths of deeper than 3 m BGL (encountered in BH110 only) but is not predicted to be disturbed by the proposed works.

The early release residential area has low levels of actual ASS present (up to 224 mol H⁺ per tonne), with no PASS present. The planned works will not significantly disturb underlying soils or alter groundwater conditions, posing minimal acid sulfate risk for this area.



Based on an excavation of approximately 250,000 m³ from the proposed borrow area, with an average net acidity of 88 mol H⁺ per tonne, these 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. This categorisation rating is principally due to the large volume of material to be disturbed, as opposed to the strength and nature of acidity present. It is expected that due to the lack of identified PASS hazard, these works can be easily managed through application of conventional environmental strategies for actual ASS.

An ASS Management Plan (ASSMP) has been prepared to provide a framework to minimise the potential of adverse environmental impacts. The plan sets out clear management, treatment, and monitoring requirements for contractors, with a focus on compliance, record-keeping, and environmental protection.

Key strategies include:

- Minimising the spatial and temporal extent of soil disturbance.
- Treating all excavated ASS and acidic soils with agricultural lime at prescribed rates.
- Verifying neutralisation through laboratory testing.
- Containing, testing, and treating construction waters before reuse or controlled release.

Controlled on-site treatment areas will be used for soil neutralisation, with bunding and drainage to prevent acidic runoff. Investigation results indicate PASS material exists only below planned excavation depths, reducing *in situ* acid generation risks. Passive dewatering methods, settlement basins, and strict water quality release limits (pH, turbidity, dissolved metals, and suspended solids) will be applied in accordance with the criteria set out in this management plan.

Water quality will be monitored at upstream, excavation, and settlement basin locations. Results will be summarised in monthly environmental reports to the Contractor and the superintendent.

Upon completion of works a closure report will confirm management effectiveness, detailing soil treatment volumes, verification results, water management, non-compliances, and recommendations for any future monitoring or remediation.



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- Figure 1: Site Plan
- Figure 2: Surface Water Monitoring Plan

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- Appendix A** Borehole Logs & Explanation Notes
- Appendix B** Laboratory Test Certificates
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1. Introduction

Tectonic was commissioned by North Harbour Holdings Pty Ltd (NHH) to undertake acid sulfate soil (ASS) investigation and prepare a management plan (ASSMP) for proposed early release phase earthworks, preceding proposed marina and waterfront residential development at North Harbour.

This report has been prepared to assess the risks associated with possible disturbance of ASS and acidic soils and to provide a series of soil and groundwater management strategies which will be implemented throughout proposed cut/fill earthworks to mitigate potential impacts for proposed 'Early Release Phase' works.

2. Proposed Development

The North Harbour marina and waterfront residential development covers approximately 350 hectares, spanning two large land parcels (Lot 3 on SP266287 & Lot 25 on S31125), bounded by Caboolture River, existing North Harbour residential development, and existing rural residential land (Burpengary East).

Based on information supplied by NHH, it is understood that proposed early release works will comprise excavation of about 250,000 m³, from a ~10-hectare borrow area (within the footprint of the proposed future marina) for placement as controlled fill across about 25-hectares of proposed early release residential land. Excavations within the proposed borrow area will extend to a depth of about RL-2.5 m (~3 m below ground level [BGL]) and are expected to be internally battered (at 1V:3H or sufficient safe angle) in preparation for future marina development.

Works across the proposed early release residential land, will comprise placement and compaction of bulk fill. Excavations across this area, will be relatively minor, comprising stripping of topsoil and unsuitable subgrade material only.



Text Figure 1: Site location (Base plan: QLD Globe Website – June 2024)



3. Site Description

For the purposes of this report the subject site comprises the proposed borrow area and early release residential land zones, located on the western side of the broader marina and waterfront residential development precinct.

At the time of investigation, the borrow area was relatively flat, with existing ground surface elevations of between about RL 1 m to 2 m AHD¹. Gradients across the site were typically less than 2° (3.5%) grading inward, toward a central open drain, which extends to the north. The ground surface across the borrow area has been partially disturbed by previous earthworks, which have included excavations up to about 1 m deep, completed in 2017 to win fill for the North Harbour Residential West precinct to the west.

The early release residential land zone was also relatively flat, with natural ground surface elevations of between about RL 2 m to 3 m. Natural gradients across this part of the site are also generally less than 2° (3.5%), typically grading toward an existing creek line to the west.

Existing ground cover across both areas comprises periodically slashed grass cover.

Text Figure 2 below illustrates the borrow and early release residential land zones, with surface contours.



Text Figure 2: Aerial Image showing site conditions across subject works areas

¹ Relative Level to Australian Height Datum, as adopted for all levels mentioned within this report



4. Information on Acid Sulfate Soil

There are two principal forms of acidic soil associated with the North Harbour development precinct. The first type is 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 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 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.

4.1 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.

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.



4.2 Non-sulfuric Acidity (ANS Soil)

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 potential acidic leachate which may be caused by ANS.



5. ASS Investigation & Assessment

A site investigation has been undertaken incorporating a review of published geological and ASS risk mapping information, existing site data, and completion of site sampling and analysis, to identify and characterise the presence or absence of ASS across the subject site, and to quantify potential risks based on the proposed works.

The site investigation was completed in general accordance with *Queensland Soil Sampling Guidelines*², and *Soil Management Guidelines*³, being the applicable guidelines for identification and management of ASS in Queensland.

5.1 Existing Site Data

Several previous site investigations have been completed, incorporating some or all, of the subject investigation area. ASS investigation data, where relevant to the proposed works, has been extracted from the following reports for inclusion herein:

- *Acid Sulfate Soil Investigation & Management Plan*, Proposed Compensatory Cut, Unnamed Drainage Corridor, North Harbour, prepared by Tectonic (Report No.: 21030-001-Rev0, dated 10 March 2021).
 - » Ten boreholes (BH1 to BH10) to 2 m BGL, including 72 pH_{F-FOX} screen tests and 22 Chromium Reducible Sulfur (CRS) tests. Characterising the northern side of the early release residential zone.
- *Preliminary Geotechnical & Acid Sulfate Soil Investigation*, Marina Waterways and Land Development, North Harbour, prepared by Tectonic Geotechnical Pty Ltd (Report No.: 20334-002-Rev3, dated 23 July 2024).
 - » Two boreholes (TBH2 and TBH3) to 6 m BGL, including 10 CRS tests, characterising deeper soils in the vicinity of the borrow area.
- *Addendum to ASSMP*, North Harbour Residential West – Borrow Area 3-2, prepared by Coffey Geotechnics Pty Ltd (Report No.: GEOTKPAR01976AJ-A(Rev1), dated 13 December 2016).
 - » Seventeen boreholes (BH500 to BH503, BH506 to BH509, BH512 to BH514, BH518 to BH520, BH524 to BH526) to 2 m BGL, including 136 pH_{F-FOX} screen tests and 34 CRS tests characterising shallower soils across the borrow area. It is noted that this investigation was completed prior to 2017 excavation works, thus while results have been reviewed and are consistent with the findings of current investigation results, they have not been included in this report).

5.2 Current Fieldwork and Laboratory Testing Methodology

Fieldwork was carried out between 23 and 25 June 2025 by experienced geo-environmental staff from Tectonic. Twenty five (25) boreholes were drilled using a 100 mm auger (with TC bit) mounted on a 4WD utility.

Ten boreholes, BH101 to BH110, were drilled across the proposed borrow area to a depth of 4.0 m BGL (extending 1 m below the anticipated depth of disturbance) or shallower on refusal. Due to access limitations across the eastern side of the borrow area, boreholes BH103, BH107 and BH110 were positioned as close as access would allow.

² Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland (Ahern et al., 1998)

³ Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines v4.0 (Dear et al., 2014)



Fifteen boreholes, BH111 to BH125, were drilled across the proposed residential area to a depth of 2.0 m BGL.

Borehole locations are illustrated in the Site Plan attached as Figure 1.

All boreholes were logged in accordance with the Unified Soil Classification system. Where encountered, details of groundwater seepage and/or depth to the standing groundwater table were recorded on borehole logs. Soil samples were collected at 0.25 m depth intervals from all boreholes for laboratory assessment. Selected soil samples were dispatched to Eurofins MGT, a NATA accredited analytical laboratory located in Brisbane. ASS sampling protocols in the field were observed to minimise potential for oxidation prior to laboratory testing and followed the guidelines.

Borehole logs, together with explanatory notes, are attached in Appendix A.

All ASS samples (260) were screened to assess field pH (pH_F) and pH after oxidation (pH_{FOX}). Using the pH screening testing results and borehole logs, a total of 64 samples were selected to undergo quantitative analysis by the Total Actual Acidity (TAA) and Chromium Reducible Sulfur (CRS) suite.

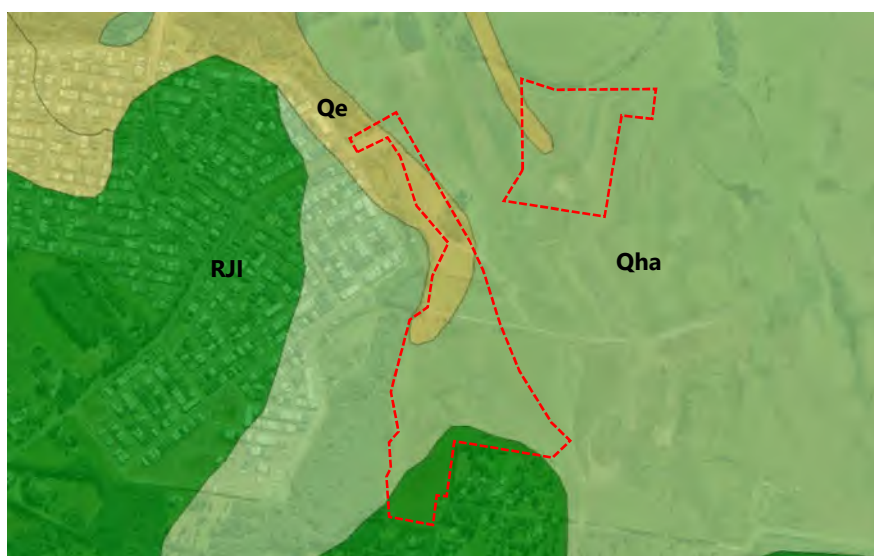
pH screening and CRS laboratory test results are tabulated in Table B1 (Appendix B), together with results of past investigations. Laboratory test certificates are also presented in Appendix B.

5.3 Desktop Assessment

5.3.1 Regional Geology

The 1:100,000 Series Caboolture Geological Map (Sheet 9443, First Edition 1979) indicates that surface geology across the site mostly consists of Holocene age alluvium (denoted **Qha** in Text Figure 3), comprising of secondary river terrace deposits of sand, silt, clay and gravel. Some miscellaneous unconsolidated sediments (denoted **Qe**) associated with estuarine and tidal flat conditions (sand & mud) are mapped underlying the northern part of the residential area and extending into the borrow area from the north-west side.

It is inferred that these strata are underlain by a basement of much older residual soils and weathered sedimentary rocks associated with the Landsborough Sandstone formation (**RJl**) which is indicated to be present to the south and west of the site.



Text Figure 3: Extract from Caboolture geological map

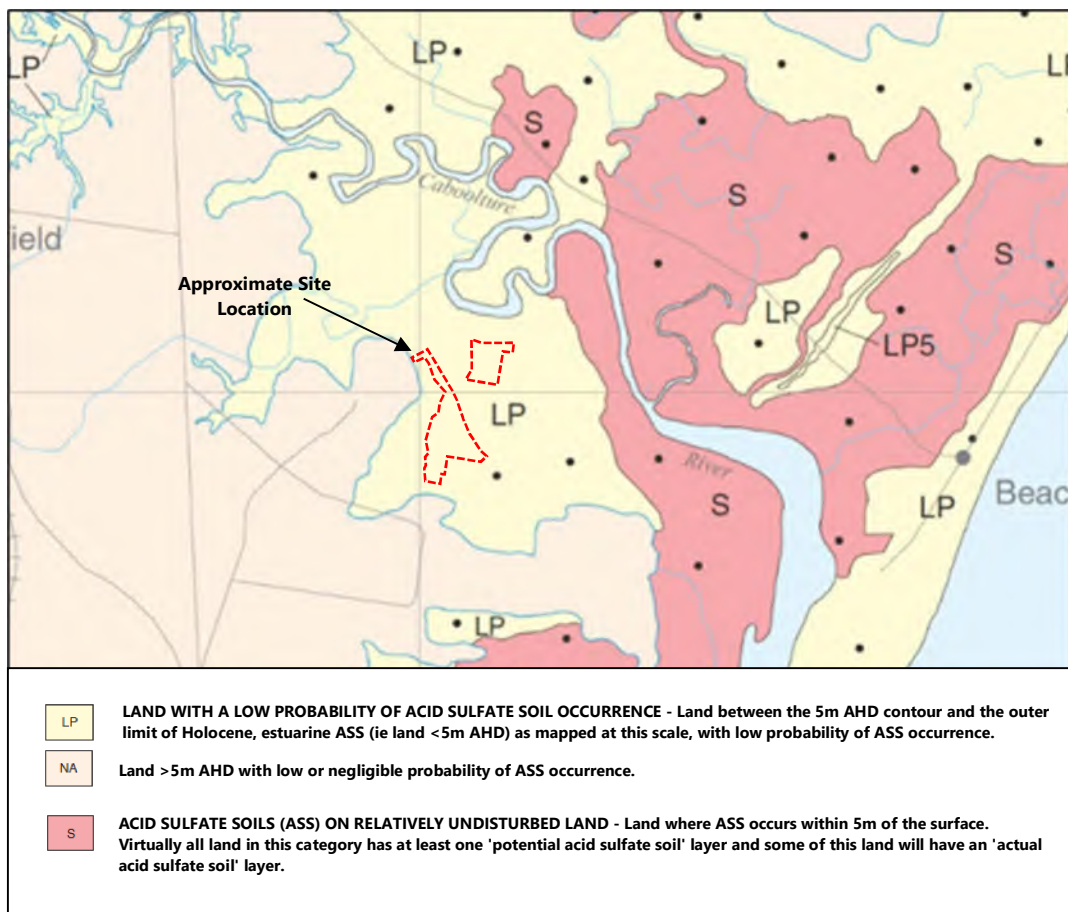


5.3.2 Regional ASS Mapping

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 4 below. Mapping indicates the presence of primarily **Low Probability "LP"** ASS land types across the subject site and surrounding land situated below RL 5 m contour.

This description of the LP land type, especially across lower lying Quaternary estuarine alluvium located nearer Caboolture River, does not match with regional geological mapping discussed above in Section 5.3.1, or our past site experience. Our experience is that some weak non-sulfuric acidity exists throughout the soil profile in these lower lying areas, and that some potential for AASS and PASS exists, where low strength estuarine sediments are encountered closer to the Caboolture River. 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 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 and may only be confirmed by completion of a site investigation, involving site assessment and quantitative analyses.



Text Figure 4: Redcliffe - Teewah Acid Sulfate Soils Map 2 (NR&M-SEA-I-A0 3261)



5.4 Subsurface Conditions

The subsurface conditions encountered in the boreholes were generally consistent with the regional geological formations described in Section 5.3.1.

Borrow Area

Subsurface conditions encountered in BH101 to BH110, completed across the borrow area, typically consisted interlayered alluvial soils, mostly comprising firm to very stiff sandy and silty clays, and loose to dense clayey and silty sands, generally extending to the limit of investigation.

A ridge of very dense/hard, indurated or cemented material, was encountered at between 2 m to 3 m BGL, in BH101, BH102, BH105 BH109, which resulted in drilling refusal and early termination at these locations. This indurated or cemented layer generally corresponded with mapped Quaternary estuarine sediments (Unit Qe) extending into the borrow area from the north-west, as mapped in Text Figure 3. This layer may also have been underlain by residual soils or weathered sandstone at relatively shallow depth.

The presence of alluvial clay soils was more generally encountered across the eastern side of the proposed borrow area and is expected to comprise most of the excavated material extracted from the borrow area.

A layer of soft organic silt was encountered at a depth of 3 m to 3.2 m BGL in BH110, located in the south-eastern corner of the borrow area. This dark grey/brown layer corresponds with very high PASS results (discussed further in Section 5.7) but was not consistently encountered across any other boreholes. This hotspot is likely an infilled paleochannel, which are expected to become more frequent across land to the east of the subject site.

Existing investigation boreholes surrounding the borrow area indicate that depth to residual soil, generally comprising silty and sandy clays, is likely to be encountered from 2.5 to 4 m BGL on the southern and western sides of the borrow area, increasing to 7 m to 10 m BGL on the northern and eastern sides.

Early Release Residential Zone

Subsurface conditions encountered across the early release residential area, typically consisted interlayered alluvial soils, mostly comprising firm or stiffer sandy and silty clays and medium dense or denser sands, ranging from 1 m to 3 m depth. The alluvial soils were generally underlain by over consolidated stiff or stiffer sandy clays and inferred residual soil comprising stiff silty/sandy clay and dense clayey sands. Depth to such residual soil was generally shallower across the southern and northern extents of the proposed residential fill zone.

Some soft or loose materials were encountered close to the surface in several locations, typically associated with the presence of topographic depressions and ponded surface water. Such areas were relatively shallow (< 0.3 m depth) and are expected to be stripped out with organic topsoil as part of earthworks preparations.

5.5 Groundwater

Groundwater seepage and/or standing groundwater was encountered in 38 of the 55 investigation sites, being typically recorded at depths of between 0.5 m and 2.7 m BGL, with shallower depth to groundwater typically occurring in boreholes situated at lower elevations and in closer proximity to



surface drainage features. Ponded surface water was also observed within the existing drainage corridor to the west of the residential zone, and within the central drain extending through the centre of the borrow area at approximately RL 1 m to 1.5 m.

A relatively consistent groundwater table is likely to exist within the more permeable sandy layers, and may be either perched or confined, above and/or below, less permeable clay layers. Groundwater would be expected to fluctuate with prevailing weather conditions and levels are likely to exhibit low gradients towards internal drainage features and the Caboolture River, with an overall trend expected to be towards the northern and eastern parts of the site. No discernible trends in groundwater levels have been determined (e.g. possible gradients), other than confirming that groundwater exists at relatively shallow depths below the natural ground surface.

5.6 ASS Investigation Results

Site and laboratory investigation methods are described earlier in this report, with the past and current ASS investigations across the subject areas comprising a total of 55 boreholes including pH screen testing and quantitative laboratory analysis, completed across the proposed development area.

5.6.1 Field Screen Analysis

A total of 346 samples were assessed by pH field screen analyses. Test results indicate that the natural soils tested have field pH (pH_F) values ranging between 3.8 and 7.1, indicating variable acidic to neutral *in situ* soil conditions across the site. This would be expected to vary depending on varying geological origin, presence/absence of acid neutralising capacity (ANC), organics and levels of existing acidity across the site.

Oxidised pH (pH_{FOX}) testing recorded pH_{FOX} values between 1.8 and 6.6. Samples with pH_{FOX} less than 3 were typically obtained from younger, poorly consolidated alluvial soils comprising estuarine clays and clayey sands, indicating a moderate to high likelihood for oxidisable sulfur/PASS to be present within these types of materials. Other samples representative of overconsolidated sandy clays and residual soils recorded pH_{FOX} values greater than 3, indicating moderate to low potential for oxidisable sulfur/PASS to be present.

It is noted that pH screen testing provides an indication of potential soil hazard, and cannot definitively confirm the presence of ASS, nor can it quantify the nature or strength of any acidity present. While the ASS hazard within the soil profile has been generally outlined with regard to soil type using pH screening, quantitative laboratory testing was carried out to confirm the strength and nature of acidity present.

5.6.2 Quantitative Laboratory Analysis

Quantitative laboratory analyses were completed on 97 samples using the CRS suite of testing in order to quantify the severity and nature of acidity or potential acidity present in the soil profile. Based on the nature of the proposed disturbance (being greater than 1000 tonnes), an action criteria of **0.03%S (18 mol H⁺ per tonne)** was adopted for comparison with the combined actual plus potential acidity results.

Of the 97 samples selected for quantitative testing, 76 samples recorded a combined net acidity which exceeded the 18 mol H⁺ per tonne action criteria, confirming the extensive presence of acidic soil, within the soil profiles across the site. Recorded net acidity ranged from < 3 to 300 mol H⁺ per tonne.



It is noted that of the 76 samples which exceeded the action criteria, only one sample (BH110; 3.5-3.75m), recorded significant levels of oxidisable sulfur (S_{CR}), thus indicating that the levels of net acidity encountered primarily comprised of existing acidity, with no potential for the creation of additional sulfuric acidity if disturbed (excluding deeper soils in vicinity of BH110).

5.7 Spatial Distribution of ASS and Acidic Soil

Outcomes of the investigation and testing found significant levels of existing acidity to be present within the alluvial sediments and soils which underly the subject site. The acidic soil hazard is further characterised for respective works areas below.

Proposed Borrow Area

Soils which will be disturbed during excavation of the proposed borrow area, will generally include sandy/silty clays and silty/clayey sands to an estimated depth of 3 m BGL, which have been characterised as follows:

- **Organic Topsoil** (Up to 0.5 m BGL) – Contains actual acidity (AASS) ranging from 39 to 162 mol H⁺ per tonne. No significant oxidisable sulfur / PASS present.
- **Interlayered Alluvial Soil (Excluding BH110; below 3 m BGL)** – Contains actual acidity (AASS) ranging from 10 to 300 mol H⁺ per tonne. No oxidisable sulfur / PASS present.
 - » **Organic Silt and Silty Clay Present in BH110, below a depth of 3 m BGL** - Contains both AASS and high levels of PASS, with a reported net acidity of 1085 mol H⁺ per tonne. This material presents a high risk of generating significant volumes of sulfuric acidity if disturbed but is likely located below the anticipated extent of excavation.

Specific soil and water management will be required during excavation of the borrow area involving disturbance of the characterised alluvial soil profile.

Early Release Residential Area

The soil profile across the early release residential area has been characterised as follows:

- **Organic Topsoil** (Up to 0.5 m BGL) – Contains actual acidity (combination of ANS and AASS) ranging from 3 to 61 mol H⁺ per tonne. No significant oxidisable sulfur / PASS present.
- **Interlayered Alluvial Soil** – Contains actual acidity (mostly ANS acidity) ranging from 3 to 224 mol H⁺ per tonne. No oxidisable sulfur / PASS present.
- **Inferred Residual Soil** – Contains actual acidity (ANS) ranging from < 18 to 61 mol H⁺ per tonne. No AASS / PASS present.

Anticipated ground disturbance across the proposed early release residential area includes stripping of organic topsoil, and placement of fill only. Underlying alluvial and residual materials are not expected to be significantly disturbed by the proposed works. Furthermore, the placement of anticipated fill loads across the residential fill zone would not result in the displacement of underlying soils or alteration to groundwater conditions.

5.7.1 ASS Risk Characterisation

Based on an excavation of approximately 250,000 m³ from the proposed borrow area, with an average net acidity of 88 mol H⁺ per tonne, these 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*.



It is noted that this categorisation rating is principally due to the large volume of material to be disturbed, as opposed to strength and nature of acidity present and has assumed the acidity to be associated with ASS. Whilst it is noted that the project would fall within the extra high treatment category, it is expected that due to the lack of identified PASS hazard, these works can be managed through application of conventional environmental strategies for ASS and ANS soil.

6. 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 to any areas outside the identified works area;
- Neutralisation of disturbed ASS and ANS soil (where potential risk exists), and successful verification testing; and
- Containment, testing and treatment (where necessary) of any construction waters collected during the excavation and treatment processes.

6.1 Contractor Responsibilities

Any Contractor/s responsible for soil disturbance at the site must conduct operations in accordance with this ASSMP. The Contractor will incorporate the requirements of this ASSMP into any subsequent construction and environmental management planning. Erosion and sediment control measures must be applied in accordance with current industry best practice to contain and control quality of site runoff waters during construction.

Whilst undertaking any works at the site, the Contractor/s will maintain appropriately detailed records in the following areas:

- Results of any ASS testing as required by this ASSMP.
- Location of soil moved during the treatment process, including the source and final destination, as well as quantities of ameliorant (aglime) added to the soil for neutralisation.
- A register of all agricultural lime delivered to site and used for the purpose of soil neutralisation, including the volumes of soil treated, and respective treatment rates.
- Results of any surface and ground water monitoring as required by this ASSMP; and
- Incidents, near incidents or complaints related to the performance of ASSMP requirements during the works.

6.1.1 Training and Orientation

Appropriate training will be provided to all Contractor's staff involved in earthworks on the site, to be delivered as part of site induction. Sessions must 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.



6.1.2 Management of Non-Conformance Issues

The Contractor will be responsible 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 Site Management Plan 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.

6.2 Management of Disturbed Material

All material excavated or otherwise disturbed from within the proposed borrow area has been characterised as containing significant levels of existing AASS and must be treated to neutralise the respective levels of acidity present. Materials stripped from the proposed early release residential area, in preparation for placement of fill have also been characterised as containing significant levels of existing AASS and must also be treated to neutralise the respective levels of acidity present.

Excavated soil will be mixed with a neutralising agent (fine agricultural lime) at predetermined rates, as calculated from quantitative testing results.

Areas characterised as containing primarily non-sulfuric acidity, were generally located across the residential fill zone, below the level of proposed disturbance, and are not expected to be significantly disturbed. Similarly, PASS material was only encountered in BH110 at depth greater than 3 m BGL, which is beyond the proposed depth for excavation.

6.2.1 Soil Treatment Methodology

Prior to the commencement of any excavation works 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.

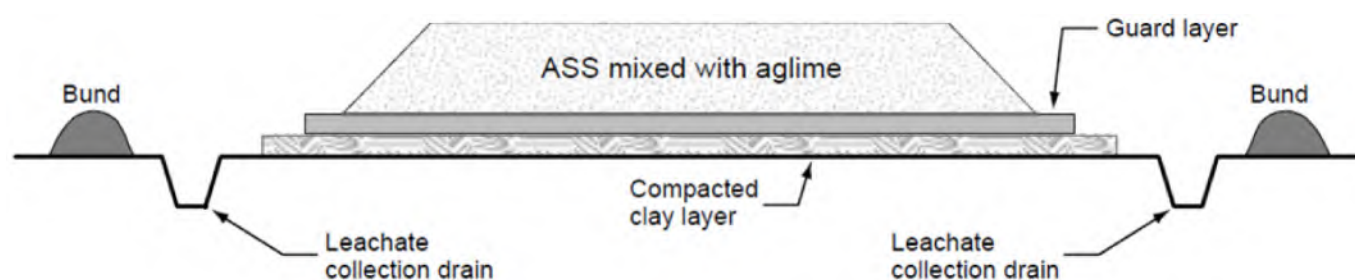


The treatment area/s shall consist of a near level area effectively controlled by drainage or earthen bunds (of non-ASS material or previously treated and verified material), placed to prevent the escape of acidic leachate or runoff from untreated/stockpiled material during the treatment process. The drainage and bunding must also exclude stormwater from areas outside the treatment area from entering the treatment area.

Appropriate erosion and sediment control measures must be implemented in accordance with the International Erosion Control Association's Best Practice Guidelines, to 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 any 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.

If the selected treatment areas are to be the final placement destination of the excavated material, geotechnical advice is to 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 5 below.



Text Figure 5: 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.

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. ASS shall be stockpiled for no more than 48 hours prior to neutralisation.

Lime treatment will be completed at the rates specified in Table 1 in Section 6.2.2.

To achieve successful treatment, it is critical that the appropriate quantity of lime is thoroughly mixed with the excavated material. Excavated material must 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.



6.2.2 Recommended Liming Rates

Recommended lime treatment rates for characterised materials are detailed in Table 1 below. 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 1: Recommended Lime Application Rates

Works Area	Materials	Risk Characterisation	Liming Rate
Borrow Area	Topsoil (0.0-0.5 m BGL)	AASS	12 kg/m ³
	Alluvial Sands & Clays	AASS	15 kg/m ³
	Organic Silts (BH110; below 3 m BGL only)	AASS/PASS	140 kg/m ³
Residential Fill Zone	Topsoil (0.0-0.5 m BGL)	AASS	6 kg/m ³

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.

6.2.3 Verification Testing

Verification testing shall be carried out on all treated ASS material to confirm successful treatment has been undertaken.

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 mixing material 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.

The frequency of verification testing is set at one sample per 1000 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.

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.

6.3 Management of *In-situ* ASS

6.3.1 Groundwater & Dewatering

Groundwater conditions across the site were variable, being dependant on local topography and proximity to surface water drainage. Groundwater was not typically observed across elevated (> RL 2 m) parts of the site; however seepage and groundwater inflow was generally observed between 1 m to 3 m BGL, across the borrow area, and across lower lying sections of the residential fill zone. Groundwater was typically perched or confined within sandy layers, or above and/or below less permeable clay layers following rainfall events.

