Appendix 01 Certificates of Title

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 5723 Folio 299

Parent Title(s) CT 5211/524

Creating Dealing(s) TG 8770112

Title Issued 07/01/2000 **Edition** 2 **Edition Issued** 14/03/2019

Estate Type

FEE SIMPLE

Registered Proprietor

SOUTH AUSTRALIAN WATER CORPORATION
OF ADELAIDE SA 5000

Description of Land

ALLOTMENTS 3 AND 4 FILED PLAN 115108
IN THE AREA NAMED WATERLOO CORNER
HUNDRED OF PORT ADELAIDE

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO ETSA UTILITIES PTY. LTD. (TG 8770112)

Schedule of Dealings

NIL

Notations

Dealings Affecting Title NIL

Priority Notices NIL

Notations on Plan NIL

Registrar-General's Notes

AREA NAME UPDATED VIDE GOVERNMENT GAZETTE DATED 02/06/2011

Administrative Interests NIL

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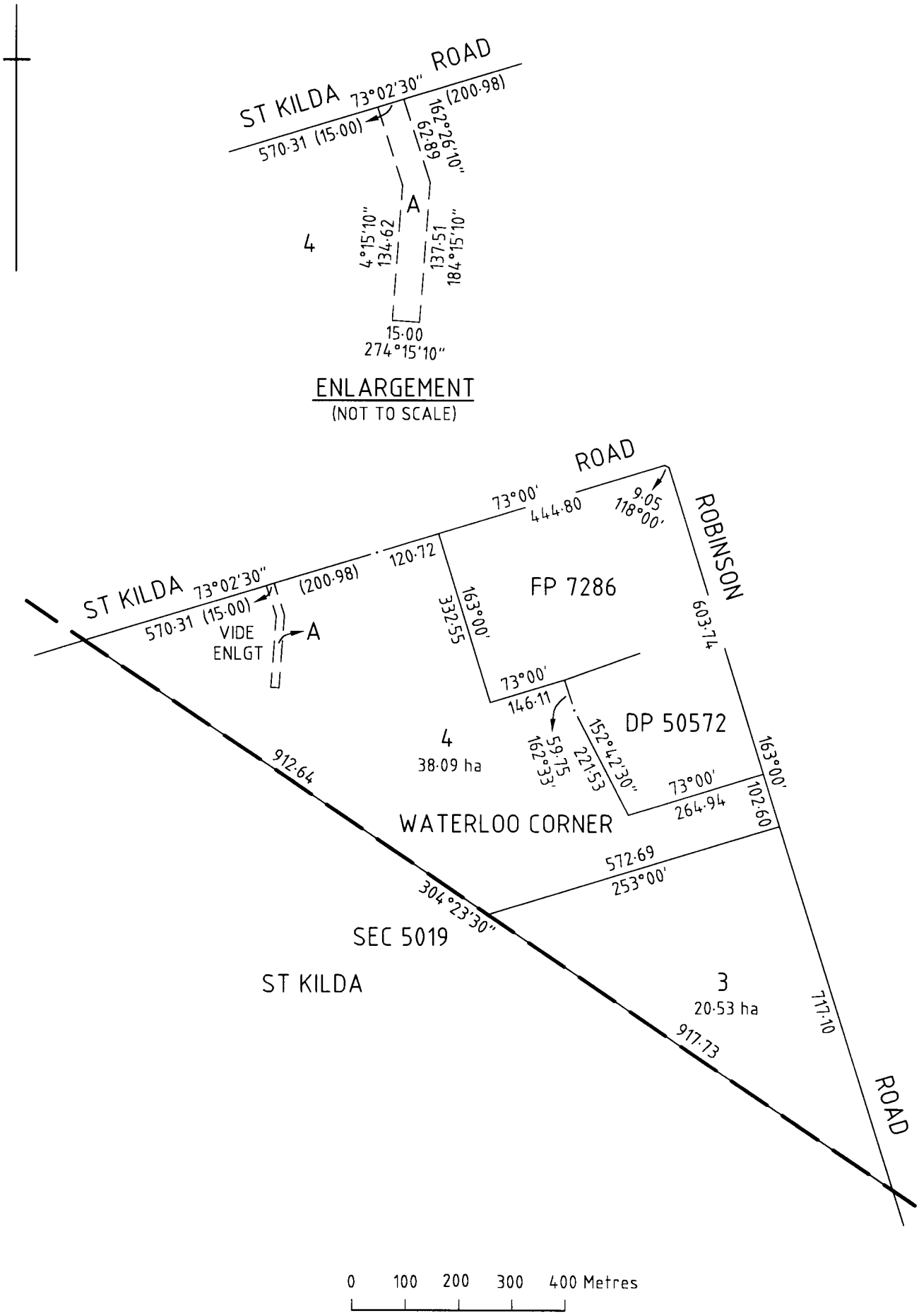

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Certificate of Title

Title Reference:	CT 5723/299
Status:	CURRENT
Parent Title(s):	CT 5211/524
Dealing(s) Creating Title:	TG 8770112
Title Issued:	07/01/2000
Edition:	2

Dealings

No lodged Dealings found.