As PASS was not typically present within the borrow area above a depth of 3 m BGL (~RL -2.5 m), lowering of the groundwater table across the proposed borrow area, to facilitate excavation, would not be expected to result in significant generation of *in situ* sulfuric acid. Excavation of materials from the borrow area could therefore be undertaken utilising dry excavation methods.

The excavation area will be internally graded to drain to a lower sump point, from where construction waters (comprising a combination of surface runoff and groundwater seepage), are pumped to a settlement basin located, on the down-stream side of the excavation area. Waters within the settlement basin would be treated (where necessary) to achieve required water quality criteria, prior to controlled release. The volumes of groundwater seepage and construction runoff requiring treatment would vary depending on rainfall conditions.

Using this methodology, passive dewatering would occur to the proposed excavation depth of 3 m BGL (~RL -2.5 m), which would result in negligible risk of *in situ* acidification, as PASS were not present above this depth. Any existing acidity, present in the soil profile above a depth of 3 m BGL, would be captured



within the excavation, managed and neutralised as part of the construction water quality management and release process.

Upon completion of the required excavation, passive dewatering will cease, and the excavation allowed to refill with groundwater and surface water runoff, creating a temporary lake water body (which is expected to form part of the future marina).

Where excavation and passive dewatering is being undertaken within the borrow area, the following management strategies will be utilised during periods of dewatering:

- Excavation undertaken continuously from start to finish, to minimise the extent of passive dewatering and exposure timeframes. Passive dewatering will be ceased, and the excavation allowed to refill within 3 days, of any non-consecutive excavation works occurring (i.e. breaks in excavation exceeding three days).
- Quality of construction water within the borrow area and settlement basin will be monitored as per Section 7 below, to ensure acidification is not occurring. Active management will be triggered, where low pH waters are encountered, and management measures will be undertaken to adjust the pH of construction waters to a neutral range (6.5 to 8.0) prior to controlled release.
- Depth of any passive dewatering shall be limited to within 0.5 metre of the base of the required excavation (~RL 3 m).

6.3.2 Fill Placement

Where fill is placed over compressible soils or relatively flat areas (where standing groundwater exists), the load imposed by the fill can cause settlement and /or mounding of the groundwater. 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 the borehole logs. The anticipated loads associated with fill placement on the site are about 20 kPa.

The investigation indicated that subgrade soils across the proposed fill areas were competent, having a bearing capacity more than the anticipated fill loads. Potential for settlement, heave or uncharacteristic soil movement was unlikely to occur within, or around, the perimeter of the fill platform. Furthermore, there is expected to be no change to the hydraulic conductivity of the underlying aquifer materials, with significant mounding of the groundwater considered unlikely to occur.



7. Water Quality Management

A detailed Erosion and Sediment Control Plan will be prepared by the Contractor prior to the commencement of works, 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 must 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 release of construction waters, such as from the dewatering sump or settlement basins, must comply with Table 2 Site Water Quality Release Criteria, shown in Section 7.1.

7.1 Construction Water Quality

All upstream surface water flows, with potential to enter the borrow areas must be diverted around proposed excavation works.

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 settlement basin(s) and 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 2 (over page) may be discharged to the receiving environment.

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.

Uncontrolled release of construction waters will not be permitted. If discharge from the site is required, the performance criteria detailed in Table 2 (over page) must be met prior to release. The Contractor will be responsible for ensuring relevant water quality criteria are met prior to discharge.



Table 2: Water Quality Release Criteria

Indicator	Release Limit	Criteria Type
pH	6.0 to 8.0 ^{1.}	Range
Turbidity	To be determined by site specific correlation testing ^{2.}	Maximum
Total Suspended Solids	< 50 mg/L	Maximum
Dissolved Oxygen	85% to 110 % saturation	Range
Dissolved Aluminium	0.2 mg/L	Maximum
Dissolved Iron	0.3 mg/L	Maximum
Litter/Gross Pollutants	No visible litter washed from the site, nor any unsightly flocs deposited in waters downstream of any discharge point.	

Notes:

1. It should be noted that groundwater in the area is expected to be somewhat naturally acidic (pH 4.5-6.5). As releases of treated water occur to Raff Creek and Caboolture River 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.

Water quality release limits requiring laboratory analyses must be collected from stored water bodies and tested on a daily 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.

7.2 Surface Water Monitoring

Surface water conditions in the borrow area and settlement basin will be regularly monitored throughout construction to gauge construction water conditions and to identify potential impacts to surface water which may be resulting from disturbance of ASS or acidic soils during construction activities.

Surface water monitoring as detailed herein will be completed primarily for the purpose of monitoring surface water conditions associated with borrow area excavations, identifying potential water quality impacts with regard to ASS, should they occur. 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 three surface water monitoring locations (ref Figure 2). SW1 will be located upstream of the borrow area to provide an indication of background surface water quality, SW2 will be located within the dewatering sump (representing groundwater seepage and construction water within the excavation), and SW3 will be located within the settlement pond



(representing managed surface water quality prior to release). Surface watering monitoring will be conducted as per the parameters and frequencies described in Table 3 below.

Table 3: Surface Water Monitoring Parameters and Frequencies

Parameter	Monitoring Frequency		
	Pre-Construction Phase	Construction Phase	Post Construction
pH (pH Unit)	Weekly for at least 4 rounds prior to construction	Weekly throughout construction works.	Weekly for a period of 2 months following completion of works.
Electrical Conductivity (mS/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 2 months following 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. 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.

8. 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 will 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 validation testing, together with discussion of any potential issues or non-compliances.

8.1 Closure Reporting

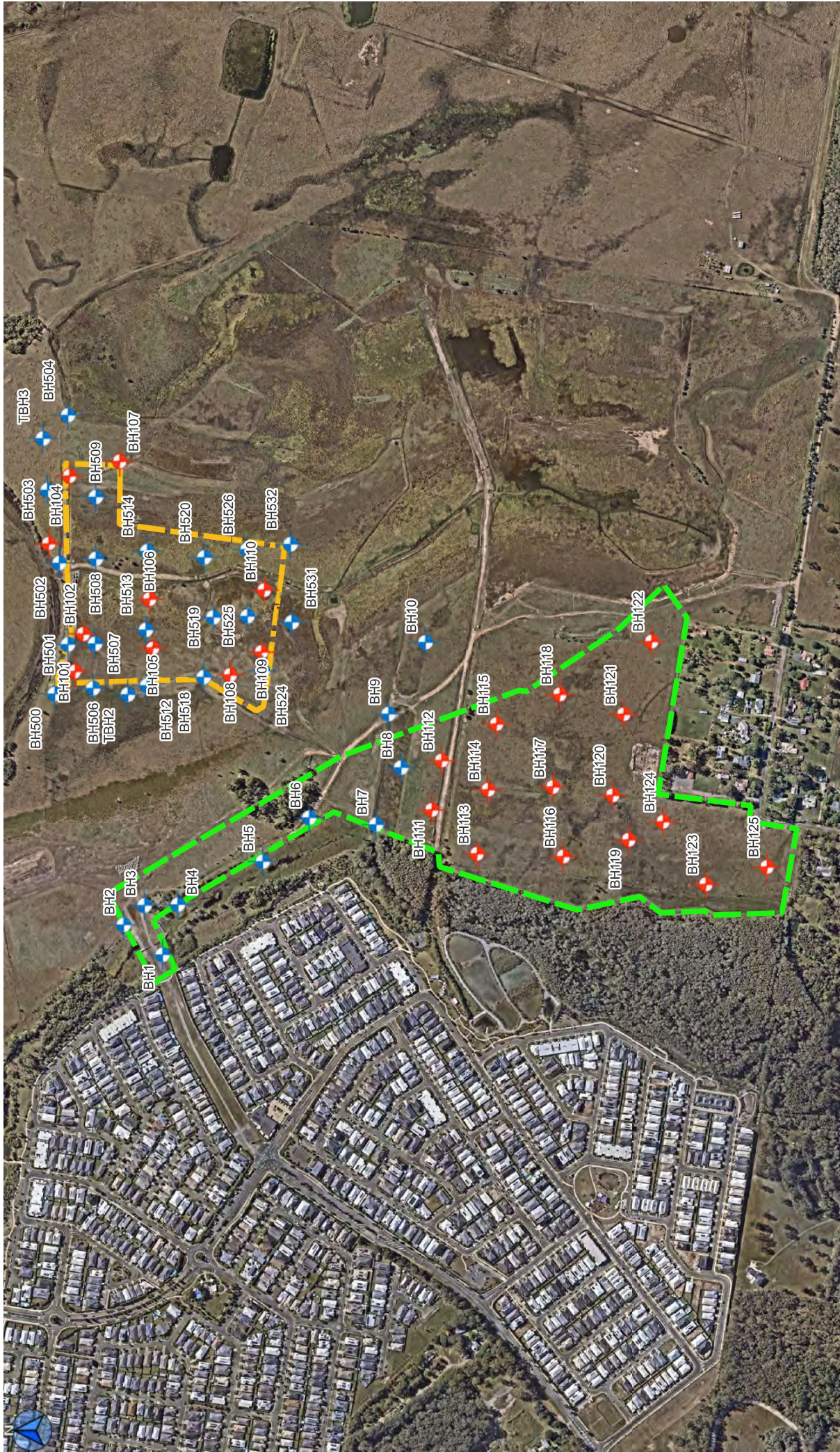
Following completion of bulk earthworks and site remediation, a Closure Report will be prepared to detail the effectiveness of site management measures undertaken during construction works. The closure report will summarise the details of ASS disturbance and management, including results of all ASS validation 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.

9. 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.

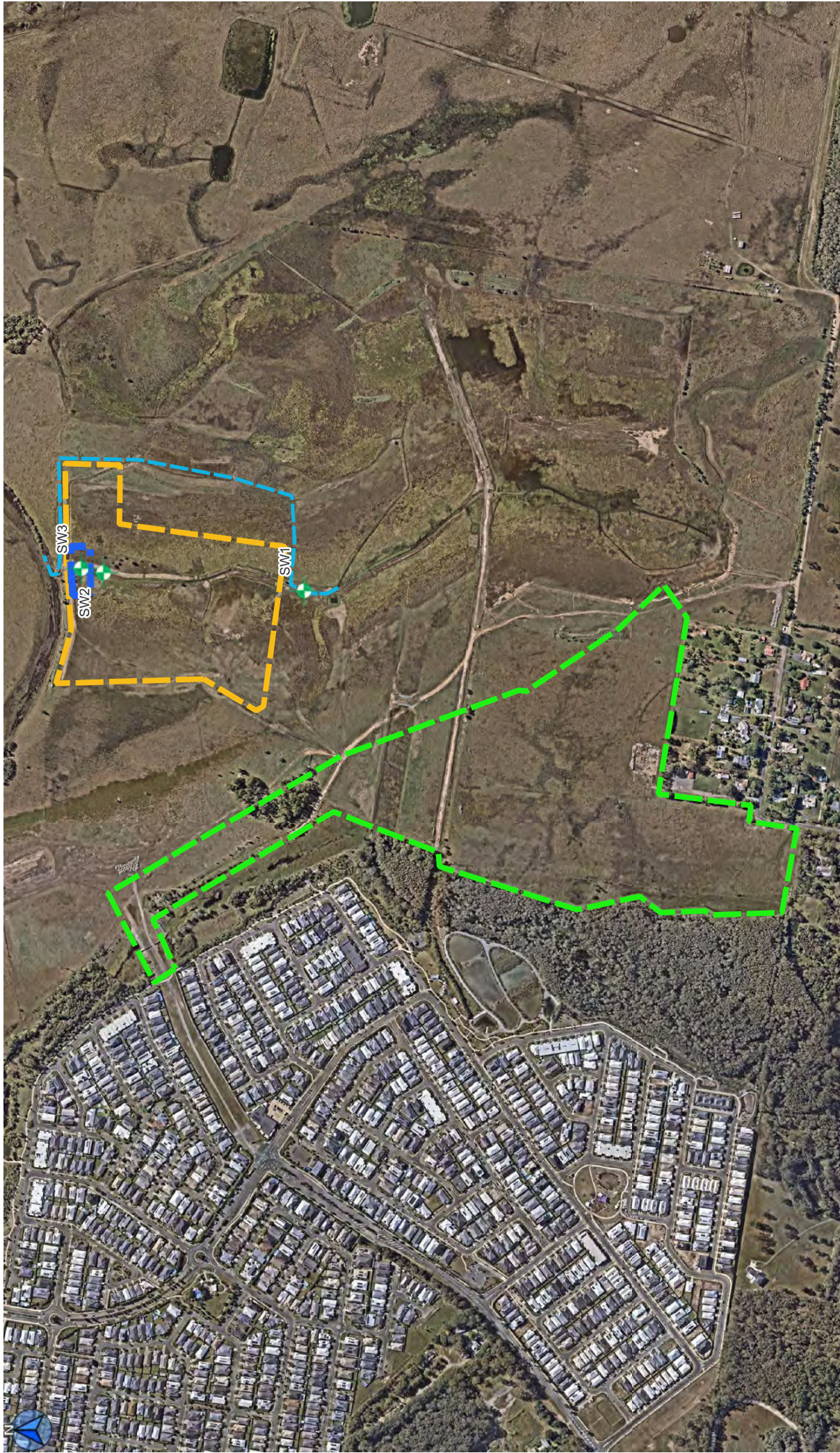
Your attention is drawn to the document "Limitations", which is included in Appendix C of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks associated with the services provided by Tectonic for this project.



LEGEND

- BOREHOLE LOCATIONS (CURRENT INVESTIGATION)
- BOREHOLE LOCATIONS (PAST INVESTIGATION)
- PROPOSED BORROW AREA (CUT)
- PROPOSED EARLY RELEASE AREA (FILL)

CLIENT		PROJECT		NOTES	
NORTH HARBOUR HOLDINGS		ACID SULFATE SOIL INVESTIGATION & MANAGEMENT PLAN		ACID SULFATE SOIL INVESTIGATION & MANAGEMENT PLAN	
DRAWN BY		DATE		DRAWING TITLE	
KAB		12/08/2025		PROPOSED EARLY RELEASE WORKS - NORTH HARBOUR MARINA, NORTH HARBOUR	
CHECKED BY		DATE		SITE PLAN	
MT		12/08/2025		BASEMAP COURTESY OF NEARMAP, DATED 8 JUNE 2025	
SCALE		SHEET SIZE		PROJECT NO.	
AS SHOWN		A3		20334	
				DOC NO.	
				007	
				FIGURE NO.	
				1	
				REVISION	
				0	



LEGEND

-  SURFACE WATER MONITORING LOCATION
-  SEDIMENT/ SETTLEMENT BASIN
-  SURFACE WATER DIVERSION DRAIN
-  PROPOSED BORROW AREA (CUT)
-  PROPOSED EARLY RELEASE AREA (FILL)

CLIENT		PROJECT	
NORTH HARBOUR HOLDINGS		ACID SULFATE SOIL INVESTIGATION & MANAGEMENT PLAN	
DRAWN BY		PROPOSED EARLY RELEASE WORKS - NORTH HARBOUR MARINA, NORTH HARBOUR	
KAB	DATE	NOTES	
	12/08/2025	BASEMAP COURTESY OF NEARMAP, DATED 8 JUNE 2025	
CHECKED BY	DATE	DRAWING TITLE	
MT	12/08/2025	SURFACE WATER MONITORING PLAN	
SCALE	SHEET SIZE	PROJECT NO.	FIGURE NO.
AS SHOWN	A3	20334	007
			REVISION
			2
			0

Appendix A

Borehole Logs & Explanation Notes



Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings		Commenced:		23/6/2025	
Project Name:		ASS Management Plan		Completed:		23/6/2025	
Hole Location:		North Harbour Marina, North Harbour		Logged By:		KAB	
Hole Position:		500460.0 m E 7000454.0 m N MGA2020 Zone 56		Checked By:		MT	
Drill Model and Mounting:		4WD Auger		Inclination:		-90°	
Hole Diameter:		100 mm		Bearing:		360°	
				RL Surface:		No survey	
				Datum:		AHD	
				Operator:		WD	

Drilling Information				Material Description and 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)	DCP TEST Blows per 100 mm				
AD/T	Not Encountered		ASS_@0.25m intervals_to_2.5m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark grey, with organics	W = PL	St	160					
						0.5	SC	Clayey SAND, fine to medium grained sand, grey mottled orange brown, medium plasticity clay fines	D	>20							
						1.0	CH	Silty CLAY, high plasticity, grey mottled orange brown, trace sand	M	VSt	250	Augered to 1.0m					
						1.5		with sand	St	170							
						2.0	SC	Clayey SAND, fine to medium grained, grey, medium plasticity clay fines, trace gravel, (Indurated/Cemented)	D to M	VD		Augered to 2.4m					
2.5												>20					
						2.5			Hole Terminated at 2.50 m Refusal on sandstone								
						3.0											
						3.5											
						4.0											

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	 VE - Very Easy E - Easy F - Firm H - Hard VH - Very Hard	 Level (Date) Inflow Partial Loss Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
	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	

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings
 Project Name: ASS Management Plan
 Hole Location: North Harbour Marina, North Harbour
 Hole Position: 500543.0 m E 7000444.0 m N MGA2020 Zone 56

Commenced: 23/6/2025
 Completed: 23/6/2025
 Logged By: KAB
 Checked By: MT

Drill Model and Mounting: 4WD Auger Inclination: -90° RL Surface: No survey
 Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: WD

Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm				
AD/T	Not Encountered		ASS_@0.25m intervals_to_2.5m			0.0		SP	Silty CLAY (TOPSOIL), high plasticity, dark grey, with organics	w = PL	F		150	Augered to 1.1m			
						0.5			SAND, fine to medium grained sand, grey mottled orange brown, trace silt	M	MD	>20					
						1.0		CI-CH	Sandy CLAY, medium to high plasticity, grey mottled orange brown, fine to coarse grained sand								
						1.5		CH	Silty CLAY, high plasticity, grey mottled orange brown, trace sand	w = PL	St						
						2.0		CH	Silty CLAY, high plasticity, orange brown, trace sand, (RESIDUAL)								
						2.5			tending to extremely weathered material	w < PL	VSt to H		Augered to 2.2m				
						2.5			Hole Terminated at 2.50 m Refusal on siltstone					>20			
						3.0											
						3.5											
						4.0											

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	 VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard	 Level (Date)  Inflow  Partial Loss  Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS- Bulk Disturbed Sample SPT- Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
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		

Method
 AD/T-Auger Drilling TC Bit
 AD/V-Auger Drilling V Bit
 RT - Rotary Tri-cone Bit
 RD - Rotary Drilling
 NMLC - Rock Core
 HA - Hand Auger

Penetration
 VE - Very Easy
 E - Easy
 F - Firm
 H - Hard
 VH - Very hard

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 (## mm)
 DS - Disturbed Sample
 BDS - Bulk 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
 Fr - Friable

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings		Commenced: 26/6/2025	
Project Name: ASS Management Plan		Completed: 26/6/2025	
Hole Location: North Harbour Marina, North Harbour		Logged By: KAB	
Hole Position: 500668.0 m E 7000495.0 m N MGA2020 Zone 56		Checked By: MT	
Drill Model and Mounting: 4WD Auger		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		Bearing: 360°	
		Datum: AHD	
		Operator: WD	

Drilling Information					Material Description and 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)	DCP TEST Blows per 100 mm				
AD/T		Groundwater seepage @1.1m	ASS_@0.25m intervals_to_4.0m			0.0		CI	Silty CLAY (TOPSOIL), medium plasticity, dark grey, with sand, with rootlets	St							
						0.5			w < PL	VSt	220						
						1.0		CH	Silty CLAY, high plasticity, grey mottled orange brown	w = PL	St	110					
						1.2		SC	Clayey SAND, fine to medium grained, grey, high plasticity clay fines	W	L						
						1.5		CH	Silty CLAY, high plasticity, grey mottled orange brown, trace sand, trace gravel			220					
						2.0											
						2.5			without gravel	w < PL		230					
						3.0						270					
						3.5						300					
						4.0											
Hole Terminated at 4.00 m Target depth																	

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard	Level (Date) Inflow Partial Loss Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS- Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
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					

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings			Commenced:		25/6/2025																
Project Name:		ASS Management Plan			Completed:		25/6/2025																
Hole Location:		North Harbour Marina, North Harbour			Logged By:		SB																
Hole Position:		500791.0 m E 7000465.0 m N MGA2020 Zone 56			Checked By:		MT																
Drill Model and Mounting:		4WD Auger		Inclination:		-90°		RL Surface:		No survey													
Hole Diameter:		100 mm		Bearing:		360°		Datum:		AHD Operator: WD													
Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm									
AD/T		Not Encountered	ASS_@0.25m intervals_to_4.0m			0.0		CI	Sandy CLAY, medium plasticity, brown, fine to medium grained sand, organics	w = PL	F		100	200	300	400	500	0	5	10	15	20	25
						0.1		organics cease	St														
						0.2																	
						0.3																	
						0.4																	
						0.5																	
						0.6																	
						0.7																	
						0.8																	
						0.9																	
						1.0																	
						1.1																	
						1.2																	
						1.3																	
						1.4																	
1.5																							
1.6																							
1.7																							
1.8																							
1.9																							
2.0																							
2.1																							
2.2																							
2.3																							
2.4																							
2.5																							
2.6																							
2.7																							
2.8																							
2.9																							
3.0																							
3.1																							
3.2																							
3.3																							
3.4																							
3.5																							
3.6																							
3.7																							
3.8																							
3.9																							
4.0																							
									Hole Terminated at 4.00 m Target depth														
Method		Penetration		Water		Samples and Tests		Moisture Condition		Consistency/Relative Density													
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC-Rock Core HA - Hand Auger		 VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard		 Level (Date) Inflow Partial Loss Complete Loss		U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS- Bulk Disturbed Sample SPT- Standard Penetration Test		D - Dry M - Moist W - Wet		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 Fr - Friable													
		Graphic Log/Core Loss						Plastic Limit															
		 Core recovered (hatching indicates material) Core loss						< PL = PL < PL															
		</																					

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings
 Project Name: ASS Management Plan
 Hole Location: North Harbour Marina, North Harbour
 Hole Position: 500502.0 m E 7000327.0 m N MGA2020 Zone 56

Commenced: 23/6/2025
 Completed: 23/6/2025
 Logged By: KAB
 Checked By: MT

Drill Model and Mounting: 4WD Auger Inclination: -90° RL Surface: No survey
 Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: WD

Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm					
AD/T	Not Encountered		ASS_@0.25m intervals_to_3.0m			0.0		SP	Silty CLAY (TOPSOIL), high plasticity, dark grey, fine to medium grained sand, with organics	w = PL	F							
						0.1		L			L							
						0.2		M			M							
						0.3		D			D							
						0.4		CI	SAND, fine to medium grained, grey, with silt, trace clay	w < PL	VSt	300						
						0.5		CH	Silty CLAY, medium plasticity, grey mottled orange brown, trace sand									
						0.6			Silty CLAY, high plasticity, grey mottled orange brown, red brown									
						0.7						150						
						0.8				w = PL	St							
						0.9												
						1.0			trace sand			130						
						1.1												
						1.2												
						1.3												
						1.4												
						1.5												
						1.6												
						1.7												
						1.8												
						1.9												
						2.0		CH	Silty CLAY, high plasticity, pale grey mottled orange brown, (RESIDUAL)									
						2.1												
						2.2												
						2.3												
						2.4												
						2.5												
						2.6												
						2.7												
						2.8												
						2.9												
						3.0			Hole Terminated at 3.00 m Refusal on sandstone									
						3.1												
						3.2												
						3.3												
						3.4												
						3.5												
						3.6												
						3.7												
						3.8												
						3.9												

Method

AD/T-Auger Drilling TC Bit
AD/V-Auger Drilling V Bit
RT - Rotary Tri-cone Bit
RD - Rotary Drilling
NMLC- Rock Core
HA - Hand Auger

Penetration



VE - Very Easy
E - Easy
F - Firm
H - Hard
VH - Very hard

Water



Level (Date)



Inflow



Partial Loss



Complete Loss

Samples and Tests

U## - Undisturbed Sample (## mm)
DS - Disturbed Sample
BDS- Bulk 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
Fr - Friable

Plastic Limit

< PL
= PL
< PL

Classification Symbols and Soil Descriptions

Based on Unified Soil Classification System

Graphic Log/Core Loss



Core recovered (hatching indicates material)



Core loss

Method
 AD/T-Auger Drilling TC Bit
 AD/V-Auger Drilling V Bit
 RT - Rotary Tri-cone Bit
 RD - Rotary Drilling
 NMLC - Rock Core
 HA - Hand Auger

Penetration
 VE - Very Easy
 E - Easy
 F - Firm
 H - Hard
 VH - Very hard

Water
 Level (Date)
 Inflow
 Partial Loss
 Complete Loss

Samples and Tests
 U## - Undisturbed Sample (## mm)
 DS - Disturbed Sample
 BDS - Bulk 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
 Fr - Friable

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

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings
 Project Name: ASS Management Plan
 Hole Location: North Harbour Marina, North Harbour
 Hole Position: 500600.0 m E 7000280.0 m N MGA2020 Zone 56

Commenced: 26/6/2025
 Completed: 26/6/2025
 Logged By: KAB
 Checked By: MT

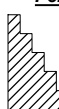
Drill Model and Mounting: 4WD Auger Inclination: -90° RL Surface: No survey
 Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: WD

Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm						
AD/T		Groundwater seepage @2.7m	ASS_@0.25m intervals_to_4.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark grey, trace sand, trace rootlets Silty CLAY, high plasticity, dark grey	w < PL	F	100		0	5	10	15	20	25
						0.5													
						1.0													
						1.5													
						2.0													
						2.5													
						3.0													
						3.5													
						4.0													
						</													

Method

AD/T-Auger Drilling TC Bit
 AD/V-Auger Drilling V Bit
 RT - Rotary Tri-cone Bit
 RD - Rotary Drilling
 NMLC - Rock Core
 HA - Hand Auger

Penetration



VE - Very Easy
 E - Easy
 F - Firm
 H - Hard
 VH - Very Hard

Water



Level (Date)
 Inflow
 Partial Loss
 Complete Loss

Samples and Tests

U## - Undisturbed Sample (## mm)
 DS - Disturbed Sample
 BDS - Bulk 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
 Fr - Friable

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

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings		Commenced:		25/6/2025	
Project Name:		ASS Management Plan		Completed:		25/6/2025	
Hole Location:		North Harbour Marina, North Harbour		Logged By:		SB	
Hole Position:		500826.0 m E 7000375.0 m N MGA2020 Zone 56		Checked By:		MT	
Drill Model and Mounting:		4WD Auger		Inclination:		-90°	
Hole Diameter:		100 mm		Bearing:		360°	
				RL Surface:		No survey	
				Datum:		AHD	
				Operator:		WD	

Drilling Information				Material Description and 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)	DCP TEST Blows per 100 mm					
AD/T			ASS_@0.25m intervals_to_4.0m		RL (m)	0.0		CH	Sandy CLAY, high plasticity, dark grey, fine to medium grained sand, trace organics to 200mm	w = PL	S	100	0	5	10	15	20	25
						0.5			becoming grey									
						1.0		SC	Clayey SAND, fine to coarse grained, grey, trace gravels	W	MD	200	5	10	15	20	25	
						1.5		CI	Sandy CLAY, medium plasticity, pale brown, grey, fine to medium grained sand									
						2.0				w = PL	VSt	300	10	15	20	25		
2.5																		
3.0				w = PL	VSt to H	400	15	20	25									
3.5																		
4.0																		
						4.0			Hole Terminated at 4.00 m Target depth									

Method
AD/T-Auger Drilling TC Bit
AD/V-Auger Drilling V Bit
RT - Rotary Tri-cone Bit
RD - Rotary Drilling
NMLC - Rock Core
HA - Hand Auger

Penetration
VE - Very Easy
E - Easy
F - Firm
H - Hard
VH - Very hard

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U## - Undisturbed Sample (## mm)
DS - Disturbed Sample
BDS - Bulk 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
Fr - Friable

Plastic Limit
< PL
= PL
> PL

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings		Commenced: 23/6/2025	
Project Name: ASS Management Plan		Completed: 23/6/2025	
Hole Location: North Harbour Marina, North Harbour		Logged By: KAB	
Hole Position: 500463.0 m E 7000196.0 m N MGA2020 Zone 56		Checked By: MT	
Drill Model and Mounting: 4WD Auger		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		Bearing: 360°	
		Datum: AHD	
		Operator: WD	

Drilling Information					Material Description and 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)	DCP TEST Blows per 100 mm				
AD/T		Groundwater seepage @ 1.5m	ASS @ 0.25m intervals to 4.0m			0.0			Silty CLAY (TOPSOIL), high plasticity, dark grey, with organics	w = PL	F	100					
						0.5	CH	Silty CLAY, high plasticity, dark grey	110								
						1.0		becoming grey mottled orange brown	120								
						1.5		becoming pale grey	110								
						2.0	CH	Silty Sandy CLAY, high plasticity, grey, fine to coarse grained sand, trace gravels	220								
						2.5			300								
						3.0	CI	Silty Sandy CLAY, medium plasticity, orange brown mottled grey, trace sand, (RESIDUAL)	260								
						3.5		becoming red brown mottled grey									
						4.0		Hole Terminated at 4.00 m Target depth									

Method
AD/T-Auger Drilling TC Bit
AD/V-Auger Drilling V Bit
RT - Rotary Tri-cone Bit
RD - Rotary Drilling
NMLC - Rock Core
HA - Hand Auger

Penetration
VE - Very Easy
E - Easy
F - Firm
H - Hard
VH - Very hard

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 (## mm)
DS - Disturbed Sample
BDS - Bulk 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

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
Fr - Friable

Plastic Limit
< PL
= PL
> PL

Engineering Log - Borehole

Project No.: 20334

[illegible]

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings				Commenced:		26/6/2025															
Project Name:		ASS Management Plan				Completed:		26/6/2025															
Hole Location:		North Harbour Marina, North Harbour				Logged By:		KAB															
Hole Position:		500597.0 m E 7000102.0 m N MGA2020 Zone 56				Checked By:		MT															
Drill Model and Mounting:		4WD Auger		Inclination:		-90°		RL Surface:		No survey													
Hole Diameter:		100 mm		Bearing:		360°		Datum:		AHD Operator: WD													
Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm									
AD/T			ASS_@0.25m intervals_to_4.0m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, dark grey, trace sand, trace rootlets	w = PL	F	x ₉₆	100	200	300	400	500	0	5	10	15	20	25
									Silty CLAY, high plasticity, dark grey														
						1.0			becoming pale brown														
						1.5																	
						2.0					St												
						2.5																	
						3.0			SILT, medium plasticity, dark grey/brown, with fine to medium grained sand, trace organics		S												
						3.5		CH	Silty CLAY, high plasticity, dark grey/brown, trace fine to medium grained sand		F												
						4.0			Hole Terminated at 4.00 m Target depth														
Method AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC- Rock Core HA - Hand Auger Penetration  VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard Water  Level (Date) Inflow Partial Loss Complete Loss Samples and Tests U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS- Bulk 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 Fr - Friable 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																							

Engineering Log - Borehole

Project No.: 20334

Client:	North Harbour Holdings	Commenced:	24/6/2025
Project Name:	ASS Management Plan	Completed:	24/6/2025
Hole Location:	North Harbour Marina, North Harbour	Logged By:	SB
Hole Position:	500218.0 m E 6999853.0 m N MGA2020 Zone 56	Checked By:	MT

Drill Model and Mounting:	4WD Auger	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	WD

Drilling Information					Material Description and 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)	DCP TEST Blows per 100 mm								
AD/T		Groundwater seepage @1.0m	ASS_@0.25m intervals_to_2.0m			0.0			Sandy CLAY (TOPSOIL), medium plasticity, brown	w = PL	St										
						0.5	SC	Clayey SAND, fine to medium grained, pale brown, pale grey	M												
						1.0	SP	SAND, fine to medium grained, pale grey	MD												
						1.5			W												
						2.0	CI	Sandy CLAY, medium plasticity, pale grey	w < PL	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 AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	Penetration VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard	Water Level (Date) Inflow Partial Loss Complete Loss	Samples and Tests U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk 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 Fr - Friable
Graphic Log/Core Loss Core recovered (hatching indicates material) Core loss	Plastic Limit < PL = PL < PL	Classification Symbols and Soil Descriptions Based on Unified Soil Classification System			

Engineering Log - Borehole

Project No.: 20334

Client:	North Harbour Holdings	Commenced:	24/6/2025
Project Name:	ASS Management Plan	Completed:	24/6/2025
Hole Location:	North Harbour Marina, North Harbour	Logged By:	SB
Hole Position:	500330.0 m E 6999836.0 m N MGA2020 Zone 56	Checked By:	MT

Drill Model and Mounting:	4WD Auger	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	WD

Drilling Information					Material Description and 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)	DCP TEST Blows per 100 mm						
AD/T		Groundwater seepage @1.0m	ASS_@0.25m intervals_to_2.0m			0.0			Clayey SAND (TOPSOIL), fine to medium grained, brown	L	M	100	21/100	0	5	10	15	20	25
						0.5	SP	SAND, fine to medium grained, pale brown, trace clay fines	200										
						1.0	MD		300										
						1.5	W	D to VD	400										
2.0	SC	Clayey SAND, fine to coarse grained, pale grey, brown, yellow brown, trace gravel	500																
						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 AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	Penetration VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard Core recovered (hatching indicates material) Core loss	Water Level (Date) Inflow Partial Loss Complete Loss	Samples and Tests U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk 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 Fr - Friable
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TECTONIC 3.00.2 LIB GLE Log 1 TECTONIC BOREHOLE 20334 2025.GPJ <<DrawingFiles>> 13/6/2025 08:41 10.02.00.04 D:\git\Lab and In Situ Tool - DGD\1 Lib\ Tectonic 3.00.2 2021-03-30 Proj\ Tectonic 3.00.2 2021-03-30

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings				Commenced:		24/6/2025																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Project Name:		ASS Management Plan				Completed:		24/6/2025																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Hole Location:		North Harbour Marina, North Harbour				Logged By:		SB																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Hole Position:		500149.0 m E 6999754.0 m N MGA2020 Zone 56				Checked By:		MT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Drill Model and Mounting:		4WD Auger		Inclination:		-90°		RL Surface:		No survey																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Hole Diameter:		100 mm		Bearing:		360°		Datum:		AHD Operator: WD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
AD/T			ASS_@0.25m intervals_to_2.0m			0.5		CI	Sandy CLAY, medium plasticity, brown, fine to medium grained sand, trace organics	w = PL	F																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings		Commenced: 24/6/2025	
Project Name: ASS Management Plan		Completed: 24/6/2025	
Hole Location: North Harbour Marina, North Harbour		Logged By: SB	
Hole Position: 500258.0 m E 6999739.0 m N MGA2020 Zone 56		Checked By: MT	
Drill Model and Mounting: 4WD Auger		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		Bearing: 360°	
		Datum: AHD	
		Operator: WD	

Drilling Information					Material Description and 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)	DCP TEST Blows per 100 mm								
												100 200 300 400 500	0	5	10	15	20	25			
AD/T		Groundwater seepage @0.1m	ASS_@0.25m intervals_to_2.0m			0.0			Sandy CLAY (TOPSOIL), medium plasticity, brown, fine to medium grained sand	w = PL	F to St		HW								
						0.5	CI	Sandy CLAY, medium plasticity, brown, fine to medium grained sand													
						1.0	SP	Clayey SAND, fine to medium grained, grey, trace gravels	M to W	MD											
						1.5															
						2.0			Hole Terminated at 2.00 m Target depth												
						2.5															
						3.0															
						3.5															
						4.0															

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	 VE - Very Easy  E - Easy  F - Firm  H - Hard  VH - Very hard	 Level (Date)  Inflow  Partial Loss  Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
	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	

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings		Commenced:		24/6/2025	
Project Name:		ASS Management Plan		Completed:		24/6/2025	
Hole Location:		North Harbour Marina, North Harbour		Logged By:		SB	
Hole Position:		500372.0 m E 6999732.0 m N MGA2020 Zone 56		Checked By:		MT	
Drill Model and Mounting:		4WD Auger		Inclination:		-90°	
Hole Diameter:		100 mm		Bearing:		360°	
				RL Surface:		No survey	
				Datum:		AHD	
				Operator:		WD	

Drilling Information				Material Description and 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)	DCP TEST Blows per 100 mm					
AD/T		Groundwater seepage @1.0m	ASS_@0.25m intervals_to_2.0m			0.0			Gravelly CLAY (TOPSOIL), medium plasticity, brown, trace organics	w = PL	St	100	0					
						0.5		CI	Gravelly CLAY, medium plasticity, brown, fine sized gravel, trace fine to coarse grained sand		F	200	5					
						1.0		SC	Clayey SAND, fine to coarse grained, grey	W	MD	300	10					
						1.5						400	15					
						2.0			Hole Terminated at 2.00 m Target depth			500	20					
						2.5							25					
						3.0												
						3.5												
						4.0												

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	 VE - Very Easy  E - Easy  F - Firm  H - Hard  VH - Very hard	 Level (Date)  Inflow  Partial Loss  Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
	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	

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings		Commenced:		23/6/2025	
Project Name:		ASS Management Plan		Completed:		23/6/2025	
Hole Location:		North Harbour Marina, North Harbour		Logged By:		KAB	
Hole Position:		500137.0 m E 6999764.0 m N MGA2020 Zone 56		Checked By:		MT	
Drill Model and Mounting:		4WD Auger		Inclination:		-90°	
Hole Diameter:		100 mm		Bearing:		360°	
				RL Surface:		No survey	
				Datum:		AHD	
				Operator:		WD	

Drilling Information				Material Description and 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)	DCP TEST Blows per 100 mm					
AD/T			ASS_@0.25m intervals_to_2.0m			0.5		CI	Silty CLAY (TOPSOIL), high plasticity, dark grey, with organics	w = PL	F	150						
								CI	Silty CLAY, medium plasticity, grey brown, trace sand, trace gravel	w = PL	St	120						
								CI	Sandy CLAY, medium plasticity, grey, fine to coarse grained sand	w > PL	VSt	250						
								SC	Clayey SAND, fine to coarse grained, grey, medium plasticity clay fines	D to M	D	>20						
								Hole Terminated at 2.00 m Target depth										
						2.0												
						2.5												
						3.0												
						3.5												
						4.0												

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	 VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard	 Level (Date) Inflow Partial Loss Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
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	

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings
Project Name: ASS Management Plan
Hole Location: North Harbour Marina, North Harbour
Hole Position: 500272.0 m E 6999646.0 m N MGA2020 Zone 56

Commenced: 24/6/2025
Completed: 24/6/2025
Logged By: SB
Checked By: MT

Drill Model and Mounting: 4WD Auger Inclination: -90° RL Surface: No survey
Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: WD

Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
AD/T		Groundwater seepage @0.6m	ASS_@0.25m intervals_to_2.0m			0.5		CI	Sandy CLAY, (TOPSOIL), medium plasticity, grey, fine to medium grained sand, trace organics	w > PL	S to F																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings
 Project Name: ASS Management Plan
 Hole Location: North Harbour Marina, North Harbour
 Hole Position: 500423.0 m E 6999626.0 m N MGA2020 Zone 56

Commenced: 24/6/2025
 Completed: 24/6/2025
 Logged By: SB
 Checked By: MT

Drill Model and Mounting: 4WD Auger Inclination: -90° RL Surface: No survey
 Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: WD

Drilling Information						Material Description and 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)			DCP TEST Blows per 100 mm										
AD/T		Groundwater seepage @0.5m	ASS_@0.25m intervals_to_2.0m			0.0			Sandy CLAY (TOPSOIL), medium plasticity, dark grey, fine to medium grained sand, trace organics	w > PL	S to F		100	200	300	400	500	0	5	10	15	20	25			
						0.5	CI	Sandy CLAY, medium plasticity, grey, fine to medium grained sand	w = PL	F																
						1.0	SC	Clayey SAND, fine to medium grained, pale brown, pale grey, trace gravels	W	MD																
						1.5			M																	
						2.0	CI	Sandy CLAY, medium plasticity, pale grey, pale brown, fine to medium grained sand, (possible residual soil)	w = PL	St to VSt																
						2.0			Hole Terminated at 2.00 m Target depth																	
						2.5																				
						3.0																				
						3.5																				
						4.0																				

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC-Rock Core HA - Hand Auger	 VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard	 Level (Date)  Inflow  Partial Loss  Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS- Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
	 Core recovered (hatching indicates material)  Core loss				
			<u>Classification Symbols and Soil Descriptions</u> Based on Unified Soil Classification System	<u>Plastic Limit</u> < PL = PL < PL	

Method
 AD/T-Auger Drilling TC Bit
 AD/V-Auger Drilling V Bit
 RT - Rotary Tri-cone Bit
 RD - Rotary Drilling
 NMLC - Rock Core
 HA - Hand Auger

Penetration
 VE - Very Easy
 E - Easy
 F - Firm
 H - Hard
 VH - Very hard

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 (## mm)
 DS - Disturbed Sample
 BDS - Bulk 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
 Fr - Friable

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings		Commenced:		25/6/2025	
Project Name:		ASS Management Plan		Completed:		25/6/2025	
Hole Location:		North Harbour Marina, North Harbour		Logged By:		SB	
Hole Position:		500158.0 m E 6999524.0 m N MGA2020 Zone 56		Checked By:		MT	
Drill Model and Mounting:		4WD Auger		Inclination:		-90°	
Hole Diameter:		100 mm		Bearing:		360°	
				RL Surface:		No survey	
				Datum:		AHD	
				Operator:		WD	

Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm										
AD/T		Groundwater seepage @0.6m	ASS_@0.25m intervals_to_2.0m			0.0			CLAY (TOPSOIL), medium plasticity, dark grey, trace sand, trace organics	w = PL	F													
						0.5		CI	CLAY, medium plasticity, dark grey, brown		F to St													
						1.0					St to VSt													
						1.5		SC	Sandy CLAY, medium plasticity, grey, brown, (RESIDUAL)		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 AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	Penetration VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard	Water Level (Date) Inflow Partial Loss Complete Loss	Samples and Tests U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk 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 Fr - Friable
Graphic Log/Core Loss Core recovered (hatching indicates material) Core loss	Plastic Limit < PL = PL < PL	Classification Symbols and Soil Descriptions Based on Unified Soil Classification System			

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings		Commenced:		25/6/2025	
Project Name:		ASS Management Plan		Completed:		25/6/2025	
Hole Location:		North Harbour Marina, North Harbour		Logged By:		SB	
Hole Position:		500253.0 m E 6999545.0 m N MGA2020 Zone 56		Checked By:		MT	
Drill Model and Mounting:		4WD Auger		Inclination:		-90°	
Hole Diameter:		100 mm		Bearing:		360°	
				RL Surface:		No survey	
				Datum:		AHD	
				Operator:		WD	

Drilling Information				Material Description and 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)	DCP TEST Blows per 100 mm				
AD/T		Groundwater seepage @1.0m	ASS_@0.25m intervals_to_2.0m			0.0		CI	Sandy CLAY, (TOPSOIL), medium plasticity, brown, fine to medium grained sand, trace organics	w = PL	F	100	0				
						0.5			Sandy CLAY, medium plasticity, brown, fine to medium grained sand			200	5				
						1.0		SC	Clayey SAND, fine to medium grained, grey	W	D	300	10				
						1.5		SC	Sandy CLAY, medium plasticity, pale grey, red, fine to medium grained sand, (RESIDUAL)			400	15				
						2.0			Hole Terminated at 2.00 m Target depth			500	19.5				
						2.5											
						3.0											
						3.5											
						4.0											

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	 VE - Very Easy E - Easy F - Firm H - Hard VH - Very Hard	 Level (Date) Inflow Partial Loss Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
	Graphic Log/Core Loss		Classification Symbols and Soil Descriptions	Plastic Limit	
	 Core recovered (hatching indicates material) Core loss		Based on Unified Soil Classification System	< PL = PL < PL	

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings		Commenced:		24/6/2025	
Project Name:		ASS Management Plan		Completed:		24/6/2025	
Hole Location:		North Harbour Marina, North Harbour		Logged By:		SB	
Hole Position:		500392.0 m E 6999530.0 m N MGA2020 Zone 56		Checked By:		MT	
Drill Model and Mounting:		4WD Auger		Inclination:		-90°	
Hole Diameter:		100 mm		Bearing:		360°	
				RL Surface:		No survey	
				Datum:		AHD	
				Operator:		WD	

Drilling Information				Material Description and 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)	DCP TEST Blows per 100 mm				
AD/T		Groundwater seepage @1.0m	ASS_@0.25m intervals_to_2.0m			0.0			Clayey SAND (TOPSOIL), fine to medium grained, grey, trace organics	M	L to MD	100	0				
						0.5	SC	Clayey SAND, fine to medium grained, grey	200			5					
						1.0		CI	Sandy CLAY, medium plasticity, pale brown, red brown, (RESIDUAL)	w = PL	VSt	300	10				
						1.5		sandy lense	400			15					
						2.0			Hole Terminated at 2.00 m Target depth	H		500	20				
						2.5						600	25				
						3.0											
						3.5											
						4.0											

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	 VE - Very Easy  E - Easy  F - Firm  H - Hard  VH - Very hard	 Level (Date)  Inflow  Partial Loss  Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
	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	

Engineering Log - Borehole

Project No.: 20334

Client:		North Harbour Holdings				Commenced:		24/6/2025																
Project Name:		ASS Management Plan				Completed:		24/6/2025																
Hole Location:		North Harbour Marina, North Harbour				Logged By:		SB																
Hole Position:		500518.0 m E 6999478.0 m N MGA2020 Zone 56				Checked By:		MT																
Drill Model and Mounting:		4WD Auger		Inclination:		-90°		RL Surface:		No survey														
Hole Diameter:		100 mm		Bearing:		360°		Datum:		AHD Operator: WD														
Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm										
AD/T		Not Encountered	ASS_@0.25m intervals_to_2.0m			0.0			Clayey SAND (TOPSOIL), fine to medium grained, grey	M	L		100	200	300	400	500	0	5	10	15	20	25	
						0.5	SC	Clayey SAND, fine to medium grained, grey	M to W	MD														
						1.0	CI	Sandy CLAY, medium plasticity, grey, pale brown, fine to medium grained sand, (RESIDUAL) becoming pale grey, brown	w = PL	VSt														
						2.0			Hole Terminated at 2.00 m Target depth															
						2.5																		
						3.0																		
						3.5																		
						4.0																		
Method		Penetration		Water		Samples and Tests		Moisture Condition		Consistency/Relative Density														
AD/T-Auger Drilling TC Bit AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC-Rock Core HA - Hand Auger		VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard		Level (Date) Inflow Partial Loss Complete Loss		U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS- Bulk Disturbed Sample SPT- Standard Penetration Test		D - Dry M - Moist W - Wet		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 Fr - Friable														
Graphic Log/Core Loss		Plastic Limit		Classification Symbols and Soil Descriptions		Based on Unified Soil Classification System		Plastic Limit																
Core recovered (hatching indicates material) Core loss		< PL = PL > PL																						

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings
Project Name: ASS Management Plan
Hole Location: North Harbour Marina, North Harbour
Hole Position: 500117.0 m E 6999391.0 m N MGA2020 Zone 56

Commenced: 23/6/2025
Completed: 23/6/2025
Logged By: KAB
Checked By: MT

Drill Model and Mounting: 4WD Auger Inclination: -90° RL Surface: No survey
Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: WD

Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm				
AD/T	Not Encountered		ASS_@0.25m intervals_to_2.0m			0.0			Silty CLAY (TOPSOIL), high plasticity, dark grey, with organics	w = PL	S to F						
						0.5	CH	Silty CLAY, high plasticity, grey mottled orange brown, trace sand	St		180						
						1.0		trace gravel			250						
						1.5			VSt			>20					
						2.0		CI	Sandy CLAY, medium plasticity, grey mottled orange brown, fine to medium grained sand, (RESIDUAL)	w < PL to w = PL							
						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
AD/V-Auger Drilling V Bit
RT - Rotary Tri-cone Bit
RD - Rotary Drilling
NMLC - Rock Core
HA - Hand Auger

Penetration
VE - Very Easy
E - Easy
F - Firm
H - Hard
VH - Very hard
Core recovered (hatching indicates material)
Core loss

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 (## mm)
DS - Disturbed Sample
BDS- Bulk 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
Fr - Friable

Engineering Log - Borehole

Project No.: 20334

Client:	North Harbour Holdings	Commenced:	25/6/2025				
Project Name:	ASS Management Plan	Completed:	25/6/2025				
Hole Location:	North Harbour Marina, North Harbour	Logged By:	SB				
Hole Position:	500202.0 m E 6999453.0 m N MGA2020 Zone 56	Checked By:	MT				
Drill Model and Mounting:	4WD Auger	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	WD

Drilling Information						Material Description and 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)	DCP TEST Blows per 100 mm													
												100	200	300	400	500	0	5	10	15	20	25				
AD/T		Groundwater seepage @0.6m	ASS_@0.25m intervals_to_2.0m			0.0			Sandy CLAY (TOPSOIL), medium plasticity, brown, fine to medium grained sand	w = PL	F															
						0.5	CI	Sandy CLAY, medium plasticity, brown, fine to medium grained sand																		
						1.0	SC	Clayey SAND, fine to coarse grained, brown, grey, (RESIDUAL)	M to W	MD																
						1.5	CI	Sandy CLAY, medium plasticity, grey, fine to coarse grained sand	w = PL	H																
						2.0	SC	Clayey SAND, fine to coarse grained, pale grey	M	D																
						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 AD/V-Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	Penetration VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard	Water Level (Date) Inflow Partial Loss Complete Loss	Samples and Tests U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk 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 Fr - Friable
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			

Engineering Log - Borehole

Project No.: 20334

Client: North Harbour Holdings
Project Name: ASS Management Plan
Hole Location: North Harbour Marina, North Harbour
Hole Position: 500128.0 m E 6999274.0 m N MGA2020 Zone 56

Commenced: 25/6/2025
Completed: 25/6/2025
Logged By: SB
Checked By: MT

Drill Model and Mounting: 4WD Auger Inclination: -90° RL Surface: No survey
Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: WD

Drilling Information						Material Description and 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)					DCP TEST Blows per 100 mm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
AD/T		Not Encountered	ASS_@0.25m intervals_to_2.0m						Sandy CLAY (TOPSOIL), medium plasticity, dark brown, fine to medium grained sand	w = PL	F to St	100	200	300	400	500	0	5	10	15	20	25																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
						0.5	CI	Sandy CLAY, medium plasticity, dark brown, fine to medium grained sand																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 499978.0 m E 7000306.0 m N MGA94 Zone 56				Checked By: MT			
Drill Model and Mounting: Hand Auger				Inclination: -90°		RL Surface: No survey	
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)	Structure and Additional Observations
HA		Not Encountered	ASS 0.0-0.25m			0.5		CI	Silty CLAY, medium plasticity, dark brown, with organics and fine to medium grained sand	M	St		
			ASS 0.25-0.5m										
			ASS 0.5-0.7m					CH					
									Hole Terminated at 0.70 m Target depth				
						1.0							
						1.5							
						2.0							
						2.5							
						3.0							

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

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 500024.0 m E 7000385.0 m N MGA94 Zone 56				Checked By: MT			
Drill Model and Mounting: 4WD Auger				Inclination: -90°		RL Surface: No survey	
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)	Structure and Additional Observations
AD/T	[Hatching]	09/02/21, Groundwater level at 0.6m [Symbol]	ASS at 0.25m Intervals to 2.0m			0.5 1.0 1.5 2.0	[Symbol]	SM	Silty SAND, fine to coarse grained, dark brown	M	MD		
									becoming grey	M to W			
										W			
							[Symbol]	CH	Sandy CLAY, high plasticity, brown to grey, fine to medium grained sand	M	F to St		
						becoming pale grey to white							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							

Method AD/T - Auger Drilling TC Bit RR - Rock Roller RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	Penetration [Symbol] No resistance ranging to refusal [Symbol] Level (Date) [Symbol] Inflow [Symbol] Partial Loss [Symbol] Complete Loss	Water [Symbol] Level (Date) [Symbol] Inflow [Symbol] Partial Loss [Symbol] 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 [Symbol] Core recovered (hatching indicates material) [Symbol] Core loss			Classification Symbols and Soil Descriptions Based on Unified Soil Classification System		
			Plastic Limit < PL = PL < PL		

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 500059.0 m E 7000342.0 m N MGA94 Zone 56				Checked By: MT			

Drill Model and Mounting: 4WD Auger	Inclination: -90°	RL Surface: No survey
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)	Structure and Additional Observations
AD/T		09/02/21, Groundwater level at 0.5m	ASS at 0.25m Intervals to 2.0m			0.5		SM	Silty SAND, fine to medium grained, dark brown	M			
						1.0				MD			
						1.5		CH	CLAY, high plasticity, pale grey, trace of fine to medium grained sand		St		
						2.0			becoming white	M	VSt		
						2.5			Hole Terminated at 2.00 m Target depth				
						3.0							

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

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 500070.0 m E 7000273.0 m N MGA94 Zone 56				Checked By: MT			
Drill Model and Mounting: 4WD Auger				Inclination: -90°		RL Surface: No survey	
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)	Structure and Additional Observations
AD/T	Groundwater inflow at 0.5m	ASS at 0.25m Intervals to 2.0m				0.5	X	SM	Silty SAND, fine to medium grained, dark brown, silt/clay fines, with organic fines	M	MD		0.50: Perched Water 0.70: Partially Cemented
							X		organics cease				
							X	CI	Silty CLAY, medium plasticity, brown to pale brown		St		
							X	CH	CLAY, high plasticity, pale grey, trace of fine grained sand	M	St to VSt		
X		becoming pale grey mottled orange											
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							

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

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 500131.0 m E 7000131.0 m N MGA94 Zone 56				Checked By: MT			
Drill Model and Mounting: 4WD Auger				Inclination: -90°		RL Surface: No survey	
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)	Structure and Additional Observations
AD/T			ASS at 0.25m Intervals to 2.0m			0.5		SM	Silty SAND, fine to medium grained, dark brown, with organics (root fibres)	M	MD			
								SP	SAND, fine to medium grained, brown, with silt/clay fines	W				
								CH	Sandy CLAY, high plasticity, pale grey to white mottled orange, fine to medium grained sand	M	St to VSt			
						2.0			Hole Terminated at 2.00 m Target depth					
						2.5								
						3.0								

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 Inflow Partial Loss Complete Loss	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	

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 500208.0 m E 7000062.0 m N MGA94 Zone 56				Checked By: MT			
Drill Model and Mounting: 4WD Auger				Inclination: -90°		RL Surface: No survey	
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)	Structure and Additional Observations
AD/T			ASS at 0.25m Intervals to 2.0m			0.0		SP	SAND, fine to medium grained, dark brown, with organic silt fines	M	MD	100	0.30: Clean Sand
						0.5		becomign pale brown to white, fines cease					
						1.0							
						1.5		CH	Sandy CLAY, high plasticity, pale grey to pale brown, fine to coarse grained sand	W	St		
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							

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

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings		Commenced: 09/02/2021	
Project Name: Compensation Cut		Completed: 09/02/2021	
Hole Location:		Logged By: MT	
Hole Position: 500205.0 m E 6999949.0 m N MGA94 Zone 56		Checked By: MT	
Drill Model and Mounting: 4WD Auger		Inclination: -90°	
Hole Diameter: 100 mm		RL Surface: No survey	
		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)	Structure and Additional Observations	
AD/T			ASS at 0.25m Intervals to 2.0m			0.0		CI	Silty CLAY, medium plasticity, dark brown, with organics (root fibres), trace of	F to St					
						0.25		CH	CLAY, high plasticity, red to brown, trace of fine to coarse grained sand	St to VSt					
						0.5			becoming pale brown	M					
						1.0				St					
						1.25		SP	SAND, fine to coarse grained, pale grey, trace of some clay fines	W	MD				
						1.5		CH	Sandy CLAY, high plasticity, grey, fine to coarse grained sand	M	St				
						2.0			Hole Terminated at 2.00 m Target depth						
						2.5									
						3.0									

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 Level (Date) Inflow Partial Loss Complete Loss	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	

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 500301.0 m E 6999915.0 m N MGA94 Zone 56				Checked By: MT			
Drill Model and Mounting: 4WD Auger				Inclination: -90°		RL Surface: No survey	
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)	Structure and Additional Observations	
ADT			ASS Samples at 0.25m Intervals to 2.0m			0.5	[Pattern]	SP	SAND, fine to medium grained, grey, trace of silt fines and trace of organics	M				0.20: Clean Sand!
						1.0			becoming pale brown, organics cease					
ADT						2.0	[Pattern]	W	becoming dark brown, with silt fines	D				2.00: Possible Very Low Strength Induration?
						2.5								
ADT						3.0	[Pattern]		Hole Terminated at 3.00 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

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

[Pattern] Core recovered (hatching indicates material)