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Product	Register Search Plus (CT 6257/133)
Date/Time	24/05/2023 10:53AM
Customer Reference	62455 CB
Order ID	20230524002676

REAL PROPERTY ACT, 1886
South Australia

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Certificate of Title - Volume 6257 Folio 133

Parent Title(s)	CT 5922/939				
Creating Dealing(s)	RTC 13559060				
Title Issued	28/07/2021	**Edition**	1	**Edition Issued**	28/07/2021

Estate Type

FEE SIMPLE

Registered Proprietor

SOUTH AUSTRALIAN WATER CORPORATION
OF ADELAIDE SA 5000

Description of Land

SECTIONS 185 AND 186
HUNDRED OF PORT ADELAIDE
IN THE AREA NAMED ST KILDA

SECTIONS 3234, 3502 AND 3503
HUNDRED OF PORT ADELAIDE
IN THE AREA NAMED BOLIVAR

SECTIONS 5000, 5001, 5007, 5008, 5009, 5010, 5017, 5018, 5019 AND 7598
HUNDRED OF PORT ADELAIDE
IN THE AREA NAMED ST KILDA

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO TRANSMISSION LESSOR CORPORATION OF 1 UNDIVIDED 2ND PART (SUBJECT TO LEASE 9061500) AND ELECTRANET PTY. LTD. OF 1 UNDIVIDED 2ND PART (T 1772496)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED B TO ETSA CORPORATION (VM 7787017)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED C TO DISTRIBUTION LESSOR CORPORATION (SUBJECT TO LEASE 8890000) (TG 7986788)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED D.E AND F TO DISTRIBUTION LESSOR CORPORATION (SUBJECT TO LEASE 8890000) (TG 9121704)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED Q (TG 9648734)

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED R (TG 9787781)

Schedule of Dealings

NIL

Notations

Dealings Affecting Title	NIL
Priority Notices	NIL
Notations on Plan	NIL

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Registrar-General's Notes NIL

Administrative Interests

SIGNIFICANT ENVIRONMENTAL BENEFIT 2004_2030

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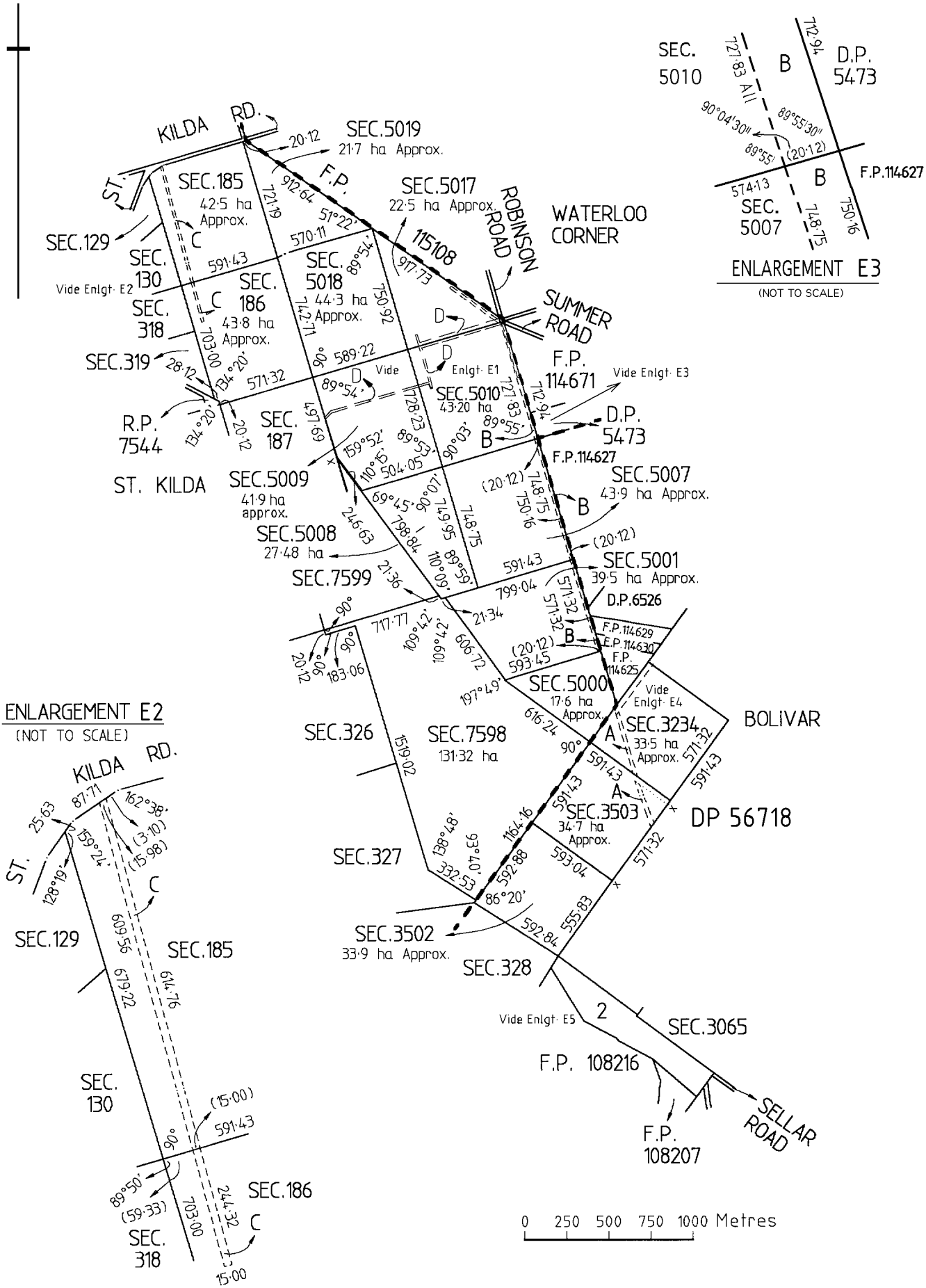