[Pattern] Core loss

Classification Symbols and Soil Descriptions

Based on Unified Soil Classification System

Plastic Limit

< PL

= PL

< PL

TECTONIC 2.00.2 LUG-INT-GLB Log - TECTONIC BOREHOLE 21030.GPJ <DrawingFile> 05/03/2021 10:47 10.02.00.04 Datagel Lab and In Situ Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13 Pjt: Tectonic 2.00 2016-02-16

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 500399.0 m E 6999922.0 m N MGA94 Zone 56				Checked By: MT			
Drill Model and Mounting: 4WD Auger				Inclination: -90°		RL Surface: No survey	
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)	Structure and Additional Observations
AD/T			ASS at 0.25m Intervals to 2.0m			0.5		SP	SAND, fine to medium grained, brown, trace of silt/clay fines	M			100	
						1.0			MD			200		
						1.5			becoming grey, with clay fines	W			300	1.80: Low Strength Induration
						2.0		SM	Silty SAND, fine to medium grained, dark brown	M	D	400		
						2.0			Hole Terminated at 2.00 m Target depth				500	
						2.5								
						3.0								

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 Level (Date) Inflow Partial Loss Complete Loss	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		

Engineering Log - Borehole

Project No.: 21030

Client: North Harbour Holdings				Commenced: 09/02/2021			
Project Name: Compensation Cut				Completed: 09/02/2021			
Hole Location:				Logged By: MT			
Hole Position: 500517.0 m E 6999858.0 m N MGA94 Zone 56				Checked By: MT			
Drill Model and Mounting: 4WD Auger				Inclination: -90°		RL Surface: No survey	
Hole Diameter:				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)	Structure and Additional Observations
AD/T		 09/02/21, Groundwater level at 0.8m	ASS at 0.25m Intervals to 2.0m			0.0 - 0.25		CI	Silty CLAY, medium plasticity, dark brown, with organics (root fibres)	M	F	100	
						0.25 - 0.5		CH	CLAY, high plasticity, red to grey		St	200	
						0.5 - 1.0		CH	Sandy CLAY, high plasticity, grey to brown, fine to medium grained sand	W	F to St	300	
						1.0 - 1.5					St	400	
						1.5 - 2.0						500	
						2.0 - 2.5			Hole Terminated at 2.00 m Target depth				
						2.5 - 3.0							
						3.0 - 3.5							

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 Level (Date) Inflow Partial Loss Complete Loss	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		

Engineering Log - Borehole

Project No.: 20334

Client: North East Business Park
Project Name: Proposed Marina & Land Development
Hole Location: North Harbour, Burpengary East
Hole Position: 500430.0 m E 7000324.0 m N MGA2020 Zone 56

Commenced: 10/5/2021
Completed: 10/5/2021
Logged By: MS
Checked By: ACD

Drill Model and Mounting: Hydrapower Scout Inclinometer: -90° RL Surface: No survey
Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: Drillsure

Drilling Information						Material Description and 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)				Shear Vane Test (kPa)	Structure and Additional Observations
AD/T		Groundwater not observed due to the introduction of drilling water below 2.5m	SPT 7.26, 12/40mm N* > 60			0.00		CH	Silty CLAY, high plasticity, dark grey, with organics	M	St						0.00: TOPSOIL
						0.20		CH	Silty Sandy CLAY, high plasticity, dark grey and brown, fine to medium grained sand becoming grey and orange brown						0.20: ALLUVIUM		
						2.40		CH	Sandy CLAY, high plasticity, grey and pale grey, fine to coarse grained sand	D to M	H				2.40: RESIDUAL		
						4.00			tending to extremely weathered sandstone	M					4.00: SANDSTONE		
RD			SPT 30/105mm N* > 60			4.00			SANDSTONE, highly weathered, fine to medium grained, pale grey to grey, very low to low strength								
			SPT 18.30/100mm N* > 60			6.00			Hole Terminated at 5.95 m SPT Refusal on low strength sandstone								
						8.00											
						10.00											

Method
AD/T- Auger Drilling TC Bit
AD/V- Auger Drilling V Bit
RT - Rotary Tri-cone Bit
RD - Rotary Drilling
NMLC - Rock Core
HA - Hand Auger

Penetration

VE - Very Easy
E - Easy
F - Firm
H - Hard
VH - Very hard

Water

Level (Date)

Inflow

Partial Loss

Complete Loss

Samples and Tests
U## - Undisturbed Sample (## mm)
DS - Disturbed Sample
BDS - Bulk 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
Fr - Friable

Plastic Limit
< PL
= PL
< PL

Graphic Log/Core Loss

Core recovered (hatching indicates material)

Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Method
AD/T - Auger Drilling TC Bit
AD/V - Auger Drilling V Bit
RT - Rotary Tri-cone Bit
RD - Rotary Drilling
NMLC - Rock Core
HA - Hand Auger

Penetration
VE - Very Easy
E - Easy
F - Firm
H - Hard
VH - Very hard

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U## - Undisturbed Sample (## mm)
DS - Disturbed Sample
BDS - Bulk 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
Fr - Friable

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

Engineering Log - Borehole

Project No.: 20334

Client: North East Business Park
Project Name: Proposed Marina & Land Development
Hole Location: North Harbour, Burpengary East
Hole Position: 500863.0 m E 7000489.0 m N MGA2020 Zone 56

Commenced: 4/5/2021
Completed: 4/5/2021
Logged By: MS
Checked By: ACD

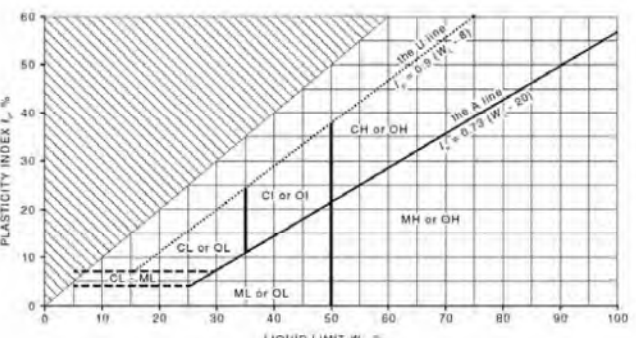
Drill Model and Mounting: Hydrapower Scout Inclin: -90° RL Surface: No survey
Hole Diameter: 100 mm Bearing: 360° Datum: AHD Operator: Drillsure

Drilling Information						Material Description and 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)	Shear Vane Test (kPa)	Structure and Additional Observations
AD/T RD			SPT 1.0,1 N=1 Groundwater seepage at 2.4m SPT 0.1,3 N=4 SPT 4.4,8 N=12 SPT 5.7,9 N=16 SPT 5.7,7 N=14 SPT 4.5,5 N=10 SPT 1.2,2 N=4				0.00	CH	Silty CLAY, high plasticity, dark grey	M	St	100		<

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AD/T - Auger Drilling TC Bit AD/V - Auger Drilling V Bit RT - Rotary Tri-cone Bit RD - Rotary Drilling NMLC - Rock Core HA - Hand Auger	VE - Very Easy E - Easy F - Firm H - Hard VH - Very hard	Level (Date) Inflow Partial Loss Complete Loss	U## - Undisturbed Sample (## mm) DS - Disturbed Sample BDS - Bulk Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	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 Fr - Friable
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		

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			Plasticity Properties
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	

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
Coarse Grained Soils			
Symbol	Term	Description	
D	Dry	Sands and gravels are free flowing.	
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	

Fine Grained Soils	
Symbol	Description
w < PL	Moist, dry of plastic limit, (hard and friable or powdery)
w = PL	Moist, near plastic limit, (soils can be moulded at a moisture content approximately equal to the plastic limit)
w > PL	Moist, wet of plastic limit, (soils usually weakened and free water forms on hands when handling)
w = LL	Wet, near liquid limit
w > LL	Wet, wet of liquid limit

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.

CLASSIFICATION AND INFERRED STRATIGRAPHY

Rock 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.

STRENGTH

Symbol	Term	Point Load Index, $I_s(50)$ (MPa)	Field Guide
VL	Very Low	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30 mm can be broken by finger pressure.
L	Low	0.1 to 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
M	Medium	0.3 to 1	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
H	High	1 to 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken with pick with a single firm blow; rock rings under hammer.
VH	Very High	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
EH	Extremely High	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Relationship between $I_s(50)$ and UCS (unconfined compressive strength) will vary with rock type and strength, and should be determined on a site-specific basis. UCS is typically 10 to 30 x $I_s(50)$, but can be as low as 5.

ROCK MATERIAL WEATHERING

Symbol		Term		Field Guide
RS		Residual Soil		Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
EW		Extremely Weathered		Rock is weathered to such an extent that it has soil properties - i.e. it either disintegrates or can be remoulded, in water.
HW	DW	Highly Weathered	Distinctly Weathered	Whole of rock is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable. Rock strength is significantly changed by weathering. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
MW		Moderately Weathered		Whole of rock is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable; but shows little or no change of strength from fresh rock.
SW		Slightly Weathered		Rock is slightly discoloured but shows little or no change of strength relative to fresh rock.
FR		Fresh		Rock shows no sign of decomposition or staining.

ABBREVIATIONS FOR DEFECT TYPES AND DESCRIPTIONS

Defect Type	Coating or Infilling	Roughness
CS/CZ Crushed seam/zone (Fault)	Ca Calcite	Po Polished
DB Drilling break	Clay Clay	Sm Smooth
EW Extremely weathered seam	Cn Clean	Sl Slickensided
HB Handling break	Co Coating ($\geq 1\text{mm}$)	Ro Rough
IS/IZ Infilled seam/zone	Fe Iron oxide	VRo Very rough
J Joint	Op Open	
Pt Parting	Qz Quartz	
SS/SZ Sheared seam/zone (Fault)	St Stain	
Vn Vein	Vn Veneer ($<1\text{mm}$)	
	X Carbonaceous	
		Planarity
		Cu Curved
		Dis Discontinuous
		Ir Irregular
		Pl Planar
		St Stepped
		Un Undulating

Appendix B

Laboratory Test Certificates



Ref: 20334

Ref: 20334

Location & Depth (m)	Soil Type	pH _F		AASS likelihood ¹	pH _{FOX}		PASS likelihood ²	Reaction 1 to 4	pH KCl	Titratable Actual Acidity		S _{KCl}	Chromium Reducible Sulfur		S _{NAS}	ANC_bt mole H+ / t	Net Acidity (Existing + Potential)	Indicative Lime Rate	
		pH Unit			pH Unit					mole H+ / t	mole H+ / t		%S	mole H+ / t			mole H+ / t	kg CaCO ₃ /t	kg CaCO ₃ /m ³
BH107	Sandy CLAY	4.2	M		3.2	M		3											
		4.7	M		3.1	M		3	4.3	140		0.06	0.018	11		N/A	162	12.2	20.7
		4.3	M		3	M		4											
		4.3	M		3	M		4											
	Clayey SAND	4.4	M		3	M		2											
		4.1	M		3.2	M		2	4.2	28		0.02	< 0.005	< 3		N/A	28	2.1	3.6
		4.1	M		3.5	M		3											
		4.2	M		3.7	M		3											
	Sandy CLAY	4.6	M		4.1	L		3											
		4.7	M		3.9	M		2	4.3	34		0.06	< 0.005	< 3		N/A	45	3.4	5.7
		4.2	M		3.8	M		2											
		4.4	M		3.9	M		2											
BH108	Silty CLAY	4.4	M		3.9	M		2											
		6.9	L		4.9	L		2											
		6	L		4.8	L		2	5.3	10		0.05	< 0.005	< 3		N/A	10	0.8	1.3
		6.2	L		5	L		2											
	Silty Sandy CLAY	6.7	L		5.9	L		4											
		6.1	L		4.1	L		4	5.6	31		0.03	0.03	19		N/A	50	3.8	6.4
		5.3	L		2.7	H		4											
		4.9	M		3.7	M		4											
	Silty CLAY	4.6	M		3.5	M		4											
		4.6	M		3.1	M		4	4.2	110		0.03	< 0.005	< 3		N/A	133	10.0	17.0
		5.1	L		3.5	M		3											
		4.9	M		3.6	M		2											
BH109	Silty CLAY	6.6	L		3.9	M		2											
		4.8	M		4	L		2	4.2	54		0.02	< 0.005	< 3		N/A	59.8	4.5	7.6
		5.1	L		4.3	L		2											
		4.8	M		4.1	L		2											
	Silty Sandy CLAY	5.2	L		3.7	M		2											
		5.7	L		4.4	L		2	4.5	27		0.01	< 0.005	< 3		N/A	27	2.0	3.4
		5.4	L		4.9	L		2											
		5.5	L		5	L		2											
	Silty CLAY	5.2	L		4.7	L		2											
		4.1	M		3	M		3											
		7.1	L		2.8	H		2											
		4	H		3	H		3											
BH109	Silty CLAY	3.9	H		2.8	M		2	4	150		0.06	< 0.005	< 3		N/A	222	16.7	28.3
		4	H		2.7	M		4											
		3.9	H		2.9	M		4											
		4	H		2.7	M		4											
	Silty Sandy CLAY	3.9	H		2.7	M		4											
		3.9	H		2.8	M		4	4.1	100		0.05	< 0.005	< 3		N/A	300	22.5	38.3
		6.8	L		2.6	H		2											
		6.8	L		2.5	H		2											
	Silty CLAY (Residual)	4.1	M		2.7	M		2											
		4.3	M		3.6	M		3	4	77		0.05	< 0.005	< 3		N/A	88	6.6	11.2

Location & Depth (m)		Soil Type	pH _F	AASS likelihood ¹	pH _{FOX} pH Unit	PASS likelihood ²	Reaction 1 to 4	pH KCl	Titratable Actual Acidity mole H+ / t	S _{KCl} %S	Chromium Reducible Sulfur		S _{NAS} mole H+ / t	ANC _{bt} mole H+ / t	Net Acidity (Existing + Potential) mole H+ / t	Indicative Lime Rate	
	pH Unit		%S								mole H+ / t	kg CaCO ₃ /t				kg CaCO ₃ /m ³	
BH121	0.0-0.25	Clayey SAND	5.6	L	2.7	H	3	4.6	12	<0.005	<3	N/A	N/A	12		0.9	1.5
	0.25-0.5		5.5	L	3.1	M	3										
	0.5-0.75		5.4	L	3.3	M	3										
	0.75-1.0		5	M	3.8	M	2										
	1.0-1.25	Sandy CLAY (Residual)	5	M	3.9	M	2	4.4	15	<0.005	<3	3.2	N/A	18.2	1.4	2.3	
	1.25-1.5		4.5	M	3.8	M	2										
	1.5-1.75		5	M	3.9	M	2										
	1.75-2.0		4.6	M	3.7	M	2										
BH122	0.0-0.25	Clayey SAND	5.7	L	2.4	H	3	4.7	23	<0.005	<3	N/A	N/A	23	1.7	2.9	
	0.25-0.5		5.9	L	2.4	H	3										
	0.5-0.75		5.8	L	2.8	H	4										
	0.75-1.0		5.6	L	3.5	M	2										
	1.0-1.25	Sandy CLAY (Residual)	5.4	L	3.4	M	2	4.3	37	<0.005	<3	3.2	N/A	40.2	3.0	5.1	
	1.25-1.5		5.5	L	3.7	M	2										
	1.5-1.75		5.5	L	4	M	2										
	1.75-2.0		5.2	L	3.7	M	2										
BH123	0.0-0.25	Silty CLAY	4.8	M	3	M	4										
	0.25-0.5		4.8	M	3.2	M	3										
	0.5-0.75		4.9	M	3.7	M	3										
	0.75-1.0		5	M	3.6	M	3	4.1	73	0.01	<0.005	<3	3.1	N/A	76.1	5.7	9.7
	1.0-1.25		4.9	M	3.8	M	3										
	1.25-1.5		5.3	L	4.3	L	3										
	1.5-1.75		5	M	3.6	M	2										
	1.75-2.0		4.9	M	4.1	L	2	4.4	25	0.01	<0.005	<3	<2	N/A	25	1.9	3.2
BH124	0.0-0.25	Sandy CLAY	5.5	L	2.9	H	3										
	0.25-0.5		5.4	L	3.1	M	3										
	0.5-0.75	Clayey SAND (Residual)	5.4	L	3.3	M	2										
	0.75-1.0		5.6	L	3.4	M	2	4.5	17	<0.005	<3	2.5	N/A	19.5	1.5	2.5	
	1.0-1.25		5.6	L	3.8	M	2										
	1.25-1.5		5.3	L	3.9	M	2										
	1.5-1.75	Clayey SAND (Residual)	5.2	L	3.8	M	2										
	1.75-2.0		5.3	L	3.9	M	2	4.4	15	<0.005	<3	2.6	N/A	17.6	1.3	2.2	
BH125	0.0-0.25	Sandy CLAY	5.7	L	3	H	3										
	0.25-0.5		5.5	L	3	H	3	4.6	24	<0.005	<3	N/A	N/A	24	1.8	3.1	
	0.5-0.75		4.9	M	3.3	M	3										
	0.75-1.0		5	M	3.4	M	2										
	1.0-1.25	CLAY (Residual)	5	M	3.7	M	2										
	1.25-1.5		4.9	M	3.7	M	2	4.3	25	0.02	<0.005	<3	<2	N/A	25	1.9	3.2
	1.5-1.75		5.2	L	4.2	L	4										
	1.75-2.0		5	M	3.7	M	4										

Location & Depth (m)		Soil Type		pH _F		AASS likelihood 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	
BH8	0.0-0.25			6.0	L		3.0	M		4											
	0.25-0.5			6.1	L		3.4	M		4	5.6	3.7	< 0.02	< 0.005	< 3	n/a	n/a	3.7	N/R	N/R	
	0.5-0.75			6.0	L		3.8	M		4											
	0.75-1.0			6.0	L		4.3	L		2											
	1.0-1.25			6.0	L		4.4	L		2											
	1.25-1.5			6.5	L		4.8	L		2	5.5	2	< 0.02	< 0.005	< 3	n/a	n/a	< 3	N/R	N/R	
	1.5-1.75			6.1	L		4.6	L		1											
	1.75-2.0			6.1	L		4.2	L		1											
	0.0-0.25			5.9	L		2.9	H		4	5.4	7.9	< 0.02	< 0.005	< 3	n/a	n/a	7.9	N/R	N/R	
	0.25-0.5			6.2	L		3.3	M		4											
0.5-0.75			5.8	L		3.7	M		4	5.5	5.4	< 0.02	< 0.005	< 3	n/a	n/a	5.4	N/R	N/R		
0.75-1.0			5.6	L		4.0	L		4												
1.0-1.25			5.8	L		4.3	L		1												
1.25-1.5			5.9	L		4.2	L		1												
1.5-1.75			5.7	L		3.8	M		4	4.9	22	< 0.02	< 0.005	< 3	n/a	n/a	22	1	3		
1.75-2.0			5.8	L		3.9	M		4	5.0	17	< 0.02	< 0.005	< 3	n/a	n/a	17	N/R	N/R		
0.0-0.25			5.8	L		2.8	H		4	4.7	52	< 0.02	< 0.005	< 3	n/a	n/a	52	3	4		
0.25-0.5			5.4	L		4.0	L		4	4.5	65	< 0.02	< 0.005	< 3	< 10	n/a	65	3	5		
0.5-0.75			5.5	L		3.2	M		4												
0.75-1.0			5.7	L		3.3	M		4												
1.0-1.25			5.5	L		4.1	L		4												
1.25-1.5			5.3	L		4.4	L		4												
1.5-1.75			5.7	L		4.1	L		4												
1.75-2.0			5.7	L		4.2	L		1												
TBH2	1.0 - 1.45			-	-	-	-	-	-	-	4.3	61	< 0.02	< 0.005	< 3	< 10	N/A	N/A	61	4.6	7.8
	2.5 - 2.95			-	-	-	-	-	-	-	4.5	42	< 0.02	< 0.005	< 3	N/A	N/A	42	3.2	5.4	
	4.0 - 4.45			-	-	-	-	-	-	-	4.8	26	< 0.02	< 0.005	< 3	N/A	N/A	26	2.0	3.3	
	5.5 - 5.95			-	-	-	-	-	-	-	4.7	28	0.02	< 0.005	< 3	N/A	N/A	28	2.1	3.6	
TBH3	1.0 - 1.45			-	-	-	-	-	-	-	4.6	44	< 0.02	0.005	3.1	N/A	N/A	47.1	3.5	6.0	
	2.5 - 2.95			-	-	-	-	-	-	-	4.9	22	< 0.02	< 0.005	< 3	N/A	N/A	22	1.7	2.8	
	4.0 - 4.45			-	-	-	-	-	-	-	5.6	7	< 0.02	< 0.005	< 3	N/A	N/A	7	0.5	0.9	
	5.5 - 5.95			-	-	-	-	-	-	-	5.7	4	< 0.02	< 0.005	< 3	N/A	N/A	4	0.3	0.5	
	7.0 - 7.45			-	-	-	-	-	-	-	6.1	< 2	< 0.02	< 0.005	< 3	N/A	N/A	< 2	N/R	N/R	
8.5 - 8.95			-	-	-	-	-	-	-	6.1	< 2	< 0.02	< 0.005	< 3	N/A	N/A	< 2	N/R	N/R		
10 - 10.45			-	-	-	-	-	-	-	-	6.2	< 2	< 0.02	< 0.005	< 3	N/A	N/A	< 2	N/R	N/R	

1. Actual Acid Sulfate Soil (AASS) likelihood is indicated by Low (L & no shading)(pH > 5), Medium (M & yellow shade)(pH 5 ≤ pH < 4) and High (H & red shade)(pH ≤ 4).

2. Potential Acid Sulfate Soil (PASS) likelihood 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 (persistent froth), 4 = Extreme reaction.

4. Shaded TAA & SCR results are those exceeding the QASST action levels of 18 mol H+/t or 0.03 %S (> 18 mol H+/t Yellow; > 62 mol H+/t Orange; > 623 mol H+/t Red).

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
924 David Low Way
Marcoola
QLD 4564



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 Arrangement for the mutual recognition of the
 equivalence of testing, medical testing, calibration,
 inspection, proficiency testing scheme providers and
 reference materials producers reports and certificates.

Attention: **Mark Thomson**

Report **1239655-S**
Project name **NORTH HARBOUR**
Project ID **20334**
Received Date **Jul 01, 2025**

Client Sample ID			BH101 0 - 0.25m	BH101 0.25 - 0.50m	BH101 0.50 - 0.75m	BH101 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006256	B25-JI0006257	B25-JI0006258	B25-JI0006259
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.9	4.9	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.2	3.7	3.8
Reaction Ratings* ^{S05}	0	comment	3.0	4.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.2
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	42
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.070
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.020
HCl Extractable Sulfur	0.005	% S	-	-	-	0.020
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	< 2
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.07
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	42
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	-	3.1
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	140
>2mm Fraction	0.005	g	-	-	-	3.7
Analysed Material	0.1	%	-	-	-	98
Extraneous Material	0.1	%	-	-	-	2.5
Sample Properties						
% Moisture	1	%	-	-	-	11

Client Sample ID			BH101 1.0 - 1.25m	BH101 1.25 - 1.50m	BH101 1.5 - 1.75m	BH101 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006260	B25-JI0006261	B25-JI0006262	B25-JI0006263
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	4.8	5.3	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.3	4.8	4.6
Reaction Ratings**S05	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.5
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	29
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.050
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.010
HCl Extractable Sulfur	0.005	% S	-	-	-	0.020
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.005
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	2.5
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.05
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	32
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	-	2.4
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	120
>2mm Fraction	0.005	g	-	-	-	1.3
Analysed Material	0.1	%	-	-	-	99
Extraneous Material	0.1	%	-	-	-	1.1
Sample Properties						
% Moisture	1	%	-	-	-	20

Client Sample ID			BH101 2.0 - 2.25m	BH101 2.25 - 2.50m	BH102 0 - 0.25m	BH102 0.25 - 0.50m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006264	B25-JI0006265	B25-JI0006266	B25-JI0006267
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.0	4.5	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	4.9	3.9	3.6
Reaction Ratings**S05	0	comment	2.0	2.0	3.0	3.0

Client Sample ID			BH102 0.50 - 0.75m	BH102 0.75 - 1.0m	BH102 1.0 - 1.25m	BH102 1.25 - 1.50m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006268	B25-JI0006269	B25-JI0006270	B25-JI0006271
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.5	5.0	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.8	4.2	4.2
Reaction Ratings**S05	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.3	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	30	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.050	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.040	-	-	-
HCl Extractable Sulfur	0.005	% S	0.040	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	< 0.005	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	< 0.005	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	< 2	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.05	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	31	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	2.3	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	71	-	-	-
>2mm Fraction	0.005	g	18	-	-	-
Analysed Material	0.1	%	80	-	-	-
Extraneous Material	0.1	%	20	-	-	-
Sample Properties						
% Moisture	1	%	13	-	-	-

Client Sample ID			BH102 1.5 - 1.75m	BH102 1.75 - 2.0m	BH102 2.0 - 2.25m	BH102 2.25 - 2.50m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006272	B25-JI0006273	B25-JI0006274	B25-JI0006275
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
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	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.1	5.3	4.9	5.1
Reaction Ratings**S05	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			BH102 1.5 - 1.75m	BH102 1.75 - 2.0m	BH102 2.0 - 2.25m	BH102 2.25 - 2.50m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006272	B25-JI0006273	B25-JI0006274	B25-JI0006275
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.7	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	17	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.030	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.020	-	-	-
HCl Extractable Sulfur	0.005	% S	N/A	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.03	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	17	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	1.3	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	94	-	-	-
>2mm Fraction	0.005	g	1.6	-	-	-
Analysed Material	0.1	%	98	-	-	-
Extraneous Material	0.1	%	1.7	-	-	-
Sample Properties						
% Moisture	1	%	22	-	-	-

Client Sample ID			BH103 0 - 0.25m	BH103 0.25 - 0.50m	BH103 0.50 - 0.75m	BH103 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006276	B25-JI0006277	B25-JI0006278	B25-JI0006279
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	5.5	4.8	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.4	3.1	3.2
Reaction Ratings ^{S05}	0	comment	3.0	3.0	4.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.8	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	39	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.060	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-

Client Sample ID			BH103 0 - 0.25m	BH103 0.25 - 0.50m	BH103 0.50 - 0.75m	BH103 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006276	B25-JI0006277	B25-JI0006278	B25-JI0006279
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.010	-	-
HCl Extractable Sulfur	0.005	% S	-	N/A	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.06	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	39	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	2.9	-	-
Chromium Suite (SKCl) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	68	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
Sample Properties						
% Moisture	1	%	-	20	-	-

Client Sample ID			BH103 1.0 - 1.25m	BH103 1.25 - 1.50m	BH103 1.5 - 1.75m	BH103 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006280	B25-JI0006281	B25-JI0006282	B25-JI0006283
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.8	4.4	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.2	3.7	3.9
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.3	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	26	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.040	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.030	-	-
HCl Extractable Sulfur	0.005	% S	-	0.030	-	-

Client Sample ID			BH103 1.0 - 1.25m	BH103 1.25 - 1.50m	BH103 1.5 - 1.75m	BH103 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006280	B25-JI0006281	B25-JI0006282	B25-JI0006283
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	0.008	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	0.006	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	3.9	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.05	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	30	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	2.3	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	150	-	-
>2mm Fraction	0.005	g	-	8.5	-	-
Analysed Material	0.1	%	-	95	-	-
Extraneous Material	0.1	%	-	5.2	-	-
Sample Properties						
% Moisture	1	%	-	13	-	-

Client Sample ID			BH103 2.0 - 2.25m	BH103 2.25 - 2.50m	BH103 2.50 - 2.75m	BH103 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006284	B25-JI0006285	B25-JI0006286	B25-JI0006287
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.9	5.2	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.4	4.9	5.2
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.5	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	-	26	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.040	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.020	-	-
HCl Extractable Sulfur	0.005	% S	-	N/A	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH103 2.0 - 2.25m	BH103 2.25 - 2.50m	BH103 2.50 - 2.75m	BH103 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006284	B25-JI0006285	B25-JI0006286	B25-JI0006287
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.04	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H ⁺ /t	-	26	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	2.0	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	75	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
Sample Properties						
% Moisture	1	%	-	23	-	-

Client Sample ID			BH103 3.0 - 3.25m	BH103 3.25 - 3.50m	BH103 3.5 - 3.75m	BH103 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006288	B25-JI0006289	B25-JI0006290	B25-JI0006291
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.9	6.4	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.2	5.1	5.2	5.7
Reaction Ratings ^{*S05}	0	comment	2.0	2.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.7	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H ⁺ /t	-	14	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.020	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H ⁺ /t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.090	-	-
HCl Extractable Sulfur	0.005	% S	-	N/A	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H ⁺ /t	-	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-

Client Sample ID			BH103 3.0 - 3.25m	BH103 3.25 - 3.50m	BH103 3.5 - 3.75m	BH103 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006288	B25-JI0006289	B25-JI0006290	B25-JI0006291
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.02	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	14	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	1.1	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	82	-	-
>2mm Fraction	0.005	g	-	2.2	-	-
Analysed Material	0.1	%	-	97	-	-
Extraneous Material	0.1	%	-	2.6	-	-
Sample Properties						
% Moisture	1	%	-	13	-	-

Client Sample ID			BH104 0 - 0.25m	BH104 0.25 - 0.50m	BH104 0.50 - 0.75m	BH104 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006292	B25-JI0006293	B25-JI0006294	B25-JI0006295
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.5	4.9	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	2.7	3.1	3.2
Reaction Ratings* ^{S05}	0	comment	3.0	4.0	4.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.7	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	81	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.13	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	0.031	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	19	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.010	-	-	-
HCl Extractable Sulfur	0.005	% S	N/A	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.16	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	100	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	7.5	-	-	-

Client Sample ID			BH104 0 - 0.25m	BH104 0.25 - 0.50m	BH104 0.50 - 0.75m	BH104 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006292	B25-JI0006293	B25-JI0006294	B25-JI0006295
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	70	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	29	-	-	-

Client Sample ID			BH104 1.0 - 1.25m	BH104 1.25 - 1.50m	BH104 1.5 - 1.75m	BH104 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006296	B25-JI0006297	B25-JI0006298	B25-JI0006299
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	3.9	4.2	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.9	3.4	3.7
Reaction Ratings* ^{S05}	0	comment	4.0	3.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.1	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	130	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.20	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.020	-	-	-
HCl Extractable Sulfur	0.005	% S	0.030	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.022	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	0.016	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	10	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.22	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	140	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	10	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	74	-	-	-
>2mm Fraction	0.005	g	2.5	-	-	-
Analysed Material	0.1	%	97	-	-	-
Extraneous Material	0.1	%	3.2	-	-	-
Sample Properties						
% Moisture	1	%	27	-	-	-

Client Sample ID			BH104 2.0 - 2.25m	BH104 2.25 - 2.50m	BH104 2.50 - 2.75m	BH104 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006300	B25-JI0006301	B25-JI0006302	B25-JI0006303
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.3	4.1	4.5	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	2.9	3.0	4.1
Reaction Ratings* ^{S05}	0	comment	3.0	3.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.0	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	110	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.17	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.010	-	-	-
HCl Extractable Sulfur	0.005	% S	0.010	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	< 0.005	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	< 0.005	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	< 2	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.17	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	110	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	8.1	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	150	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	18	-	-	-

Client Sample ID			BH104 3.0 - 3.25m	BH104 3.25 - 3.50m	BH104 3.5 - 3.75m	BH104 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006304	B25-JI0006305	B25-JI0006306	B25-JI0006307
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	5.0	5.1	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.6	4.5	4.4	4.5
Reaction Ratings* ^{S05}	0	comment	3.0	2.0	2.0	2.0

Client Sample ID			BH104 3.0 - 3.25m	BH104 3.25 - 3.50m	BH104 3.5 - 3.75m	BH104 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006304	B25-JI0006305	B25-JI0006306	B25-JI0006307
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.5	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	24	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.040	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.020	-	-	-
HCl Extractable Sulfur	0.005	% S	0.020	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	< 0.005	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	< 0.005	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	< 2	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.04	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	24	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	1.8	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	200	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	18	-	-	-

Client Sample ID			BH105 0 - 0.25m	BH105 0.25 - 0.50m	BH105 0.50 - 0.75m	BH105 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006308	B25-JI0006309	B25-JI0006310	B25-JI0006311
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	4.5	4.6	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.3	3.5	3.6
Reaction Ratings ^{S05}	0	comment	3.0	3.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.2
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	78
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.13
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3

Client Sample ID			BH105 0 - 0.25m	BH105 0.25 - 0.50m	BH105 0.50 - 0.75m	BH105 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006308	B25-JI0006309	B25-JI0006310	B25-JI0006311
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.040
HCl Extractable Sulfur	0.005	% S	-	-	-	0.040
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.010
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	0.008
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	4.8
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.13
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	83
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	-	6.2
Chromium Suite (SKCl) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	130
>2mm Fraction	0.005	g	-	-	-	3.4
Analysed Material	0.1	%	-	-	-	98
Extraneous Material	0.1	%	-	-	-	2.5
Sample Properties						
% Moisture	1	%	-	-	-	23

Client Sample ID			BH105 1.0 - 1.25m	BH105 1.25 - 1.50m	BH105 1.5 - 1.75m	BH105 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006312	B25-JI0006313	B25-JI0006314	B25-JI0006315
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	5.2	5.2	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.0	4.0	4.5
Reaction Ratings* ^{S05}	0	comment	4.0	4.0	4.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.3
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	36
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.060
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.010
HCl Extractable Sulfur	0.005	% S	-	-	-	0.010

Client Sample ID			BH105 1.0 - 1.25m	BH105 1.25 - 1.50m	BH105 1.5 - 1.75m	BH105 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006312	B25-JI0006313	B25-JI0006314	B25-JI0006315
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	< 2
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.06
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	37
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	-	2.8
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	110
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	14

Client Sample ID			BH105 2.0 - 2.25m	BH105 2.25 - 2.50m	BH105 2.50 - 2.75m	BH105 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006316	B25-JI0006317	B25-JI0006318	B25-JI0006319
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	5.1	4.8	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.5	4.5	4.2	4.4
Reaction Ratings* ^{S05}	0	comment	3.0	3.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.4
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	36
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.060
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.020
HCl Extractable Sulfur	0.005	% S	-	-	-	0.020
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	2.1
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH105 2.0 - 2.25m	BH105 2.25 - 2.50m	BH105 2.50 - 2.75m	BH105 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006316	B25-JI0006317	B25-JI0006318	B25-JI0006319
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.06
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H ⁺ /t	-	-	-	38
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	-	2.9
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	120
>2mm Fraction	0.005	g	-	-	-	9.2
Analysed Material	0.1	%	-	-	-	93
Extraneous Material	0.1	%	-	-	-	7.4
Sample Properties						
% Moisture	1	%	-	-	-	15

Client Sample ID			BH106 0 - 0.25m	BH106 0.25 - 0.50m	BH106 0.50 - 0.75m	BH106 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006320	B25-JI0006321	B25-JI0006322	B25-JI0006323
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.4	4.6	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.1	3.3	2.9
Reaction Ratings ^{*S05}	0	comment	4.0	4.0	4.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.3	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H ⁺ /t	-	-	170	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.28	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	0.025	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H ⁺ /t	-	-	16	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.050	-
HCl Extractable Sulfur	0.005	% S	-	-	0.060	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.026	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.020	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H ⁺ /t	-	-	12	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-

Client Sample ID			BH106 0 - 0.25m	BH106 0.25 - 0.50m	BH106 0.50 - 0.75m	BH106 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006320	B25-JI0006321	B25-JI0006322	B25-JI0006323
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.32	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	200	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	15	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	100	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	34	-

Client Sample ID			BH106 1.0 - 1.25m	BH106 1.25 - 1.50m	BH106 1.5 - 1.75m	BH106 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006324	B25-JI0006325	B25-JI0006326	B25-JI0006327
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.0	4.0	5.0	3.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	3.2	3.0	3.0
Reaction Ratings* ^{S05}	0	comment	3.0	3.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.2	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	82	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.13	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.050	-
HCl Extractable Sulfur	0.005	% S	-	-	0.12	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.14	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.10	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	65	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.24	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	150	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	11	-

Client Sample ID			BH106 1.0 - 1.25m	BH106 1.25 - 1.50m	BH106 1.5 - 1.75m	BH106 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006324	B25-JI0006325	B25-JI0006326	B25-JI0006327
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	100	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	31	-

Client Sample ID			BH106 2.0 - 2.25m	BH106 2.25 - 2.50m	BH106 2.50 - 2.75m	BH106 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006328	B25-JI0006329	B25-JI0006330	B25-JI0006331
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.3	4.2	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.1	3.1	3.3
Reaction Ratings* ^{S05}	0	comment	3.0	3.0	3.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.2	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	75	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.12	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.050	-
HCl Extractable Sulfur	0.005	% S	-	-	0.15	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.19	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.14	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	87	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.26	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	160	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	12	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	85	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	28	-

Client Sample ID			BH106 3.0 - 3.25m	BH106 3.25 - 3.50m	BH106 3.5 - 3.75m	BH106 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006332	B25-JI0006333	B25-JI0006334	B25-JI0006335
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.2	4.3	4.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.4	3.6	3.3
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.2	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	53	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.080	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.050	-
HCl Extractable Sulfur	0.005	% S	-	-	0.060	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.012	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.009	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	5.6	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.09	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	58	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	4.4	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	130	-
>2mm Fraction	0.005	g	-	-	3.6	-
Analysed Material	0.1	%	-	-	97	-
Extraneous Material	0.1	%	-	-	2.7	-
Sample Properties						
% Moisture	1	%	-	-	23	-

Client Sample ID			BH107 0 - 0.25m	BH107 0.25 - 0.50m	BH107 0.50 - 0.75m	BH107 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006336	B25-JI0006337	B25-JI0006338	B25-JI0006339
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.7	4.3	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.1	3.0	3.0
Reaction Ratings* ^{S05}	0	comment	3.0	3.0	4.0	4.0

Client Sample ID			BH107 0 - 0.25m	BH107 0.25 - 0.50m	BH107 0.50 - 0.75m	BH107 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006336	B25-JI0006337	B25-JI0006338	B25-JI0006339
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.3	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	140	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.23	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	0.018	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	11	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.060	-	-
HCl Extractable Sulfur	0.005	% S	-	0.070	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	0.023	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	0.017	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	11	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.26	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	160	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	12	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	61	-	-
>2mm Fraction	0.005	g	-	1.9	-	-
Analysed Material	0.1	%	-	97	-	-
Extraneous Material	0.1	%	-	3.1	-	-
Sample Properties						
% Moisture	1	%	-	32	-	-

Client Sample ID			BH107 1.0 - 1.25m	BH107 1.25 - 1.50m	BH107 1.5 - 1.75m	BH107 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006340	B25-JI0006341	B25-JI0006342	B25-JI0006343
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.1	4.1	4.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.2	3.5	3.7
Reaction Ratings ^{S05}	0	comment	2.0	2.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.2	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	28	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.050	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-

Client Sample ID			BH107 1.0 - 1.25m	BH107 1.25 - 1.50m	BH107 1.5 - 1.75m	BH107 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006340	B25-JI0006341	B25-JI0006342	B25-JI0006343
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.020	-	-
HCl Extractable Sulfur	0.005	% S	-	0.020	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	< 0.005	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	< 0.005	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	< 2	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.05	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	30	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	2.3	-	-
Chromium Suite (SKCl) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	69	-	-
>2mm Fraction	0.005	g	-	4.9	-	-
Analysed Material	0.1	%	-	93	-	-
Extraneous Material	0.1	%	-	6.6	-	-
Sample Properties						
% Moisture	1	%	-	16	-	-

Client Sample ID			BH107 2.0 - 2.25m	BH107 2.25 - 2.50m	BH107 2.50 - 2.75m	BH107 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006344	B25-JI0006345	B25-JI0006346	B25-JI0006347
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.7	4.2	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	3.9	3.8	3.9
Reaction Ratings ^{S05}	0	comment	3.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.3	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	34	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.050	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.060	-	-
HCl Extractable Sulfur	0.005	% S	-	0.070	-	-

Client Sample ID			BH107 2.0 - 2.25m	BH107 2.25 - 2.50m	BH107 2.50 - 2.75m	BH107 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006344	B25-JI0006345	B25-JI0006346	B25-JI0006347
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	0.023	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	0.017	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	11	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.07	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	44	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	3.3	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	120	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
Sample Properties						
% Moisture	1	%	-	18	-	-

Client Sample ID			BH107 3.0 - 3.25m	BH107 3.25 - 3.50m	BH107 3.5 - 3.75m	BH107 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006348	B25-JI0006349	B25-JI0006350	B25-JI0006351
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	6.0	6.2	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	4.8	5.0	5.9
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	5.3	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	-	10	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.020	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.050	-	-
HCl Extractable Sulfur	0.005	% S	-	N/A	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH107 3.0 - 3.25m	BH107 3.25 - 3.50m	BH107 3.5 - 3.75m	BH107 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006348	B25-JI0006349	B25-JI0006350	B25-JI0006351
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.02	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H ⁺ /t	-	< 10	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	< 1	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	57	-	-
>2mm Fraction	0.005	g	-	0.69	-	-
Analysed Material	0.1	%	-	99	-	-
Extraneous Material	0.1	%	-	1.2	-	-
Sample Properties						
% Moisture	1	%	-	17	-	-

Client Sample ID			BH108 0 - 0.25m	BH108 0.25 - 0.50m	BH108 0.50 - 0.75m	BH108 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006352	B25-JI0006353	B25-JI0006354	B25-JI0006355
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	5.3	4.9	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	2.7	3.7	3.5
Reaction Ratings ^{*S05}	0	comment	4.0	4.0	4.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	5.6	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H ⁺ /t	31	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.050	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	0.030	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H ⁺ /t	19	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.030	-	-	-
HCl Extractable Sulfur	0.005	% S	N/A	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H ⁺ /t	N/A	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-

Client Sample ID			BH108 0 - 0.25m	BH108 0.25 - 0.50m	BH108 0.50 - 0.75m	BH108 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006352	B25-JI0006353	B25-JI0006354	B25-JI0006355
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.08	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	49	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	3.7	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	53	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	35	-	-	-

Client Sample ID			BH108 1.0 - 1.25m	BH108 1.25 - 1.50m	BH108 1.5 - 1.75m	BH108 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006356	B25-JI0006357	B25-JI0006358	B25-JI0006359
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	5.1	4.9	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.5	3.6	3.9
Reaction Ratings ^{S05}	0	comment	4.0	3.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.2	-	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	110	-	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.18	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.030	-	-	-
HCl Extractable Sulfur	0.005	% S	0.050	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.049	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	0.037	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	23	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.22	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	140	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	10	-	-	-

Client Sample ID			BH108 1.0 - 1.25m	BH108 1.25 - 1.50m	BH108 1.5 - 1.75m	BH108 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006356	B25-JI0006357	B25-JI0006358	B25-JI0006359
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	43	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	30	-	-	-

Client Sample ID			BH108 2.0 - 2.25m	BH108 2.25 - 2.50m	BH108 2.50 - 2.75m	BH108 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006360	B25-JI0006361	B25-JI0006362	B25-JI0006363
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	5.1	4.8	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.3	4.1	3.7
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.2	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	54	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.090	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.020	-	-	-
HCl Extractable Sulfur	0.005	% S	0.020	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.012	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	0.009	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	5.8	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.10	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	60	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	4.5	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	95	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	22	-	-	-

Client Sample ID			BH108 3.0 - 3.25m	BH108 3.25 - 3.50m	BH108 3.5 - 3.75m	BH108 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006364	B25-JI0006365	B25-JI0006366	B25-JI0006367
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.4	5.5	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.9	5.0	4.7
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.5	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	27	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.040	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.010	-	-	-
HCl Extractable Sulfur	0.005	% S	N/A	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.04	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	27	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	2.1	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	110	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	27	-	-	-

Client Sample ID			BH109 0 - 0.25m	BH109 0.25 - 0.50m	BH109 0.50 - 0.75m	BH109 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006368	B25-JI0006369	B25-JI0006370	B25-JI0006371
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.1	7.1	4.0	3.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.8	3.0	2.8
Reaction Ratings* ^{S05}	0	comment	3.0	2.0	3.0	2.0

Client Sample ID			BH109 0 - 0.25m	BH109 0.25 - 0.50m	BH109 0.50 - 0.75m	BH109 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006368	B25-JI0006369	B25-JI0006370	B25-JI0006371
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.0
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	150
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.24
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.060
HCl Extractable Sulfur	0.005	% S	-	-	-	0.14
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.15
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	0.12
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	72
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.36
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	220
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	-	17
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	58
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	32

Client Sample ID			BH109 1.0 - 1.25m	BH109 1.25 - 1.50m	BH109 1.5 - 1.75m	BH109 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006372	B25-JI0006373	B25-JI0006374	B25-JI0006375
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.0	3.9	4.0	3.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	2.9	2.7	2.8
Reaction Ratings ^{S05}	0	comment	4.0	4.0	4.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.1
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	100
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.16
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3

Client Sample ID			BH109 1.0 - 1.25m	BH109 1.25 - 1.50m	BH109 1.5 - 1.75m	BH109 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006372	B25-JI0006373	B25-JI0006374	B25-JI0006375
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.050
HCl Extractable Sulfur	0.005	% S	-	-	-	0.26
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.42
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	0.32
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	200
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.48
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	300
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	-	22
Chromium Suite (SKCl) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	59
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	29

Client Sample ID			BH109 2.0 - 2.25m	BH109 2.25 - 2.50m	BH109 2.50 - 2.75m	BH109 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006376	B25-JI0006377	B25-JI0006378	B25-JI0006379
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.8	6.8	4.1	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.6	2.5	2.7	3.6
Reaction Ratings ^{S05}	0	comment	2.0	2.0	2.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.0
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	77
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.12
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.050
HCl Extractable Sulfur	0.005	% S	-	-	-	0.060

Client Sample ID			BH109 2.0 - 2.25m	BH109 2.25 - 2.50m	BH109 2.50 - 2.75m	BH109 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006376	B25-JI0006377	B25-JI0006378	B25-JI0006379
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.023
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	0.018
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	11
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.14
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	87
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	-	6.6
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	88
>2mm Fraction	0.005	g	-	-	-	1.4
Analysed Material	0.1	%	-	-	-	98
Extraneous Material	0.1	%	-	-	-	1.6
Sample Properties						
% Moisture	1	%	-	-	-	21

Client Sample ID			BH110 0 - 0.25m	BH110 0.25 - 0.50m	BH110 0.50 - 0.75m	BH110 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006380	B25-JI0006381	B25-JI0006382	B25-JI0006383
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.4	3.8	3.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.6	3.2	2.9	2.9
Reaction Ratings* ^{S05}	0	comment	4.0	3.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.1	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	140	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.23	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.070	-
HCl Extractable Sulfur	0.005	% S	-	-	0.10	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.050	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.038	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	23	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH110 0 - 0.25m	BH110 0.25 - 0.50m	BH110 0.50 - 0.75m	BH110 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006380	B25-JI0006381	B25-JI0006382	B25-JI0006383
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.26	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H ⁺ /t	-	-	160	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	12	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	100	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	33	-

Client Sample ID			BH110 1.0 - 1.25m	BH110 1.25 - 1.50m	BH110 1.5 - 1.75m	BH110 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006384	B25-JI0006385	B25-JI0006386	B25-JI0006387
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.1	4.3	4.0	4.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.2	2.9	2.9
Reaction Ratings* ^{S05}	0	comment	3.0	2.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.2	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H ⁺ /t	-	-	77	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.12	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H ⁺ /t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.030	-
HCl Extractable Sulfur	0.005	% S	-	-	0.16	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.26	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.19	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H ⁺ /t	-	-	120	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-

Client Sample ID			BH110 1.0 - 1.25m	BH110 1.25 - 1.50m	BH110 1.5 - 1.75m	BH110 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006384	B25-JI0006385	B25-JI0006386	B25-JI0006387
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.32	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	200	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	15	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	87	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	30	-

Client Sample ID			BH110 2.0 - 2.25m	BH110 2.25 - 2.50m	BH110 2.50 - 2.75m	BH110 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006388	B25-JI0006389	B25-JI0006390	B25-JI0006391
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.0	4.0	4.2	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.7	2.9	3.8
Reaction Ratings* ^{S05}	0	comment	3.0	3.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.3	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	47	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.080	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.030	-
HCl Extractable Sulfur	0.005	% S	-	-	0.11	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.15	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.11	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	71	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.19	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	120	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	8.9	-

Client Sample ID			BH110 2.0 - 2.25m	BH110 2.25 - 2.50m	BH110 2.50 - 2.75m	BH110 2.75 - 3.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006388	B25-JI0006389	B25-JI0006390	B25-JI0006391
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	100	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	27	-

Client Sample ID			BH110 3.0 - 3.25m	BH110 3.25 - 3.50m	BH110 3.5 - 3.75m	BH110 3.75 - 4.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006392	B25-JI0006393	B25-JI0006394	B25-JI0006395
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	4.9	4.7	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.8	1.9	1.9	1.9
Reaction Ratings* ^{S05}	0	comment	4.0	4.0	4.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.2	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	46	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.070	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	1.6	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	1000	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.080	-
HCl Extractable Sulfur	0.005	% S	-	-	0.12	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.084	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.063	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	39	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	1.8	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	1100	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	83	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	58	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	30	-

Client Sample ID			BH111 0 - 0.25m	BH111 0.25 - 0.50m	BH111 0.50 - 0.75m	BH111 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006396	B25-JI0006397	B25-JI0006398	B25-JI0006399
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.5	5.5	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.6	3.6	4.1	4.1
Reaction Ratings* ^{S05}	0	comment	3.0	3.0	3.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.7	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	16	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.030	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	< 0.005	-	-
HCl Extractable Sulfur	0.005	% S	-	N/A	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.03	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	16	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	1.2	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	160	-	-
>2mm Fraction	0.005	g	-	1.1	-	-
Analysed Material	0.1	%	-	99	-	-
Extraneous Material	0.1	%	-	0.7	-	-
Sample Properties						
% Moisture	1	%	-	12	-	-

Client Sample ID			BH111 1.0 - 1.25m	BH111 1.25 - 1.50m	BH111 1.5 - 1.75m	BH111 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006400	B25-JI0006401	B25-JI0006402	B25-JI0006403
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	5.4	5.2	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.3	3.9	3.5
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			BH111 1.0 - 1.25m	BH111 1.25 - 1.50m	BH111 1.5 - 1.75m	BH111 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006400	B25-JI0006401	B25-JI0006402	B25-JI0006403
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.5	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	10	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.020	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	0.011	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	7.1	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	< 0.005	-	-
HCl Extractable Sulfur	0.005	% S	-	< 0.005	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	0.006	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	< 0.005	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	2.7	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.03	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	20	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	1.5	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	180	-	-
>2mm Fraction	0.005	g	-	1.9	-	-
Analysed Material	0.1	%	-	99	-	-
Extraneous Material	0.1	%	-	1.1	-	-
Sample Properties						
% Moisture	1	%	-	17	-	-

Client Sample ID			BH112 0 - 0.25m	BH112 0.25 - 0.50m	BH112 0.50 - 0.75m	BH112 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006404	B25-JI0006405	B25-JI0006406	B25-JI0006407
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	6.2	5.8	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.9	3.8	4.0
Reaction Ratings ^{S05}	0	comment	3.0	3.0	3.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	5.3	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	5.0	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.010	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-

Client Sample ID			BH112 0 - 0.25m	BH112 0.25 - 0.50m	BH112 0.50 - 0.75m	BH112 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006404	B25-JI0006405	B25-JI0006406	B25-JI0006407
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	< 0.005	-	-
HCl Extractable Sulfur	0.005	% S	-	N/A	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	< 1	-	-
Chromium Suite (SKCl) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	140	-	-
>2mm Fraction	0.005	g	-	1.1	-	-
Analysed Material	0.1	%	-	99	-	-
Extraneous Material	0.1	%	-	0.8	-	-
Sample Properties						
% Moisture	1	%	-	10	-	-

Client Sample ID			BH112 1.0 - 1.25m	BH112 1.25 - 1.50m	BH112 1.5 - 1.75m	BH112 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006408	B25-JI0006409	B25-JI0006410	B25-JI0006411
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.1	5.4	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.8	4.2	4.1
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.8	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	26	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.040	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	< 0.005	-	-
HCl Extractable Sulfur	0.005	% S	-	N/A	-	-

Client Sample ID			BH112 1.0 - 1.25m	BH112 1.25 - 1.50m	BH112 1.5 - 1.75m	BH112 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006408	B25-JI0006409	B25-JI0006410	B25-JI0006411
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.04	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	26	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	1.9	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	120	-	-
>2mm Fraction	0.005	g	-	3.9	-	-
Analysed Material	0.1	%	-	97	-	-
Extraneous Material	0.1	%	-	3.1	-	-
Sample Properties						
% Moisture	1	%	-	15	-	-

Client Sample ID			BH113 0 - 0.25m	BH113 0.25 - 0.50m	BH113 0.50 - 0.75m	BH113 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006412	B25-JI0006413	B25-JI0006414	B25-JI0006415
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	4.6	4.5	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	2.8	3.0	3.2
Reaction Ratings* ^{S05}	0	comment	4.0	3.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.8	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	37	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.060	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.010	-	-	-
HCl Extractable Sulfur	0.005	% S	N/A	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH113 0 - 0.25m	BH113 0.25 - 0.50m	BH113 0.50 - 0.75m	BH113 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006412	B25-JI0006413	B25-JI0006414	B25-JI0006415
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.06	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H ⁺ /t	37	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	2.8	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	86	-	-	-
>2mm Fraction	0.005	g	7.9	-	-	-
Analysed Material	0.1	%	92	-	-	-
Extraneous Material	0.1	%	8.4	-	-	-
Sample Properties						
% Moisture	1	%	21	-	-	-

Client Sample ID			BH113 1.0 - 1.25m	BH113 1.25 - 1.50m	BH113 1.5 - 1.75m	BH113 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006416	B25-JI0006417	B25-JI0006418	B25-JI0006419
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.6	5.0	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.9	3.9	3.9
Reaction Ratings ^{*S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.2	-	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H ⁺ /t	45	-	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.070	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H ⁺ /t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	-	-	-
HCl Extractable Sulfur	0.005	% S	0.010	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.010	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	0.008	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H ⁺ /t	4.9	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-

Client Sample ID			BH113 1.0 - 1.25m	BH113 1.25 - 1.50m	BH113 1.5 - 1.75m	BH113 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006416	B25-JI0006417	B25-JI0006418	B25-JI0006419
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.08	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	50	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	3.7	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	120	-	-	-
>2mm Fraction	0.005	g	1.4	-	-	-
Analysed Material	0.1	%	99	-	-	-
Extraneous Material	0.1	%	1.2	-	-	-
Sample Properties						
% Moisture	1	%	18	-	-	-

Client Sample ID			BH114 0 - 0.25m	BH114 0.25 - 0.50m	BH114 0.50 - 0.75m	BH114 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006420	B25-JI0006421	B25-JI0006422	B25-JI0006423
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.8	4.9	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.1	3.1	3.0
Reaction Ratings ^{S05}	0	comment	4.0	3.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.2	-	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	110	-	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.17	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	0.010	-	-	-
HCl Extractable Sulfur	0.005	% S	0.020	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.015	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	0.011	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	7.0	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.18	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	110	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	8.6	-	-	-

Client Sample ID			BH114 0 - 0.25m	BH114 0.25 - 0.50m	BH114 0.50 - 0.75m	BH114 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006420	B25-JI0006421	B25-JI0006422	B25-JI0006423
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	93	-	-	-
>2mm Fraction	0.005	g	4.2	-	-	-
Analysed Material	0.1	%	96	-	-	-
Extraneous Material	0.1	%	4.4	-	-	-
Sample Properties						
% Moisture	1	%	26	-	-	-

Client Sample ID			BH114 1.0 - 1.25m	BH114 1.25 - 1.50m	BH114 1.5 - 1.75m	BH114 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006424	B25-JI0006425	B25-JI0006426	B25-JI0006427
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
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	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.2	2.9	3.4
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.4	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	19	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.030	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	-	-	-
HCl Extractable Sulfur	0.005	% S	< 0.005	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.009	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	0.006	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	4.0	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.04	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	23	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	1.7	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	210	-	-	-
>2mm Fraction	0.005	g	2.8	-	-	-
Analysed Material	0.1	%	99	-	-	-
Extraneous Material	0.1	%	1.3	-	-	-
Sample Properties						
% Moisture	1	%	13	-	-	-

Client Sample ID			BH115 0 - 0.25m	BH115 0.25 - 0.50m	BH115 0.50 - 0.75m	BH115 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006428	B25-JI0006429	B25-JI0006430	B25-JI0006431
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.0	4.9	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.9	3.3	4.7
Reaction Ratings**S05	0	comment	4.0	4.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.2
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	120
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.20
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.010
HCl Extractable Sulfur	0.005	% S	-	-	-	0.010
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.006
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	2.8
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.20
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	130
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	-	9.4
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	71
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	25

Client Sample ID			BH115 1.0 - 1.25m	BH115 1.25 - 1.50m	BH115 1.5 - 1.75m	BH115 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006432	B25-JI0006433	B25-JI0006434	B25-JI0006435
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.3	4.7	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.0	3.4	3.6
Reaction Ratings**S05	0	comment	2.0	2.0	2.0	2.0

Client Sample ID			BH115 1.0 - 1.25m	BH115 1.25 - 1.50m	BH115 1.5 - 1.75m	BH115 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006432	B25-JI0006433	B25-JI0006434	B25-JI0006435
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.3
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	17
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.030
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	< 0.005
HCl Extractable Sulfur	0.005	% S	-	-	-	0.010
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.013
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	0.009
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	5.9
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.04
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	22
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	-	1.7
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	180
>2mm Fraction	0.005	g	-	-	-	4.1
Analysed Material	0.1	%	-	-	-	98
Extraneous Material	0.1	%	-	-	-	2.2
Sample Properties						
% Moisture	1	%	-	-	-	12

Client Sample ID			BH116 0 - 0.25m	BH116 0.25 - 0.50m	BH116 0.50 - 0.75m	BH116 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006436	B25-JI0006437	B25-JI0006438	B25-JI0006439
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.8	4.4	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.0	4.7	2.9
Reaction Ratings ^{S05}	0	comment	4.0	4.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.1
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	73
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.12
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3

Client Sample ID			BH116 0 - 0.25m	BH116 0.25 - 0.50m	BH116 0.50 - 0.75m	BH116 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006436	B25-JI0006437	B25-JI0006438	B25-JI0006439
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.010
HCl Extractable Sulfur	0.005	% S	-	-	-	0.010
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.006
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	2.6
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.12
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	76
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	-	5.7
Chromium Suite (SKCl) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	120
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	16

Client Sample ID			BH116 1.0 - 1.25m	BH116 1.25 - 1.50m	BH116 1.5 - 1.75m	BH116 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006440	B25-JI0006441	B25-JI0006442	B25-JI0006443
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.3	4.5	4.4	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.2	3.2	3.2
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.1
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	24
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.040
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	0.006
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	3.9
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.010
HCl Extractable Sulfur	0.005	% S	-	-	-	0.020

Client Sample ID			BH116 1.0 - 1.25m	BH116 1.25 - 1.50m	BH116 1.5 - 1.75m	BH116 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006440	B25-JI0006441	B25-JI0006442	B25-JI0006443
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.009
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	0.006
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	4.0
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.05
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	32
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	-	2.4
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	170
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	12

Client Sample ID			BH117 0 - 0.25m	BH117 0.25 - 0.50m	BH117 0.50 - 0.75m	BH117 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006444	B25-JI0006445	B25-JI0006446	B25-JI0006447
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.4	5.8	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.7	3.2	3.3
Reaction Ratings* ^{S05}	0	comment	4.0	4.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.3	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	33	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.050	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	< 0.005	-
HCl Extractable Sulfur	0.005	% S	-	-	< 0.005	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.005	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	< 0.005	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	2.4	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH117 0 - 0.25m	BH117 0.25 - 0.50m	BH117 0.50 - 0.75m	BH117 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006444	B25-JI0006445	B25-JI0006446	B25-JI0006447
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.06	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H ⁺ /t	-	-	35	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	2.7	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	97	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	15	-

Client Sample ID			BH117 1.0 - 1.25m	BH117 1.25 - 1.50m	BH117 1.5 - 1.75m	BH117 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006448	B25-JI0006449	B25-JI0006450	B25-JI0006451
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.6	5.7	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.1	3.3	3.3
Reaction Ratings ^{*S05}	0	comment	4.0	2.0	1.0	1.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.6	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H ⁺ /t	-	-	36	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.060	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H ⁺ /t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	< 0.005	-
HCl Extractable Sulfur	0.005	% S	-	-	N/A	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	N/A	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	N/A	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H ⁺ /t	-	-	N/A	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-

Client Sample ID			BH117 1.0 - 1.25m	BH117 1.25 - 1.50m	BH117 1.5 - 1.75m	BH117 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006448	B25-JI0006449	B25-JI0006450	B25-JI0006451
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.06	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	36	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	2.7	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	100	-
>2mm Fraction	0.005	g	-	-	1.9	-
Analysed Material	0.1	%	-	-	98	-
Extraneous Material	0.1	%	-	-	1.9	-
Sample Properties						
% Moisture	1	%	-	-	17	-

Client Sample ID			BH118 0 - 0.25m	BH118 0.25 - 0.50m	BH118 0.50 - 0.75m	BH118 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006452	B25-JI0006453	B25-JI0006454	B25-JI0006455
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.7	5.4	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.0	3.7	4.1
Reaction Ratings* ^{S05}	0	comment	4.0	4.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.4	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	14	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.020	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	< 0.005	-
HCl Extractable Sulfur	0.005	% S	-	-	< 0.005	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	0.006	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	0.005	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	2.8	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.03	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	17	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	1.3	-

Client Sample ID			BH118 0 - 0.25m	BH118 0.25 - 0.50m	BH118 0.50 - 0.75m	BH118 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006452	B25-JI0006453	B25-JI0006454	B25-JI0006455
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	150	-
>2mm Fraction	0.005	g	-	-	3.5	-
Analysed Material	0.1	%	-	-	98	-
Extraneous Material	0.1	%	-	-	2.3	-
Sample Properties						
% Moisture	1	%	-	-	14	-

Client Sample ID			BH118 1.0 - 1.25m	BH118 1.25 - 1.50m	BH118 1.5 - 1.75m	BH118 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006456	B25-JI0006457	B25-JI0006458	B25-JI0006459
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.5	4.8	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	4.3	4.1	3.9
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	3.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	4.3	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	44	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	0.070	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	< 3	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	0.010	-
HCl Extractable Sulfur	0.005	% S	-	-	0.010	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	< 0.005	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	< 0.005	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	< 2	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	N/A	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	N/A	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	N/A	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	0.07	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	46	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	3.4	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	100	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
Sample Properties						
% Moisture	1	%	-	-	18	-

Client Sample ID			BH119 0 - 0.25m	BH119 0.25 - 0.50m	BH119 0.50 - 0.75m	BH119 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006460	B25-JI0006461	B25-JI0006462	B25-JI0006463
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
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	6.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.0	3.5	3.6
Reaction Ratings**S05	0	comment	4.0	4.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.0	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	180	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.29	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.050	-	-
HCl Extractable Sulfur	0.005	% S	-	0.10	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	0.094	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	0.071	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	44	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.36	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	220	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	17	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	55	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
Sample Properties						
% Moisture	1	%	-	27	-	-

Client Sample ID			BH119 1.0 - 1.25m	BH119 1.25 - 1.50m	BH119 1.5 - 1.75m	BH119 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006464	B25-JI0006465	B25-JI0006466	B25-JI0006467
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	4.5	5.0	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	3.8	4.3	4.4
Reaction Ratings**S05	0	comment	2.0	2.0	2.0	3.0

Client Sample ID			BH119 1.0 - 1.25m	BH119 1.25 - 1.50m	BH119 1.5 - 1.75m	BH119 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006464	B25-JI0006465	B25-JI0006466	B25-JI0006467
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.2	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	69	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.11	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.020	-	-
HCl Extractable Sulfur	0.005	% S	-	0.020	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	< 0.005	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	< 0.005	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	< 2	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.11	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	70	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	5.3	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	150	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
Sample Properties						
% Moisture	1	%	-	19	-	-

Client Sample ID			BH120 0 - 0.25m	BH120 0.25 - 0.50m	BH120 0.50 - 0.75m	BH120 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006468	B25-JI0006469	B25-JI0006470	B25-JI0006471
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.3	4.8	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.6	3.3	3.1
Reaction Ratings ^{S05}	0	comment	4.0	4.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.2	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	120	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.20	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-

Client Sample ID			BH120 0 - 0.25m	BH120 0.25 - 0.50m	BH120 0.50 - 0.75m	BH120 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006468	B25-JI0006469	B25-JI0006470	B25-JI0006471
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.010	-	-
HCl Extractable Sulfur	0.005	% S	-	0.010	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	0.018	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	0.013	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	8.2	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.21	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	130	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	9.8	-	-
Chromium Suite (SKCl) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	130	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
Sample Properties						
% Moisture	1	%	-	27	-	-

Client Sample ID			BH120 1.0 - 1.25m	BH120 1.25 - 1.50m	BH120 1.5 - 1.75m	BH120 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006472	B25-JI0006473	B25-JI0006474	B25-JI0006475
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.1	5.0	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	2.9	3.9	3.8
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.3	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	21	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.030	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	< 0.005	-	-
HCl Extractable Sulfur	0.005	% S	-	< 0.005	-	-

Client Sample ID			BH120 1.0 - 1.25m	BH120 1.25 - 1.50m	BH120 1.5 - 1.75m	BH120 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006472	B25-JI0006473	B25-JI0006474	B25-JI0006475
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	0.010	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	0.007	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	4.6	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.04	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	26	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	2.0	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	180	-	-
>2mm Fraction	0.005	g	-	2.1	-	-
Analysed Material	0.1	%	-	99	-	-
Extraneous Material	0.1	%	-	1.1	-	-
Sample Properties						
% Moisture	1	%	-	17	-	-

Client Sample ID			BH121 0 - 0.25m	BH121 0.25 - 0.50m	BH121 0.50 - 0.75m	BH121 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006476	B25-JI0006477	B25-JI0006478	B25-JI0006479
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.5	5.4	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	3.1	3.3	3.8
Reaction Ratings* ^{S05}	0	comment	3.0	3.0	3.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.6	-	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	12	-	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.020	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	-	-	-
HCl Extractable Sulfur	0.005	% S	N/A	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH121 0 - 0.25m	BH121 0.25 - 0.50m	BH121 0.50 - 0.75m	BH121 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006476	B25-JI0006477	B25-JI0006478	B25-JI0006479
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.02	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H ⁺ /t	12	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	< 1	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	160	-	-	-
>2mm Fraction	0.005	g	0.95	-	-	-
Analysed Material	0.1	%	99	-	-	-
Extraneous Material	0.1	%	0.6	-	-	-
Sample Properties						
% Moisture	1	%	12	-	-	-

Client Sample ID			BH121 1.0 - 1.25m	BH121 1.25 - 1.50m	BH121 1.5 - 1.75m	BH121 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006480	B25-JI0006481	B25-JI0006482	B25-JI0006483
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.5	5.0	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	3.8	3.9	3.7
Reaction Ratings ^{*S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.4	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H ⁺ /t	15	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.020	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H ⁺ /t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	-	-	-
HCl Extractable Sulfur	0.005	% S	< 0.005	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.007	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	0.005	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H ⁺ /t	3.2	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-

Client Sample ID			BH121 1.0 - 1.25m	BH121 1.25 - 1.50m	BH121 1.5 - 1.75m	BH121 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006480	B25-JI0006481	B25-JI0006482	B25-JI0006483
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.03	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	18	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	1.4	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	180	-	-	-
>2mm Fraction	0.005	g	1.1	-	-	-
Analysed Material	0.1	%	99	-	-	-
Extraneous Material	0.1	%	0.6	-	-	-
Sample Properties						
% Moisture	1	%	12	-	-	-

Client Sample ID			BH122 0 - 0.25m	BH122 0.25 - 0.50m	BH122 0.50 - 0.75m	BH122 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006484	B25-JI0006485	B25-JI0006486	B25-JI0006487
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.9	5.8	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.4	2.4	2.8	3.5
Reaction Ratings ^{S05}	0	comment	3.0	3.0	4.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.7	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	23	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.040	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	-	-	-
HCl Extractable Sulfur	0.005	% S	N/A	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	N/A	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.04	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	23	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	1.7	-	-	-

Client Sample ID			BH122 0 - 0.25m	BH122 0.25 - 0.50m	BH122 0.50 - 0.75m	BH122 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006484	B25-JI0006485	B25-JI0006486	B25-JI0006487
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	140	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	17	-	-	-

Client Sample ID			BH122 1.0 - 1.25m	BH122 1.25 - 1.50m	BH122 1.5 - 1.75m	BH122 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006488	B25-JI0006489	B25-JI0006490	B25-JI0006491
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.5	5.5	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.7	4.0	3.7
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.3	-	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	37	-	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.060	-	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	< 3	-	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	< 0.005	-	-	-
HCl Extractable Sulfur	0.005	% S	< 0.005	-	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	0.007	-	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	0.005	-	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	3.2	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	-	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	N/A	-	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	0.06	-	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	40	-	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	3.0	-	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	180	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
Sample Properties						
% Moisture	1	%	49	-	-	-

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Jul 07, 2025	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (PHFOX) tests			
Chromium Suite (SKCI) - NASSG (Excluding ANC)	Brisbane	Jul 07, 2025	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Jul 02, 2025	14 Days
- Method: LTM-GEN-7080 Moisture			



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Company Name: Tectonic Geotechnical Pty Ltd
Address: 924 David Low Way
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QLD 4564

Project Name: NORTH HARBOUR
Project ID: 20334
Facility Code:

Order No.:
Report #: 1239655
Phone: 07 5478 9642
Fax:

Received: Jul 1, 2025 6:35 PM
Due: Jul 9, 2025
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Paige Howarth

Sample Detail						Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780						X	X	X
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	BH101 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006256	X		
2	BH101 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006257	X		
3	BH101 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006258	X		
4	BH101 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006259	X	X	
5	BH101 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006260	X		
6	BH101 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006261	X		
7	BH101 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006262	X		
8	BH101 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006263	X	X	X



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Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Paige Howarth

Sample Detail					Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780							
9	BH101 2.0 - 2.25m	Jun 23, 2025	Soil	B25-JI0006264	X	X	X
10	BH101 2.25 - 2.50m	Jun 23, 2025	Soil	B25-JI0006265	X		
11	BH102 0 - 0.25m	Jun 23, 2025	Soil	B25-JI0006266	X		
12	BH102 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006267	X		
13	BH102 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006268	X	X	X
14	BH102 0.75 - 1.0m	Jun 23, 2025	Soil	B25-JI0006269	X		
15	BH102 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006270	X		
16	BH102 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006271	X		
17	BH102 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006272	X	X	X
18	BH102 1.75 -	Jun 23, 2025	Soil	B25-JI0006273	X		

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NORTH HARBOUR

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07 5478 9642

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5 Day

Contact Name:

Mark Thomson

Eurofins Analytical Services Manager : Paige Howarth

Sample Detail					Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
2.0m							
19 BH102 2.0 - 2.25m	Jun 23, 2025		Soil	B25-JI0006274	X		
20 BH102 2.25 - 2.50m	Jun 23, 2025		Soil	B25-JI0006275	X		
21 BH103 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006276	X		
22 BH103 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006277	X	X	X
23 BH103 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006278	X		
24 BH103 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006279	X		
25 BH103 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006280	X		
26 BH103 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006281	X	X	X
27 BH103 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006282	X		

Date Reported: Jul 09, 2025

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Sample Detail				Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780						
28	BH103 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006283	X	X
29	BH103 2.0 - 2.25m	Jun 23, 2025	Soil	B25-JI0006284	X	
30	BH103 2.25 - 2.50m	Jun 23, 2025	Soil	B25-JI0006285	X	X
31	BH103 2.50 - 2.75m	Jun 23, 2025	Soil	B25-JI0006286	X	
32	BH103 2.75 - 3.0m	Jun 23, 2025	Soil	B25-JI0006287	X	
33	BH103 3.0 - 3.25m	Jun 23, 2025	Soil	B25-JI0006288	X	
34	BH103 3.25 - 3.50m	Jun 23, 2025	Soil	B25-JI0006289	X	X
35	BH103 3.5 - 3.75m	Jun 23, 2025	Soil	B25-JI0006290	X	
36	BH103 3.75 - 4.0m	Jun 23, 2025	Soil	B25-JI0006291	X	
37	BH104 0 -	Jun 23, 2025	Soil	B25-JI0006292	X	X



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Sample Detail					Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
0.25m							
38 BH104 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006293	X		
39 BH104 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006294	X		
40 BH104 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006295	X		
41 BH104 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006296	X	X	X
42 BH104 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006297	X		
43 BH104 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006298	X		
44 BH104 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006299	X		
45 BH104 2.0 - 2.25m	Jun 23, 2025		Soil	B25-JI0006300	X	X	X
46 BH104 2.25 - 2.50m	Jun 23, 2025		Soil	B25-JI0006301	X		



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Sample Detail				Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780				X	X	X
47	BH104 2.50 - 2.75m	Jun 23, 2025	Soil	B25-JI0006302	X	
48	BH104 2.75 - 3.0m	Jun 23, 2025	Soil	B25-JI0006303		
49	BH104 3.0 - 3.25m	Jun 23, 2025	Soil	B25-JI0006304	X	X
50	BH104 3.25 - 3.50m	Jun 23, 2025	Soil	B25-JI0006305	X	
51	BH104 3.5 - 3.75m	Jun 23, 2025	Soil	B25-JI0006306	X	
52	BH104 3.75 - 4.0m	Jun 23, 2025	Soil	B25-JI0006307	X	
53	BH105 0 - 0.25m	Jun 23, 2025	Soil	B25-JI0006308	X	
54	BH105 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006309	X	
55	BH105 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006310	X	
56	BH105 0.75 -	Jun 23, 2025	Soil	B25-JI0006311	X	X

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 924 David Low Way
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QLD 4564

Project Name: NORTH HARBOUR
Project ID: 20334
Facility Code:

Order No.:
Report #: 1239655
Phone: 07 5478 9642
Fax:

Received: Jul 1, 2025 6:35 PM
Due: Jul 9, 2025
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Paige Howarth

Sample Detail					Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
1.0m							
57 BH105 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006312	X		
58 BH105 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006313	X		
59 BH105 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006314	X		
60 BH105 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006315	X	X	
61 BH105 2.0 - 2.25m	Jun 23, 2025		Soil	B25-JI0006316	X		
62 BH105 2.25 - 2.50m	Jun 23, 2025		Soil	B25-JI0006317	X		
63 BH105 2.50 - 2.75m	Jun 23, 2025		Soil	B25-JI0006318	X		
64 BH105 2.75 - 3.0m	Jun 23, 2025		Soil	B25-JI0006319	X	X	
65 BH106 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006320	X		



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Sample Detail

Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780				Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
66	BH106 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006321	X	X
67	BH106 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006322	X	X
68	BH106 0.75 - 1.0m	Jun 23, 2025	Soil	B25-JI0006323	X	
69	BH106 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006324	X	
70	BH106 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006325	X	
71	BH106 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006326	X	X
72	BH106 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006327	X	
73	BH106 2.0 - 2.25m	Jun 23, 2025	Soil	B25-JI0006328	X	
74	BH106 2.25 - 2.50m	Jun 23, 2025	Soil	B25-JI0006329	X	
75	BH106 2.50 -	Jun 23, 2025	Soil	B25-JI0006330	X	X



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Sample Detail					Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
2.75m							
76 BH106 2.75 - 3.0m	Jun 23, 2025		Soil	B25-JI0006331	X		
77 BH106 3.0 - 3.25m	Jun 23, 2025		Soil	B25-JI0006332	X		
78 BH106 3.25 - 3.50m	Jun 23, 2025		Soil	B25-JI0006333	X		
79 BH106 3.5 - 3.75m	Jun 23, 2025		Soil	B25-JI0006334	X	X	X
80 BH106 3.75 - 4.0m	Jun 23, 2025		Soil	B25-JI0006335	X		
81 BH107 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006336	X		
82 BH107 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006337	X	X	X
83 BH107 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006338	X		
84 BH107 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006339	X		



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Sample Detail				Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780						
85	BH107 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006340	X	X
86	BH107 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006341	X	X
87	BH107 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006342	X	
88	BH107 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006343	X	
89	BH107 2.0 - 2.25m	Jun 23, 2025	Soil	B25-JI0006344	X	
90	BH107 2.25 - 2.50m	Jun 23, 2025	Soil	B25-JI0006345	X	X
91	BH107 2.50 - 2.75m	Jun 23, 2025	Soil	B25-JI0006346	X	
92	BH107 2.75 - 3.0m	Jun 23, 2025	Soil	B25-JI0006347	X	
93	BH107 3.0 - 3.25m	Jun 23, 2025	Soil	B25-JI0006348	X	
94	BH107 3.25 -	Jun 23, 2025	Soil	B25-JI0006349	X	X



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Sample Detail					Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
3.50m							
95 BH107 3.5 - 3.75m	Jun 23, 2025		Soil	B25-JI0006350	X		
96 BH107 3.75 - 4.0m	Jun 23, 2025		Soil	B25-JI0006351	X		
97 BH108 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006352	X	X	X
98 BH108 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006353	X		
99 BH108 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006354	X		
100 BH108 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006355	X		
101 BH108 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006356	X	X	X
102 BH108 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006357	X		
103 BH108 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006358	X		



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Sample Detail

Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
104	BH108 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006359	X	X	X
105	BH108 2.0 - 2.25m	Jun 23, 2025	Soil	B25-JI0006360	X	X	X
106	BH108 2.25 - 2.50m	Jun 23, 2025	Soil	B25-JI0006361	X		
107	BH108 2.50 - 2.75m	Jun 23, 2025	Soil	B25-JI0006362	X		
108	BH108 2.75 - 3.0m	Jun 23, 2025	Soil	B25-JI0006363	X		
109	BH108 3.0 - 3.25m	Jun 23, 2025	Soil	B25-JI0006364	X	X	X
110	BH108 3.25 - 3.50m	Jun 23, 2025	Soil	B25-JI0006365	X		
111	BH108 3.5 - 3.75m	Jun 23, 2025	Soil	B25-JI0006366	X		
112	BH108 3.75 - 4.0m	Jun 23, 2025	Soil	B25-JI0006367	X		
113	BH109 0 -	Jun 23, 2025	Soil	B25-JI0006368	X		



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Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
0.25m							
BH109 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006369	X		
BH109 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006370	X		
BH109 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006371	X	X	X
BH109 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006372	X		
BH109 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006373	X		
BH109 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006374	X		
BH109 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006375	X	X	X
BH109 2.0 - 2.25m	Jun 23, 2025		Soil	B25-JI0006376	X		
BH109 2.25 - 2.50m	Jun 23, 2025		Soil	B25-JI0006377	X		



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Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780												
123	BH109 2.50 - 2.75m	Jun 23, 2025		Soil				B25-JI0006378		X	X	X
124	BH109 2.75 - 3.0m	Jun 23, 2025		Soil				B25-JI0006379		X	X	X
125	BH110 0 - 0.25m	Jun 23, 2025		Soil				B25-JI0006380		X		
126	BH110 0.25 - 0.50m	Jun 23, 2025		Soil				B25-JI0006381		X		
127	BH110 0.50 - 0.75m	Jun 23, 2025		Soil				B25-JI0006382		X	X	X
128	BH110 0.75 - 1.0m	Jun 23, 2025		Soil				B25-JI0006383		X		
129	BH110 1.0 - 1.25m	Jun 23, 2025		Soil				B25-JI0006384		X		
130	BH110 1.25 - 1.50m	Jun 23, 2025		Soil				B25-JI0006385		X		
131	BH110 1.5 - 1.75m	Jun 23, 2025		Soil				B25-JI0006386		X	X	X
132	BH110 1.75 -	Jun 23, 2025		Soil				B25-JI0006387		X		



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Company Name: Tectonic Geotechnical Pty Ltd
Address: 924 David Low Way
Marcoola
QLD 4564

Project Name: NORTH HARBOUR
Project ID: 20334
Facility Code:

Order No.:
Report #: 1239655
Phone: 07 5478 9642
Fax:

Received: Jul 1, 2025 6:35 PM
Due: Jul 9, 2025
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Paige Howarth

Sample Detail					Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
2.0m							
133 BH110 2.0 - 2.25m	Jun 23, 2025			Soil	X		
134 BH110 2.25 - 2.50m	Jun 23, 2025			Soil	X		
135 BH110 2.50 - 2.75m	Jun 23, 2025			Soil	X	X	X
136 BH110 2.75 - 3.0m	Jun 23, 2025			Soil	X		
137 BH110 3.0 - 3.25m	Jun 23, 2025			Soil	X		
138 BH110 3.25 - 3.50m	Jun 23, 2025			Soil	X		
139 BH110 3.5 - 3.75m	Jun 23, 2025			Soil	X	X	X
140 BH110 3.75 - 4.0m	Jun 23, 2025			Soil	X		
141 BH111 0 - 0.25m	Jun 23, 2025			Soil	X		



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Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
142	BH111 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006397	X	X	X
143	BH111 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006398	X		
144	BH111 0.75 - 1.0m	Jun 23, 2025	Soil	B25-JI0006399	X		
145	BH111 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006400	X		
146	BH111 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006401	X	X	X
147	BH111 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006402	X		
148	BH111 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006403	X		
149	BH112 0 - 0.25m	Jun 23, 2025	Soil	B25-JI0006404	X		
150	BH112 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006405	X	X	X
151	BH112 0.50 -	Jun 23, 2025	Soil	B25-JI0006406	X		



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Sample Detail					Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
0.75m							
BH112 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006407	X		
BH112 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006408	X		
BH112 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006409	X	X	X
BH112 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006410	X		
BH112 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006411	X		
BH113 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006412	X	X	X
BH113 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006413	X		
BH113 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006414	X		
BH113 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006415	X		



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Sample Detail				Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780						
161	BH113 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006416	X	X
162	BH113 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006417	X	
163	BH113 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006418		
164	BH113 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006419		
165	BH114 0 - 0.25m	Jun 23, 2025	Soil	B25-JI0006420	X	X
166	BH114 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006421		
167	BH114 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006422		
168	BH114 0.75 - 1.0m	Jun 23, 2025	Soil	B25-JI0006423		
169	BH114 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006424	X	X
170	BH114 1.25 -	Jun 23, 2025	Soil	B25-JI0006425		



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Sample Detail

Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
1.50m					X	X	X
171 BH114 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006426	X		
172 BH114 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006427	X		
173 BH115 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006428	X		
174 BH115 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006429	X		
175 BH115 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006430	X		
176 BH115 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006431	X	X	
177 BH115 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006432	X		
178 BH115 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006433	X		
179 BH115 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006434	X		



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Sample Detail

Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780				Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
180	BH115 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006435	X	X
181	BH116 0 - 0.25m	Jun 23, 2025	Soil	B25-JI0006436	X	X
182	BH116 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006437	X	X
183	BH116 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006438	X	X
184	BH116 0.75 - 1.0m	Jun 23, 2025	Soil	B25-JI0006439	X	X
185	BH116 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006440	X	X
186	BH116 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006441	X	X
187	BH116 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006442	X	X
188	BH116 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006443	X	X
189	BH117 0 -	Jun 23, 2025	Soil	B25-JI0006444	X	X



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Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
0.25m							
190 BH117 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006445	X		
191 BH117 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006446	X	X	X
192 BH117 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006447	X		
193 BH117 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006448	X		
194 BH117 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006449	X		
195 BH117 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006450	X	X	X
196 BH117 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006451	X		
197 BH118 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006452	X		
198 BH118 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006453	X		



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Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780						
199	BH118 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006454	X	X
200	BH118 0.75 - 1.0m	Jun 23, 2025	Soil	B25-JI0006455	X	
201	BH118 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006456		
202	BH118 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006457		
203	BH118 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006458	X	X
204	BH118 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006459		
205	BH119 0 - 0.25m	Jun 23, 2025	Soil	B25-JI0006460		
206	BH119 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006461	X	X
207	BH119 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006462	X	
208	BH119 0.75 -	Jun 23, 2025	Soil	B25-JI0006463	X	

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 924 David Low Way
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QLD 4564

Project Name: NORTH HARBOUR
Project ID: 20334
Facility Code:

Order No.:
Report #: 1239655
Phone: 07 5478 9642
Fax:

Received: Jul 1, 2025 6:35 PM
Due: Jul 9, 2025
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Paige Howarth

Sample Detail					Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
1.0m							
209 BH119 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006464	X		
210 BH119 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006465	X	X	X
211 BH119 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006466	X		
212 BH119 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006467	X		
213 BH120 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006468	X		
214 BH120 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006469	X	X	X
215 BH120 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006470	X		
216 BH120 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006471	X		
217 BH120 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006472	X		



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NZBN: 9429046024954

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Sample Detail				Chromium Suite (SKCI) - NASSG (Excluding ANC)	Moisture Set	Acid Sulfate Soils Field pH Test
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780						
218	BH120 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006473	X	X
219	BH120 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006474	X	
220	BH120 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006475		
221	BH121 0 - 0.25m	Jun 23, 2025	Soil	B25-JI0006476	X	X
222	BH121 0.25 - 0.50m	Jun 23, 2025	Soil	B25-JI0006477		
223	BH121 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006478		
224	BH121 0.75 - 1.0m	Jun 23, 2025	Soil	B25-JI0006479		
225	BH121 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006480	X	X
226	BH121 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006481		
227	BH121 1.5 -	Jun 23, 2025	Soil	B25-JI0006482		



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Sample Detail										Chromium Suite (SKCI) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780										Moisture Set
										Acid Sulfate Soils Field pH Test
	1.75m									X
228	BH121 1.75 - 2.0m	Jun 23, 2025		Soil				B25-JI0006483		
229	BH122 0 - 0.25m	Jun 23, 2025		Soil				B25-JI0006484	X	X
230	BH122 0.25 - 0.50m	Jun 23, 2025		Soil				B25-JI0006485	X	
231	BH122 0.50 - 0.75m	Jun 23, 2025		Soil				B25-JI0006486	X	
232	BH122 0.75 - 1.0m	Jun 23, 2025		Soil				B25-JI0006487	X	
233	BH122 1.0 - 1.25m	Jun 23, 2025		Soil				B25-JI0006488	X	X
234	BH122 1.25 - 1.50m	Jun 23, 2025		Soil				B25-JI0006489	X	
235	BH122 1.5 - 1.75m	Jun 23, 2025		Soil				B25-JI0006490	X	
236	BH122 1.75 - 2.0m	Jun 23, 2025		Soil				B25-JI0006491	X	

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Sample Detail	Chromium Suite (SKCI) - NASSG (Excluding ANC)	X	58
	Moisture Set	X	58
	Acid Sulfate Soils Field pH Test	X	236
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780			
Test Counts			

Internal Quality Control Review and Glossary

General

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

Holding Times

Please refer to the '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 before sample receipt deadlines as stated on the SRA.

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

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

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

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ppm: parts per million
µg/L: micrograms per litre	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	Colour: Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as 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 are not data from your samples.
3. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. 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										
Actual Acidity (NLM-3.2)										
pH-KCL (NLM-3.1)				%	98			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)				%	94			80-120	Pass	
LCS - % Recovery										
Potential Acidity - Chromium Reducible Sulfur										
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)				%	99			80-120	Pass	
LCS - % Recovery										
Extractable Sulfur										
HCl Extractable Sulfur				%	108			80-120	Pass	
LCS - % Recovery										
Actual Acidity (NLM-3.2)										
pH-KCL (NLM-3.1)				%	98			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)				%	94			80-120	Pass	
LCS - % Recovery										
Potential Acidity - Chromium Reducible Sulfur										
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)				%	92			80-120	Pass	
LCS - % Recovery										
Extractable Sulfur										
HCl Extractable Sulfur				%	110			80-120	Pass	
LCS - % Recovery										
Actual Acidity (NLM-3.2)										
pH-KCL (NLM-3.1)				%	99			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)				%	96			80-120	Pass	
LCS - % Recovery										
Potential Acidity - Chromium Reducible Sulfur										
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)				%	99			80-120	Pass	
LCS - % Recovery										
Extractable Sulfur										
HCl Extractable Sulfur				%	108			80-120	Pass	
LCS - % Recovery										
Actual Acidity (NLM-3.2)										
pH-KCL (NLM-3.1)				%	98			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)				%	96			80-120	Pass	
LCS - % Recovery										
Potential Acidity - Chromium Reducible Sulfur										
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)				%	100			80-120	Pass	
LCS - % Recovery										
Extractable Sulfur										
HCl Extractable Sulfur				%	106			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Duplicate										
Actual Acidity (NLM-3.2)					Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	B25-JI0006259	CP	pH Units		4.2	4.2	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	B25-JI0006259	CP	mol H+/t		42	41	2.0	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	B25-JI0006259	CP	% pyrite S		0.070	0.070	2.0	30%	Pass	
Duplicate										
Potential Acidity - Chromium Reducible Sulfur					Result 1	Result 2	RPD			
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0006259	CP	% S		< 0.005	< 0.005	<1	20%	Pass	
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0006259	CP	mol H+/t		< 3	< 3	<1	30%	Pass	

Duplicate								
Extractable Sulfur				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	B25-JI0006259	CP	% S	0.020	0.020	4.0	30%	Pass
HCl Extractable Sulfur	B25-JI0006259	CP	% S	0.020	0.020	2.0	20%	Pass
Duplicate								
Retained Acidity (S-NAS)				Result 1	Result 2	RPD		
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0006259	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0006259	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0006259	CP	mol H+/t	< 2	< 2	<1	30%	Pass
Duplicate								
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD		
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0006259	CP	% CaCO ₃	N/A	N/A	N/A	20%	Pass
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0006259	CP	% S	N/A	N/A	N/A	30%	Pass
ANC Fineness Factor	B25-JI0006259	CP	factor	1.5	1.5	<1	30%	Pass
Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006259	CP	% S	0.07	0.07	2.0	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006259	CP	mol H+/t	42	41	2.0	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0006259	CP	kg CaCO ₃ /t	3.1	3.1	2.0	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006261	CP	pH Units	4.8	4.8	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006266	CP	pH Units	4.5	4.5	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006267	CP	pH Units	4.5	4.5	pass	20%	Pass
Duplicate								
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD		
pH-KCL (NLM-3.1)	B25-JI0006268	CP	pH Units	4.3	4.3	<1	20%	Pass
Titratable Actual Acidity (NLM-3.2)	B25-JI0006268	CP	mol H+/t	30	30	<1	20%	Pass
Titratable Actual Acidity (NLM-3.2)	B25-JI0006268	CP	% pyrite S	0.050	0.050	<1	30%	Pass
Duplicate								
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD		
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0006268	CP	% S	< 0.005	< 0.005	<1	20%	Pass
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0006268	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Duplicate								
Extractable Sulfur				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	B25-JI0006268	CP	% S	0.040	0.040	1.0	30%	Pass
HCl Extractable Sulfur	B25-JI0006268	CP	% S	0.040	0.040	1.0	20%	Pass
Duplicate								
Retained Acidity (S-NAS)				Result 1	Result 2	RPD		
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0006268	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0006268	CP	% S	< 0.005	< 0.005	<1	30%	Pass
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0006268	CP	mol H+/t	< 2	< 2	<1	30%	Pass

Duplicate								
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD		
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0006268	CP	% CaCO ₃	N/A	N/A	N/A	20%	Pass
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0006268	CP	% S	N/A	N/A	N/A	30%	Pass
ANC Fineness Factor	B25-JI0006268	CP	factor	1.5	1.5	<1	30%	Pass
Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (including ANC)	B25-JI0006268	CP	% S	0.05	0.05	1.0	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006268	CP	mol H ⁺ /t	31	30	1.0	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0006268	CP	kg CaCO ₃ /t	2.3	2.3	1.0	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006270	CP	pH Units	5.0	4.8	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006272	CP	pH Units	5.8	5.8	pass	20%	Pass
Duplicate								
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD		
pH-KCL (NLM-3.1)	B25-JI0006272	CP	pH Units	4.7	4.7	<1	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006272	CP	mol H ⁺ /t	17	17	2.0	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006272	CP	% pyrite S	0.030	0.030	2.0	30%	Pass
Duplicate								
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD		
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0006272	CP	% S	< 0.005	< 0.005	<1	20%	Pass
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0006272	CP	mol H ⁺ /t	< 3	< 3	<1	30%	Pass
Duplicate								
Extractable Sulfur				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	B25-JI0006272	CP	% S	0.020	0.020	3.0	30%	Pass
HCl Extractable Sulfur	B25-JI0006272	CP	% S	N/A	N/A	N/A	20%	Pass
Duplicate								
Retained Acidity (S-NAS)				Result 1	Result 2	RPD		
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0006272	CP	% S	N/A	N/A	N/A	30%	Pass
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0006272	CP	% S	N/A	N/A	N/A	30%	Pass
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0006272	CP	mol H ⁺ /t	N/A	N/A	N/A	30%	Pass
Duplicate								
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD		
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0006272	CP	% CaCO ₃	N/A	N/A	N/A	20%	Pass
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0006272	CP	% S	N/A	N/A	N/A	30%	Pass
ANC Fineness Factor	B25-JI0006272	CP	factor	1.5	1.5	<1	30%	Pass
Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (including ANC)	B25-JI0006272	CP	% S	0.03	0.03	2.0	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006272	CP	mol H ⁺ /t	17	17	2.0	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0006272	CP	kg CaCO ₃ /t	1.3	1.3	2.0	30%	Pass

Duplicate								
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD		
pH-KCL (NLM-3.1)	B25-JI0006292	CP	pH Units	4.7	4.7	<1	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006292	CP	mol H+/t	81	83	2.0	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006292	CP	% pyrite S	0.13	0.13	2.0	30%	Pass
Duplicate								
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD		
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0006292	CP	% S	0.031	0.034	9.0	20%	Pass
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0006292	CP	mol H+/t	19	21	9.0	30%	Pass
Duplicate								
Extractable Sulfur				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	B25-JI0006292	CP	% S	0.010	0.010	<1	30%	Pass
HCl Extractable Sulfur	B25-JI0006292	CP	% S	N/A	N/A	N/A	20%	Pass
Duplicate								
Retained Acidity (S-NAS)				Result 1	Result 2	RPD		
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0006292	CP	% S	N/A	N/A	N/A	30%	Pass
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0006292	CP	% S	N/A	N/A	N/A	30%	Pass
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0006292	CP	mol H+/t	N/A	N/A	N/A	30%	Pass
Duplicate								
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD		
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0006292	CP	% CaCO3	N/A	N/A	N/A	20%	Pass
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0006292	CP	% S	N/A	N/A	N/A	30%	Pass
ANC Fineness Factor	B25-JI0006292	CP	factor	1.5	1.5	<1	30%	Pass
Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (including ANC)	B25-JI0006292	CP	% S	0.16	0.17	3.0	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006292	CP	mol H+/t	100	100	3.0	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0006292	CP	kg CaCO3/t	7.5	7.8	3.0	30%	Pass
Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	B25-JI0006292	CP	%	29	29	<1	30%	Pass
Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	B25-JI0005551	NCP	%	31	30	2.0	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006301	CP	pH Units	4.1	4.0	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006313	CP	pH Units	5.2	5.2	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006323	CP	pH Units	4.3	4.3	pass	20%	Pass
Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	B25-JI0005532	NCP	%	16	19	19	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006329	CP	pH Units	4.3	4.3	pass	20%	Pass

Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	B25-JI0006334	CP	%	23	23	2.0	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006344	CP	pH Units	4.6	4.5	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006345	CP	pH Units	4.7	4.7	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006346	CP	pH Units	4.2	4.2	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006354	CP	pH Units	4.9	4.9	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006368	CP	pH Units	4.1	4.2	pass	20%	Pass
Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	B25-JI0006375	CP	%	29	30	4.0	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006383	CP	pH Units	3.9	4.1	pass	20%	Pass
Duplicate								
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD		
pH-KCL (NLM-3.1)	B25-JI0006386	CP	pH Units	4.2	4.2	<1	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006386	CP	mol H+/t	77	78	2.0	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006386	CP	% pyrite S	0.12	0.13	2.0	30%	Pass
Duplicate								
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD		
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0006386	CP	% S	< 0.005	< 0.005	<1	20%	Pass
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0006386	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Duplicate								
Extractable Sulfur				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	B25-JI0006386	CP	% S	0.030	0.030	2.0	30%	Pass
HCl Extractable Sulfur	B25-JI0006386	CP	% S	0.16	0.19	17	20%	Pass
Duplicate								
Retained Acidity (S-NAS)				Result 1	Result 2	RPD		
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0006386	CP	% S	0.26	0.31	20	30%	Pass
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0006386	CP	% S	0.19	0.24	20	30%	Pass
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0006386	CP	mol H+/t	120	150	20	30%	Pass
Duplicate								
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD		
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0006386	CP	% CaCO3	N/A	N/A	N/A	20%	Pass
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0006386	CP	% S	N/A	N/A	N/A	30%	Pass
ANC Fineness Factor	B25-JI0006386	CP	factor	1.5	1.5	<1	30%	Pass

Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006386	CP	% S	0.32	0.36	13	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006386	CP	mol H+/t	200	220	13	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0006386	CP	kg CaCO ₃ /t	15	17	13	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006393	CP	pH Units	4.9	5.1	pass	20%	Pass
Duplicate								
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD		
pH-KCL (NLM-3.1)	B25-JI0006397	CP	pH Units	4.7	4.7	<1	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006397	CP	mol H+/t	16	16	1.0	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006397	CP	% pyrite S	0.030	0.030	1.0	30%	Pass
Duplicate								
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD		
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0006397	CP	% S	< 0.005	< 0.005	<1	20%	Pass
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0006397	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Duplicate								
Extractable Sulfur				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	B25-JI0006397	CP	% S	< 0.005	< 0.005	<1	30%	Pass
HCl Extractable Sulfur	B25-JI0006397	CP	% S	N/A	N/A	N/A	20%	Pass
Duplicate								
Retained Acidity (S-NAS)				Result 1	Result 2	RPD		
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0006397	CP	% S	N/A	N/A	N/A	30%	Pass
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0006397	CP	% S	N/A	N/A	N/A	30%	Pass
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0006397	CP	mol H+/t	N/A	N/A	N/A	30%	Pass
Duplicate								
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD		
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0006397	CP	% CaCO ₃	N/A	N/A	N/A	20%	Pass
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0006397	CP	% S	N/A	N/A	N/A	30%	Pass
ANC Fineness Factor	B25-JI0006397	CP	factor	1.5	1.5	<1	30%	Pass
Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (including ANC)	B25-JI0006397	CP	% S	0.03	0.03	1.0	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006397	CP	mol H+/t	16	16	1.0	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0006397	CP	kg CaCO ₃ /t	1.2	1.2	1.0	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006406	CP	pH Units	5.8	5.8	pass	20%	Pass
Duplicate								
Sample Properties				Result 1	Result 2	RPD		
% Moisture	B25-JI0006412	CP	%	21	22	2.0	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006414	CP	pH Units	4.5	4.5	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006433	CP	pH Units	5.3	5.2	pass	20%	Pass

Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006439	CP	pH Units	4.6	4.5	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006445	CP	pH Units	5.4	5.5	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006453	CP	pH Units	5.7	5.5	pass	20%	Pass
Duplicate								
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD		
pH-KCL (NLM-3.1)	B25-JI0006461	CP	pH Units	4.0	4.0	<1	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006461	CP	mol H+/t	180	180	<1	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006461	CP	% pyrite S	0.29	0.29	<1	30%	Pass
Duplicate								
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD		
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0006461	CP	% S	< 0.005	< 0.005	<1	20%	Pass
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0006461	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Duplicate								
Extractable Sulfur				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	B25-JI0006461	CP	% S	0.050	0.050	4.0	30%	Pass
HCl Extractable Sulfur	B25-JI0006461	CP	% S	0.10	0.11	5.0	20%	Pass
Duplicate								
Retained Acidity (S-NAS)				Result 1	Result 2	RPD		
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0006461	CP	% S	0.094	0.11	13	30%	Pass
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0006461	CP	% S	0.071	0.081	13	30%	Pass
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0006461	CP	mol H+/t	44	50	13	30%	Pass
Duplicate								
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD		
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0006461	CP	% CaCO3	N/A	N/A	N/A	20%	Pass
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0006461	CP	% S	N/A	N/A	N/A	30%	Pass
ANC Fineness Factor	B25-JI0006461	CP	factor	1.5	1.5	<1	30%	Pass
Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (including ANC)	B25-JI0006461	CP	% S	0.36	0.37	3.0	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006461	CP	mol H+/t	220	230	3.0	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0006461	CP	kg CaCO3/t	17	17	3.0	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006468	CP	pH Units	5.8	5.8	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006482	CP	pH Units	5.0	5.0	pass	20%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006483	CP	pH Units	4.6	4.7	pass	20%	Pass

Duplicate								
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD		
pH-KCL (NLM-3.1)	B25-JI0006484	CP	pH Units	4.7	4.7	<1	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006484	CP	mol H+/t	23	23	1.0	20%	Pass
Titrateable Actual Acidity (NLM-3.2)	B25-JI0006484	CP	% pyrite S	0.040	0.040	1.0	30%	Pass
Duplicate								
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD		
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0006484	CP	% S	< 0.005	< 0.005	<1	20%	Pass
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0006484	CP	mol H+/t	< 3	< 3	<1	30%	Pass
Duplicate								
Extractable Sulfur				Result 1	Result 2	RPD		
Sulfur - KCl Extractable	B25-JI0006484	CP	% S	< 0.005	< 0.005	<1	30%	Pass
HCl Extractable Sulfur	B25-JI0006484	CP	% S	N/A	N/A	N/A	20%	Pass
Duplicate								
Retained Acidity (S-NAS)				Result 1	Result 2	RPD		
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0006484	CP	% S	N/A	N/A	N/A	30%	Pass
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0006484	CP	% S	N/A	N/A	N/A	30%	Pass
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0006484	CP	mol H+/t	N/A	N/A	N/A	30%	Pass
Duplicate								
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD		
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0006484	CP	% CaCO ₃	N/A	N/A	N/A	20%	Pass
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0006484	CP	% S	N/A	N/A	N/A	30%	Pass
ANC Fineness Factor	B25-JI0006484	CP	factor	1.5	1.5	<1	30%	Pass
Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (including ANC)	B25-JI0006484	CP	% S	0.04	0.04	1.0	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0006484	CP	mol H+/t	23	23	1.0	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0006484	CP	kg CaCO ₃ /t	1.7	1.7	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 (CaCO ₃) 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/m ³ in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m ³ '
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl is 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:

Jacinta Baker	Analytical Services Manager
Jonathon Angell	Senior Analyst-Sample Properties
Jonathon Angell	Senior Analyst-SPOCAS



Glenn Jackson
Managing Director

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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Site Number 20794 & 2780

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 Arrangement for the mutual recognition of the
 equivalence of testing, medical testing, calibration,
 inspection, proficiency testing scheme providers and
 reference materials producers reports and certificates.

Attention: **Mark Thomson**

Report **1239679-S**
Project name **NORTH HARBOUR**
Project ID **20334**
Received Date **Jul 01, 2025**

Client Sample ID			BH123 0 - 0.25m	BH123 0.25 - 0.50m	BH123 0.50 - 0.75m	BH123 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006745	B25-JI0006746	B25-JI0006747	B25-JI0006748
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
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	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.2	3.7	3.6
Reaction Ratings* ^{S05}	0	comment	4.0	3.0	3.0	3.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.1
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	73
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.12
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.010
HCl Extractable Sulfur	0.005	% S	-	-	-	0.010
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.007
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	3.1
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.12
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	76
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	-	5.7
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	120
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	17

Client Sample ID			BH123 1.0 - 1.25m	BH123 1.25 - 1.50m	BH123 1.5 - 1.75m	BH123 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006749	B25-JI0006750	B25-JI0006751	B25-JI0006752
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	5.3	5.0	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	4.3	3.6	4.1
Reaction Ratings**S05	0	comment	3.0	3.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.4
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	25
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.040
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	0.010
HCl Extractable Sulfur	0.005	% S	-	-	-	0.010
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	< 2
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.04
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	26
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	-	1.9
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	150
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	13

Client Sample ID			BH124 0 - 0.25m	BH124 0.25 - 0.50m	BH124 0.50 - 0.75m	BH124 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006753	B25-JI0006754	B25-JI0006755	B25-JI0006756
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.4	5.4	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.1	3.3	3.4
Reaction Ratings**S05	0	comment	3.0	3.0	2.0	2.0

Client Sample ID			BH124 0 - 0.25m	BH124 0.25 - 0.50m	BH124 0.50 - 0.75m	BH124 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006753	B25-JI0006754	B25-JI0006755	B25-JI0006756
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.5
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	17
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.030
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	< 0.005
HCl Extractable Sulfur	0.005	% S	-	-	-	< 0.005
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.005
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	2.5
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.03
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	20
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO3/t	-	-	-	1.5
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	270
>2mm Fraction	0.005	g	-	-	-	4.3
Analysed Material	0.1	%	-	-	-	98
Extraneous Material	0.1	%	-	-	-	1.6
Sample Properties						
% Moisture	1	%	-	-	-	12

Client Sample ID			BH124 1.0 - 1.25m	BH124 1.25 - 1.50m	BH124 1.5 - 1.75m	BH124 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006757	B25-JI0006758	B25-JI0006759	B25-JI0006760
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.3	5.2	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.9	3.8	3.9
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	2.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	-	-	4.4
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	-	-	15
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	-	-	0.020
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	-	-	< 3

Client Sample ID			BH124 1.0 - 1.25m	BH124 1.25 - 1.50m	BH124 1.5 - 1.75m	BH124 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006757	B25-JI0006758	B25-JI0006759	B25-JI0006760
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	-	-	< 0.005
HCl Extractable Sulfur	0.005	% S	-	-	-	< 0.005
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	-	-	0.006
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	-	-	< 0.005
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	-	-	2.6
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	-	-	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	-	-	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	-	-	N/A
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	-	-	0.03
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	-	-	18
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	-	-	1.4
Chromium Suite (SKCl) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	-	-	220
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
Sample Properties						
% Moisture	1	%	-	-	-	12

Client Sample ID			BH125 0 - 0.25m	BH125 0.25 - 0.50m	BH125 0.50 - 0.75m	BH125 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006761	B25-JI0006762	B25-JI0006763	B25-JI0006764
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.5	4.9	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.0	3.3	3.4
Reaction Ratings ^{S05}	0	comment	3.0	3.0	3.0	2.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.6	-	-
Titrateable Actual Acidity (NLM-3.2)	2	mol H+/t	-	24	-	-
Titrateable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.040	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	< 0.005	-	-
HCl Extractable Sulfur	0.005	% S	-	N/A	-	-

Client Sample ID			BH125 0 - 0.25m	BH125 0.25 - 0.50m	BH125 0.50 - 0.75m	BH125 0.75 - 1.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006761	B25-JI0006762	B25-JI0006763	B25-JI0006764
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.04	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	-	24	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	1.8	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	130	-	-
>2mm Fraction	0.005	g	-	2.1	-	-
Analysed Material	0.1	%	-	98	-	-
Extraneous Material	0.1	%	-	1.6	-	-
Sample Properties						
% Moisture	1	%	-	16	-	-

Client Sample ID			BH125 1.0 - 1.25m	BH125 1.25 - 1.50m	BH125 1.5 - 1.75m	BH125 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006765	B25-JI0006766	B25-JI0006767	B25-JI0006768
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.9	5.2	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.7	4.2	3.7
Reaction Ratings* ^{S05}	0	comment	2.0	2.0	4.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	-	4.3	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	-	25	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	-	0.040	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCR) (NLM-2.1) ^{S04}	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	3	mol H+/t	-	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	-	0.020	-	-
HCl Extractable Sulfur	0.005	% S	-	0.020	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	-	< 0.005	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1 ^{S02}	0.005	% S	-	< 0.005	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	-	< 2	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH125 1.0 - 1.25m	BH125 1.25 - 1.50m	BH125 1.5 - 1.75m	BH125 1.75 - 2.0m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B25-JI0006765	B25-JI0006766	B25-JI0006767	B25-JI0006768
Date Sampled			Jun 23, 2025	Jun 23, 2025	Jun 23, 2025	Jun 23, 2025
Test/Reference	LOR	Unit				
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO ₃	-	N/A	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2) ^{S03}	0.02	% S	-	N/A	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H ⁺ /t	-	N/A	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Including ANC)						
s-CRS Suite - Net Acidity - NASSG (including ANC)	0.02	% S	-	0.04	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H ⁺ /t	-	26	-	-
CRS Suite - Liming Rate - NASSG (Including ANC) ^{S01}	1	kg CaCO ₃ /t	-	2.0	-	-
Chromium Suite (SKCI) - NASSG (Excluding ANC)						
<2mm Fraction	0.005	g	-	180	-	-
>2mm Fraction	0.005	g	-	1.2	-	-
Analysed Material	0.1	%	-	99	-	-
Extraneous Material	0.1	%	-	0.7	-	-
Sample Properties						
% Moisture	1	%	-	12	-	-

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Jul 03, 2025	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (PHFOX) tests			
Chromium Suite (SKCI) - NASSG (Excluding ANC)	Brisbane	Jul 03, 2025	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Jul 02, 2025	14 Days
- Method: LTM-GEN-7080 Moisture			

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Sample Detail						Chromium Suite (SKCI) - NASSG (Excluding ANC)				X	
						Moisture Set				X	
						Acid Sulfate Soils Field pH Test				X	
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	BH123 0 - 0.25m	Jun 23, 2025		Soil	B25-JI0006745						
2	BH123 0.25 - 0.50m	Jun 23, 2025		Soil	B25-JI0006746						
3	BH123 0.50 - 0.75m	Jun 23, 2025		Soil	B25-JI0006747						
4	BH123 0.75 - 1.0m	Jun 23, 2025		Soil	B25-JI0006748	X					
5	BH123 1.0 - 1.25m	Jun 23, 2025		Soil	B25-JI0006749	X					
6	BH123 1.25 - 1.50m	Jun 23, 2025		Soil	B25-JI0006750	X					
7	BH123 1.5 - 1.75m	Jun 23, 2025		Soil	B25-JI0006751	X					
8	BH123 1.75 - 2.0m	Jun 23, 2025		Soil	B25-JI0006752	X					
9	BH124 0 -	Jun 23, 2025		Soil	B25-JI0006753	X					



ABN: 50 005 085 521

NZBN: 9429046024954

ABN: 91 05 0159 898

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QLD 4564

Project Name: NORTH HARBOUR
Project ID: 20334

Order No.:
Report #: 1239679
Phone: 07 5478 9642
Fax:

Received: Jul 1, 2025 6:35 PM
Due: Jul 9, 2025
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Paige Howarth

Sample Detail				Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780				X	X	X
0.25m						
10 BH124 0.25 - 0.50m	Jun 23, 2025		Soil	X		
11 BH124 0.50 - 0.75m	Jun 23, 2025		Soil	X		
12 BH124 0.75 - 1.0m	Jun 23, 2025		Soil	X	X	X
13 BH124 1.0 - 1.25m	Jun 23, 2025		Soil	X		
14 BH124 1.25 - 1.50m	Jun 23, 2025		Soil	X		
15 BH124 1.5 - 1.75m	Jun 23, 2025		Soil	X		
16 BH124 1.75 - 2.0m	Jun 23, 2025		Soil	X	X	X
17 BH125 0 - 0.25m	Jun 23, 2025		Soil	X		
18 BH125 0.25 - 0.50m	Jun 23, 2025		Soil	X	X	X
19 BH125 0.50 -	Jun 23, 2025		Soil	X		

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Address: 924 David Low Way
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QLD 4564

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Sample Detail					Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl) - NASSG (Excluding ANC)
Brisbane Laboratory - NATA # 1261 Site # 20794 & 2780					X	X	X
19	BH125 0.50 - 0.75m	Jun 23, 2025	Soil	B25-JI0006763			
20	BH125 0.75 - 1.0m	Jun 23, 2025	Soil	B25-JI0006764	X		
21	BH125 1.0 - 1.25m	Jun 23, 2025	Soil	B25-JI0006765	X		
22	BH125 1.25 - 1.50m	Jun 23, 2025	Soil	B25-JI0006766	X	X	X
23	BH125 1.5 - 1.75m	Jun 23, 2025	Soil	B25-JI0006767	X		
24	BH125 1.75 - 2.0m	Jun 23, 2025	Soil	B25-JI0006768	X		
Test Counts					24	6	6

Date Reported: Jul 08, 2025

Eurofins Environment Testing Australia Pty Ltd 1/21 Smallwood Place, Murarie, QLD, Australia 4172
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Internal Quality Control Review and Glossary

General

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

Holding Times

Please refer to the '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 before sample receipt deadlines as stated on the SRA.

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

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

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

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ppm: parts per million
µg/L: micrograms per litre	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony Forming Unit	Colour: Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - 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.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should only be used as a guide and may be different when site-specific Sampling Analysis and Quality Plan (SAQP) have been implemented.

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%

NOTE: pH duplicates are reported as a range, not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as 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 are not data from your samples.
3. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery, the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results, a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. 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										
Actual Acidity (NLM-3.2)										
pH-KCL (NLM-3.1)				%	99			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)				%	96			80-120	Pass	
LCS - % Recovery										
Potential Acidity - Chromium Reducible Sulfur										
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)				%	102			80-120	Pass	
LCS - % Recovery										
Extractable Sulfur										
HCl Extractable Sulfur				%	108			80-120	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)*	B25-JI0006483	NCP	pH Units		4.6	4.7	pass	20%	Pass	
Duplicate										
Sample Properties					Result 1	Result 2	RPD			
% Moisture	B25-JI0006748	CP	%		17	17	2.0	30%	Pass	
Duplicate										
Acid Sulfate Soils Field pH Test					Result 1	Result 2	RPD			
pH-F (Field pH test)*	B25-JI0006749	CP	pH Units		4.9	5.0	pass	20%	Pass	
Duplicate										
Actual Acidity (NLM-3.2)					Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	B25-JI0008600	NCP	pH Units		6.1	6.1	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	B25-JI0008600	NCP	mol H+/t		5.0	4.0	7.0	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	B25-JI0008600	NCP	% pyrite S		0.010	0.010	7.0	30%	Pass	
Duplicate										
Potential Acidity - Chromium Reducible Sulfur					Result 1	Result 2	RPD			
Chromium Reducible Sulfur (s-SCR) (NLM-2.1)	B25-JI0008600	NCP	% S		< 0.005	< 0.005	<1	20%	Pass	
Chromium Reducible Sulfur (a-SCR) (NLM-2.1)	B25-JI0008600	NCP	mol H+/t		< 3	< 3	<1	30%	Pass	
Duplicate										
Extractable Sulfur					Result 1	Result 2	RPD			
Sulfur - KCl Extractable	B25-JI0008600	NCP	% S		N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	B25-JI0008600	NCP	% S		N/A	N/A	N/A	20%	Pass	
Duplicate										
Retained Acidity (S-NAS)					Result 1	Result 2	RPD			
Net Acid soluble sulfur (SNAS) NLM-4.1	B25-JI0008600	NCP	% S		N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B25-JI0008600	NCP	% S		N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B25-JI0008600	NCP	mol H+/t		N/A	N/A	N/A	30%	Pass	
Duplicate										
Acid Neutralising Capacity (ANCbt)					Result 1	Result 2	RPD			
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B25-JI0008600	NCP	% CaCO3		N/A	N/A	N/A	20%	Pass	
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B25-JI0008600	NCP	% S		N/A	N/A	N/A	30%	Pass	
ANC Fineness Factor	B25-JI0008600	NCP	factor		1.5	1.5	<1	30%	Pass	

Duplicate								
Net Acidity (Including ANC)				Result 1	Result 2	RPD		
s-CRS Suite - Net Acidity - NASSG (including ANC)	B25-JI0008600	NCP	% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity - NASSG (Including ANC)	B25-JI0008600	NCP	mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate - NASSG (Including ANC)	B25-JI0008600	NCP	kg CaCO ₃ /t	< 1	< 1	<1	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B25-JI0006759	CP	pH Units	5.2	5.3	pass	20%	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 (CaCO ₃) 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/m ³ in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m ³ '
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl is 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:

Jacinta Baker	Analytical Services Manager
Jonathon Angell	Senior Analyst-Sample Properties
Jonathon Angell	Senior Analyst-SPOCAS



Glenn Jackson
Managing Director

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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Attention: Mark Thomson

Report 773118-S-V2
Project name COMPENSATORY CUT - UNNAMED CREEK
Project ID 21030
Received Date Feb 10, 2021

Client Sample ID			BH1 - 0.0-0.25 Soil B21-Fe20769 Feb 09, 2021	BH1 - 0.25-0.5 Soil B21-Fe20770 Feb 09, 2021	BH1 - 0.5-0.71 Soil B21-Fe20771 Feb 09, 2021	BH2 - 0.0-0.25 Soil B21-Fe20772 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	5.1	4.8	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.7	3.6	2.2
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	4.2	-	4.5	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	210	-	77	28
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.34	-	0.12	0.044
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.018	-	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	11	-	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	0.02	-	< 0.02	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	2.0	2.0
HCl Extractable Sulfur	0.02	% S	0.07	-	< 0.02	n/a
Net Acid soluble sulfur	0.02	% S	0.05	-	< 0.02	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	22	-	< 10	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	0.04	-	< 0.02	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	n/a	n/a
Acid Neutralising Capacity - acidity (a-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
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.39	-	0.12	0.04
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	240	-	77	28
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	18	-	5.8	2.1
<2mm Fraction	0.005	g	32	-	30	110
>2mm Fraction	0.005	g	< 0.005	-	< 0.005	< 0.005
Analysed Material	0.1	%	100	-	100	100
Extraneous Material	0.1	%	< 0.1	-	< 0.1	< 0.1
% Moisture	1	%	27	30	25	15

Client Sample ID			BH2- 0.25-0.5	BH2 - 0.5-0.75	BH2 - 0.75-1.0	BH2 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20773	B21-Fe20774	B21-Fe20775	B21-Fe20776
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.9	4.6	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	3.3	3.2	3.4
Reaction Ratings**S05	-	comment	4.0	2.0	2.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	-	-	5.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	17	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.027	-
Chromium Reducible Sulfur ^{S04}	0.005	% S	-	-	0.011	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	6.9	-
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	-	-	24	-
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	-	-	1.8	-
<2mm Fraction	0.005	g	-	-	54	-
>2mm Fraction	0.005	g	-	-	1.3	-
Analysed Material	0.1	%	-	-	98	-
Extraneous Material	0.1	%	-	-	2.3	-
% Moisture	1	%	-	-	11	-

Client Sample ID			BH2 - 1.25-1.5	BH2 - 1.5-1.75	BH2 - 1.75-2.0	BH3 - 0.0-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20777	B21-Fe20778	B21-Fe20779	B21-Fe20780
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	5.1	5.3	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.7	3.8	2.7
Reaction Ratings**S05	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH3 - 0.25-0.5 Soil B21-Fe20781 Feb 09, 2021	BH3 - 0.5-0.75 Soil B21-Fe20782 Feb 09, 2021	BH3 - 0.75-1.0 Soil B21-Fe20783 Feb 09, 2021	BH3 - 1.0-1.25 Soil B21-Fe20784 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.6	5.2	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.4	2.7	2.7	2.7
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	4.8	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	27	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.044	-	-	-
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	27	-	-	-
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	2.1	-	-	-
<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	%	14	-	-	-

Client Sample ID			BH3 - 1.25-1.5 Soil B21-Fe20785 Feb 09, 2021	BH3 - 1.5-1.75 Soil B21-Fe20786 Feb 09, 2021	BH3 - 1.75-2.0 Soil B21-Fe20787 Feb 09, 2021	BH4 - 0.0-0.25 Soil B21-Fe20788 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
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	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	4.1	4.3	2.4
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	4.3	-	-	4.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	94	-	-	43
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.15	-	-	0.069
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	-	-	n/a

Client Sample ID			BH3 - 1.25-1.5 Soil B21-Fe20785 Feb 09, 2021	BH3 - 1.5-1.75 Soil B21-Fe20786 Feb 09, 2021	BH3 - 1.75-2.0 Soil B21-Fe20787 Feb 09, 2021	BH4 - 0.0-0.25 Soil B21-Fe20788 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Chromium Suite (SKCI)						
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	% CaCO ₃	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	0.15	-	-	0.07
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	94	-	-	43
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	7.0	-	-	3.2
<2mm Fraction	0.005	g	90	-	-	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	%	24	-	-	17

Client Sample ID			BH4 - 0.25-0.5 Soil B21-Fe20789 Feb 09, 2021	BH4 - 0.5-0.75 Soil B21-Fe20790 Feb 09, 2021	BH4 - 0.75-1.0 Soil B21-Fe20791 Feb 09, 2021	BH4 - 1.0-1.25 Soil B21-Fe20792 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.4	5.1	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	2.8	4.2	4.0
Reaction Ratings ^{S05}	-	comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	-	-	4.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	150	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.25	-
Chromium Reducible Sulfur ^{S04}	0.005	% S	-	-	0.007	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	4.2	-
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	% CaCO ₃	-	-	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	-	-	0.25	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	160	-
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	-	-	12	-
<2mm Fraction	0.005	g	-	-	86	-

Client Sample ID			BH4 - 0.25-0.5	BH4 - 0.5-0.75	BH4 - 0.75-1.0	BH4 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20789	B21-Fe20790	B21-Fe20791	B21-Fe20792
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Chromium Suite (SKCI)						
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	29	-

Client Sample ID			BH4 - 1.25-1.5	BH4 - 1.5-1.75	BH4 - 1.75-2.0	BH5 - 0.0-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20793	B21-Fe20794	B21-Fe20795	B21-Fe20796
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.2	5.2	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	4.0	4.1	2.8
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH5 - 0.25-0.5	BH5 - 0.5-0.75	BH5 - 0.75-1.0	BH5 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20797	B21-Fe20798	B21-Fe20799	B21-Fe20800
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
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	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.8	3.0	3.3
Reaction Ratings* ^{S05}	-	comment	3.0	4.0	3.0	3.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	5.2	-	-	4.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	8.5	-	-	65
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.014	-	-	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 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	-	-	0.10
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	-	65
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	-	-	4.8
<2mm Fraction	0.005	g	130	-	-	99
>2mm Fraction	0.005	g	< 0.005	-	-	1.6

Client Sample ID			BH5 - 0.25-0.5	BH5 - 0.5-0.75	BH5 - 0.75-1.0	BH5 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20797	B21-Fe20798	B21-Fe20799	B21-Fe20800
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Chromium Suite (SKCI)						
Analysed Material	0.1	%	100	-	-	98
Extraneous Material	0.1	%	< 0.1	-	-	1.5
% Moisture	1	%	12	-	-	17

Client Sample ID			BH5 - 1.25-1.5	BH5 - 1.5-1.75	BH5 - 1.75-2.0	BH6 - 0.0-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20801	B21-Fe20802	B21-Fe20803	B21-Fe20804
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.8	4.8	6.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.7	3.7	3.2
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH6 - 0.25-0.5	BH6 - 0.5-0.75	BH6 - 0.75-1.0	BH6 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20805	B21-Fe20806	B21-Fe20807	B21-Fe20808
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	5.9	5.5	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.7	3.4	3.2
Reaction Ratings* ^{S05}	-	comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	-	5.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	4.9	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.008	-	-
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	-	110	-	-
>2mm Fraction	0.005	g	-	0.71	-	-
Analysed Material	0.1	%	-	99	-	-
Extraneous Material	0.1	%	-	0.7	-	-

Client Sample ID			BH6 - 0.25-0.5	BH6 - 0.5-0.75	BH6 - 0.75-1.0	BH6 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20805	B21-Fe20806	B21-Fe20807	B21-Fe20808
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
% Moisture	1	%	-	4.3	-	-

Client Sample ID			BH6 - 1.25-1.5	BH6 - 1.5-1.75	BH6 - 1.75-2.0	BH7 - 0.0-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20809	B21-Fe20810	B21-Fe20811	B21-Fe20812
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.3	5.3	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.6	3.6	3.0
Reaction Ratings* ^{S05}	-	comment	2.0	2.0	2.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	5.7	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	3.1	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.005	-	-	-
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	2.9	-	-	-
Analysed Material	0.1	%	98	-	-	-
Extraneous Material	0.1	%	2.4	-	-	-
% Moisture	1	%	10	-	-	-

Client Sample ID			BH7 - 0.25-0.5	BH7 - 0.5-0.75	BH7 - 0.75-1.0	BH7 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20813	B21-Fe20814	B21-Fe20815	B21-Fe20816
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.1	5.0	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.4	3.5	3.5
Reaction Ratings**S05	-	comment	4.0	2.0	2.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	4.6	-	4.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	54	-	74	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.086	-	0.12	-
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	0.09	-	0.12	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	54	-	74	-
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	4.0	-	5.6	-
<2mm Fraction	0.005	g	110	-	81	-
>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	%	22	-	20	-

Client Sample ID			BH7 - 1.25-1.5	BH7 - 1.5-1.75	BH7 - 1.75-2.0	BH8 - 0.0-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20817	B21-Fe20818	B21-Fe20819	B21-Fe20820
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.7	5.7	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.1	3.3	3.0
Reaction Ratings**S05	-	comment	4.0	4.0	4.0	4.0

Client Sample ID			BH8 - 0.25-0.5 Soil B21-Fe20821 Feb 09, 2021	BH8 - 0.5-0.75 Soil B21-Fe20822 Feb 09, 2021	BH8 - 0.75-1.0 Soil B21-Fe20823 Feb 09, 2021	BH8 - 1.0-1.25 Soil B21-Fe20824 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	6.0	6.0	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.8	4.3	4.4
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	2.0	2.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	5.6	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	3.7	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.006	-	-	-
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	96	-	-	-
>2mm Fraction	0.005	g	0.81	-	-	-
Analysed Material	0.1	%	99	-	-	-
Extraneous Material	0.1	%	0.8	-	-	-
% Moisture	1	%	4.1	-	-	-

Client Sample ID			BH8 - 1.25-1.5 Soil B21-Fe20825 Feb 09, 2021	BH8 - 1.5-1.75 Soil B21-Fe20826 Feb 09, 2021	BH8 - 1.75-2.0 Soil B21-Fe20827 Feb 09, 2021	BH9 - 0.0-0.25 Soil B21-Fe20828 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.5	6.1	6.1	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	4.6	4.2	2.9
Reaction Ratings* ^{S05}	-	comment	2.0	1.0	1.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	5.5	-	-	5.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	-	-	7.9
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	-	-	0.013
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

Client Sample ID			BH8 - 1.25-1.5 Soil B21-Fe20825 Feb 09, 2021	BH8 - 1.5-1.75 Soil B21-Fe20826 Feb 09, 2021	BH8 - 1.75-2.0 Soil B21-Fe20827 Feb 09, 2021	BH9 - 0.0-0.25 Soil B21-Fe20828 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Chromium Suite (SKCI)						
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	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	-	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	-	-	< 1
<2mm Fraction	0.005	g	110	-	-	76
>2mm Fraction	0.005	g	4.2	-	-	< 0.005
Analysed Material	0.1	%	96	-	-	100
Extraneous Material	0.1	%	3.7	-	-	< 0.1
% Moisture	1	%	15	-	-	7.0

Client Sample ID			BH9 - 0.25-0.5 Soil B21-Fe20829 Feb 09, 2021	BH9 - 0.5-0.75 Soil B21-Fe20830 Feb 09, 2021	BH9 - 0.75-1.0 Soil B21-Fe20831 Feb 09, 2021	BH9 - 1.0-1.25 Soil B21-Fe20832 Feb 09, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	5.8	5.6	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.7	4.0	4.3
Reaction Ratings ^{S05}	-	comment	4.0	4.0	4.0	1.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	-	5.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	5.4	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.009	-	-
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	-	110	-	-

Client Sample ID			BH9 - 0.25-0.5	BH9 - 0.5-0.75	BH9 - 0.75-1.0	BH9 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20829	B21-Fe20830	B21-Fe20831	B21-Fe20832
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Chromium Suite (SKCI)						
>2mm Fraction	0.005	g	-	3.4	-	-
Analysed Material	0.1	%	-	97	-	-
Extraneous Material	0.1	%	-	2.9	-	-
% Moisture	1	%	-	14	-	-

Client Sample ID			BH9 - 1.25-1.5	BH9 - 1.5-1.75	BH9 - 1.75-2.0	BH10 - 0.0-0.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20833	B21-Fe20834	B21-Fe20835	B21-Fe20836
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	5.7	5.8	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.2	3.8	3.9	2.8
Reaction Ratings* ^{S05}	-	comment	1.0	4.0	4.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	-	4.9	5.0	4.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	22	17	52
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.035	0.027	0.083
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 Correction Factor	1	factor	-	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	-	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	-	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	-	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	n/a	n/a
Acid Neutralising Capacity - acidity (a-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
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.04	0.03	0.08
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	22	17	52
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	-	1.7	1.3	3.9
<2mm Fraction	0.005	g	-	130	150	50
>2mm Fraction	0.005	g	-	13	9.2	< 0.005
Analysed Material	0.1	%	-	91	94	100
Extraneous Material	0.1	%	-	9.2	5.9	< 0.1
% Moisture	1	%	-	14	13	15

Client Sample ID			BH10 - 0.25-0.5	BH10 - 0.5-0.75	BH10 - 0.75-1.0	BH10 - 1.0-1.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20837	B21-Fe20838	B21-Fe20839	B21-Fe20840
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.5	5.7	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	3.2	3.3	4.1
Reaction Ratings**S05	-	comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCI)						
pH-KCL	0.1	pH Units	4.5	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	65	-	-	-
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	0.03	-	-	-
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 (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	74	-	-	-
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	5.6	-	-	-
<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	%	14	-	-	-

Client Sample ID			BH10 - 1.25-1.5	BH10 - 1.5-1.75	BH10 - 1.75-2.0
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			B21-Fe20841	B21-Fe20842	B21-Fe20843
Date Sampled			Feb 09, 2021	Feb 09, 2021	Feb 09, 2021
Test/Reference	LOR	Unit			
Acid Sulfate Soils Field pH Test					
pH-F (Field pH test)*	0.1	pH Units	5.3	5.7	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.1	4.2
Reaction Ratings**S05	-	comment	4.0	4.0	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

Acid Sulfate Soils Field pH Test

- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (PHFOX) tests

Chromium Suite (SKCI)

- Method: LTM-GEN-7070

% Moisture

- Method: LTM-GEN-7080 Moisture

Testing Site

Brisbane

Brisbane

Brisbane

Extracted

Feb 12, 2021

Mar 05, 2021

Mar 08, 2021

Holding Time

7 Days

6 Week

14 Days

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Company Name: Tectonic Geotechnical Pty Ltd
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Project Name: COMPENSATORY CUT - UNNAMED CREEK
Project ID: 21030

Order No.:
Report #: 773118
Phone: 07 5478 9642
Fax:

Received: Feb 10, 2021 9:00 AM
Due: Feb 18, 2021
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 (SKCI)
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794							X	X	X
Perth Laboratory - NATA Site # 23736									
Mayfield Laboratory									
External Laboratory									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	BH1 - 0.0-0.25	Feb 09, 2021		Soil	B21-Fe20769		X	X	
2	BH1 - 0.25-0.5	Feb 09, 2021		Soil	B21-Fe20770		X	X	
3	BH1 - 0.5-0.71	Feb 09, 2021		Soil	B21-Fe20771		X	X	
4	BH2 - 0.0-0.25	Feb 09, 2021		Soil	B21-Fe20772		X	X	
5	BH2 - 0.25-0.5	Feb 09, 2021		Soil	B21-Fe20773		X		
6	BH2 - 0.5-0.75	Feb 09, 2021		Soil	B21-Fe20774		X		
7	BH2 - 0.75-1.0	Feb 09, 2021		Soil	B21-Fe20775		X	X	
8	BH2 - 1.0-1.25	Feb 09, 2021		Soil	B21-Fe20776		X		
9	BH2 - 1.25-1.5	Feb 09, 2021		Soil	B21-Fe20777		X		

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Sample Detail				Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794				X	X	X
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory						
External Laboratory						
10	BH2 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20778		
11	BH2 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20779		
12	BH3 - 0.0-0.25	Feb 09, 2021	Soil	B21-Fe20780		
13	BH3 - 0.25-0.5	Feb 09, 2021	Soil	B21-Fe20781	X	X
14	BH3 - 0.5-0.75	Feb 09, 2021	Soil	B21-Fe20782	X	
15	BH3 - 0.75-1.0	Feb 09, 2021	Soil	B21-Fe20783	X	
16	BH3 - 1.0-1.25	Feb 09, 2021	Soil	B21-Fe20784	X	
17	BH3 - 1.25-1.5	Feb 09, 2021	Soil	B21-Fe20785	X	X
18	BH3 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20786	X	
19	BH3 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20787	X	
20	BH4 - 0.0-0.25	Feb 09, 2021	Soil	B21-Fe20788	X	X

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Sample Detail					Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794					X	X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
21	BH4 - 0.25-0.5	Feb 09, 2021	Soil	B21-Fe20789	X		
22	BH4 - 0.5-0.75	Feb 09, 2021	Soil	B21-Fe20790	X		
23	BH4 - 0.75-1.0	Feb 09, 2021	Soil	B21-Fe20791	X	X	X
24	BH4 - 1.0-1.25	Feb 09, 2021	Soil	B21-Fe20792	X		
25	BH4 - 1.25-1.5	Feb 09, 2021	Soil	B21-Fe20793	X		
26	BH4 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20794	X		
27	BH4 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20795	X		
28	BH5 - 0.0-0.25	Feb 09, 2021	Soil	B21-Fe20796	X		
29	BH5 - 0.25-0.5	Feb 09, 2021	Soil	B21-Fe20797	X	X	X
30	BH5 - 0.5-0.75	Feb 09, 2021	Soil	B21-Fe20798	X		
31	BH5 - 0.75-1.0	Feb 09, 2021	Soil	B21-Fe20799	X		

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Sample Detail				Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794				X	X	X
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory						
External Laboratory						
32	BH5 - 1.0-1.25	Feb 09, 2021	Soil	B21-Fe20800	X	X
33	BH5 - 1.25-1.5	Feb 09, 2021	Soil	B21-Fe20801	X	
34	BH5 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20802	X	
35	BH5 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20803	X	
36	BH6 - 0.0-0.25	Feb 09, 2021	Soil	B21-Fe20804	X	
37	BH6 - 0.25-0.5	Feb 09, 2021	Soil	B21-Fe20805	X	
38	BH6 - 0.5-0.75	Feb 09, 2021	Soil	B21-Fe20806	X	X
39	BH6 - 0.75-1.0	Feb 09, 2021	Soil	B21-Fe20807	X	
40	BH6 - 1.0-1.25	Feb 09, 2021	Soil	B21-Fe20808	X	
41	BH6 - 1.25-1.5	Feb 09, 2021	Soil	B21-Fe20809	X	X
42	BH6 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20810	X	

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Sample Detail				Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794				X	X	X
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory						
External Laboratory						
43	BH6 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20811	X	
44	BH7 - 0.0-0.25	Feb 09, 2021	Soil	B21-Fe20812	X	
45	BH7 - 0.25-0.5	Feb 09, 2021	Soil	B21-Fe20813	X	X
46	BH7 - 0.5-0.75	Feb 09, 2021	Soil	B21-Fe20814	X	
47	BH7 - 0.75-1.0	Feb 09, 2021	Soil	B21-Fe20815	X	X
48	BH7 - 1.0-1.25	Feb 09, 2021	Soil	B21-Fe20816	X	
49	BH7 - 1.25-1.5	Feb 09, 2021	Soil	B21-Fe20817	X	
50	BH7 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20818	X	
51	BH7 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20819	X	
52	BH8 - 0.0-0.25	Feb 09, 2021	Soil	B21-Fe20820	X	
53	BH8 - 0.25-0.5	Feb 09, 2021	Soil	B21-Fe20821	X	X

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Due: Feb 18, 2021
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 (SKCI)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794				X	X	X
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory						
External Laboratory						
54	BH8 - 0.5-0.75	Feb 09, 2021	Soil	B21-Fe20822		
55	BH8 - 0.75-1.0	Feb 09, 2021	Soil	B21-Fe20823		
56	BH8 - 1.0-1.25	Feb 09, 2021	Soil	B21-Fe20824		
57	BH8 - 1.25-1.5	Feb 09, 2021	Soil	B21-Fe20825	X	X
58	BH8 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20826	X	
59	BH8 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20827	X	
60	BH9 - 0.0-0.25	Feb 09, 2021	Soil	B21-Fe20828	X	X
61	BH9 - 0.25-0.5	Feb 09, 2021	Soil	B21-Fe20829	X	
62	BH9 - 0.5-0.75	Feb 09, 2021	Soil	B21-Fe20830	X	X
63	BH9 - 0.75-1.0	Feb 09, 2021	Soil	B21-Fe20831	X	
64	BH9 - 1.0-1.25	Feb 09, 2021	Soil	B21-Fe20832	X	

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

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

Perth
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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

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

Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: COMPENSATORY CUT - UNNAMED CREEK
Project ID: 21030

Order No.:
Report #: 773118
Phone: 07 5478 9642
Fax:

Received: Feb 10, 2021 9:00 AM
Due: Feb 18, 2021
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 (SKCI)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794					X	X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
65	BH9 - 1.25-1.5	Feb 09, 2021	Soil	B21-Fe20833	X		
66	BH9 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20834	X	X	X
67	BH9 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20835	X	X	X
68	BH10 - 0.0-0.25	Feb 09, 2021	Soil	B21-Fe20836	X	X	X
69	BH10 - 0.25-0.5	Feb 09, 2021	Soil	B21-Fe20837	X	X	X
70	BH10 - 0.5-0.75	Feb 09, 2021	Soil	B21-Fe20838	X		
71	BH10 - 0.75-1.0	Feb 09, 2021	Soil	B21-Fe20839	X		
72	BH10 - 1.0-	Feb 09, 2021	Soil	B21-Fe20840	X		

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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

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

Perth
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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

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PO Box 60 Wickham 2283
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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
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Company Name:

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40A Glen Vista Place
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COMPENSATORY CUT - UNNAMED CREEK

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Mark Thomson

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Sample Detail					Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCI)
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794					X	X	X
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
1.25							
73	BH10 - 1.25-1.5	Feb 09, 2021	Soil	B21-Fe20841	X		
74	BH10 - 1.5-1.75	Feb 09, 2021	Soil	B21-Fe20842	X		
75	BH10 - 1.75-2.0	Feb 09, 2021	Soil	B21-Fe20843	X		
Test Counts					75	23	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
NC	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 (SKCI)									
pH-KCL				%	98		80-120	Pass	
Acid trail - Titratable Actual Acidity				%	97		80-120	Pass	
Chromium Reducible Sulfur				%	96		80-120	Pass	
Acid Neutralising Capacity (ANCbt)				%	97		80-120	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)*	B21-Fe20769	CP		pH Units	5.0	4.9	pass	30%	Pass
Duplicate									
Acid Sulfate Soils Field pH Test					Result 1	Result 2	RPD		
pH-F (Field pH test)*	B21-Fe20779	CP		pH Units	5.3	5.3	pass	30%	Pass
Duplicate									
Acid Sulfate Soils Field pH Test					Result 1	Result 2	RPD		
pH-F (Field pH test)*	B21-Fe20789	CP		pH Units	4.4	4.4	pass	30%	Pass
Duplicate									
					Result 1	Result 2	RPD		
% Moisture	B21-Fe20791	CP		%	29	28	4.0	30%	Pass
Duplicate									
Acid Sulfate Soils Field pH Test					Result 1	Result 2	RPD		
pH-F (Field pH test)*	B21-Fe20799	CP		pH Units	4.8	4.8	pass	30%	Pass
Duplicate									
Acid Sulfate Soils Field pH Test					Result 1	Result 2	RPD		
pH-F (Field pH test)*	B21-Fe20809	CP		pH Units	5.5	5.5	pass	30%	Pass
Duplicate									
Chromium Suite (SKCI)					Result 1	Result 2	RPD		
pH-KCL	B21-Fe20809	CP		pH Units	5.7	5.7	<1	30%	Pass
Acid trail - Titratable Actual Acidity	B21-Fe20809	CP		mol H+/t	3.1	3.0	4.9	30%	Pass
sulfidic - TAA equiv. S% pyrite	B21-Fe20809	CP		% pyrite S	0.005	0.005	5.0	30%	Pass
Chromium Reducible Sulfur	B21-Fe20809	CP		% S	< 0.005	< 0.005	<1	30%	Pass
Chromium Reducible Sulfur -acidity units	B21-Fe20809	CP		mol H+/t	< 3	< 3	<1	30%	Pass
Sulfur - KCl Extractable	B21-Fe20809	CP		% S	< 0.02	< 0.02	<1	30%	Pass
Net Acid soluble sulfur	B21-Fe20809	CP		% S	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - acidity units	B21-Fe20809	CP		mol H+/t	n/a	n/a	n/a	30%	Pass
Net Acid soluble sulfur - equivalent S% pyrite	B21-Fe20809	CP		% S	n/a	n/a	n/a	30%	Pass
Acid Neutralising Capacity (ANCbt)	B21-Fe20809	CP		% CaCO3	n/a	n/a	n/a	30%	Pass
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B21-Fe20809	CP		% S	n/a	n/a	n/a	30%	Pass
ANC Fineness Factor	B21-Fe20809	CP		factor	1.5	1.5	<1	30%	Pass
CRS Suite - Net Acidity (Sulfur Units)	B21-Fe20809	CP		% S	< 0.02	< 0.02	<1	30%	Pass
CRS Suite - Net Acidity (Acidity Units)	B21-Fe20809	CP		mol H+/t	< 10	< 10	<1	30%	Pass
CRS Suite - Liming Rate	B21-Fe20809	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)*	B21-Fe20819	CP		pH Units	5.7	5.7	pass	30%	Pass
Duplicate									
					Result 1	Result 2	RPD		
% Moisture	B21-Fe20830	CP		%	14	14	<1	30%	Pass

Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B21-Fe20832	CP	pH Units	5.8	5.8	pass	30%	Pass
Duplicate								
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD		
pH-F (Field pH test)*	B21-Fe20839	CP	pH Units	5.7	5.6	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 (CaCO ₃) 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/m ³ in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m ³ '
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl is 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:

Myles Clark Senior Analyst-SPOCAS (QLD)

Glenn Jackson
General Manager

- 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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Appendix C

Limitations



Limitations

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Any assessments made in the preparation of this document are based on the conditions indicated from published sources and the findings of the investigation described. Actual subsurface conditions may differ from those indicated in the document (e.g. between boreholes or test pits). No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this document.

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APPENDIX 7 - 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	