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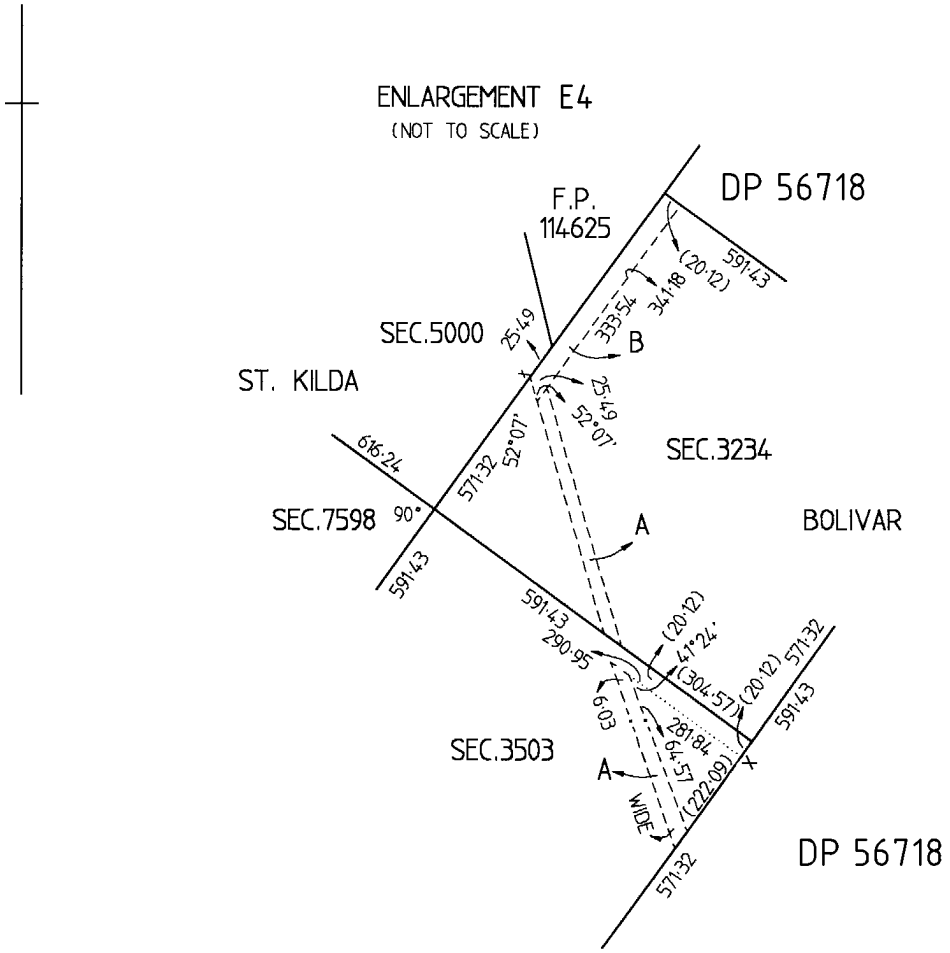

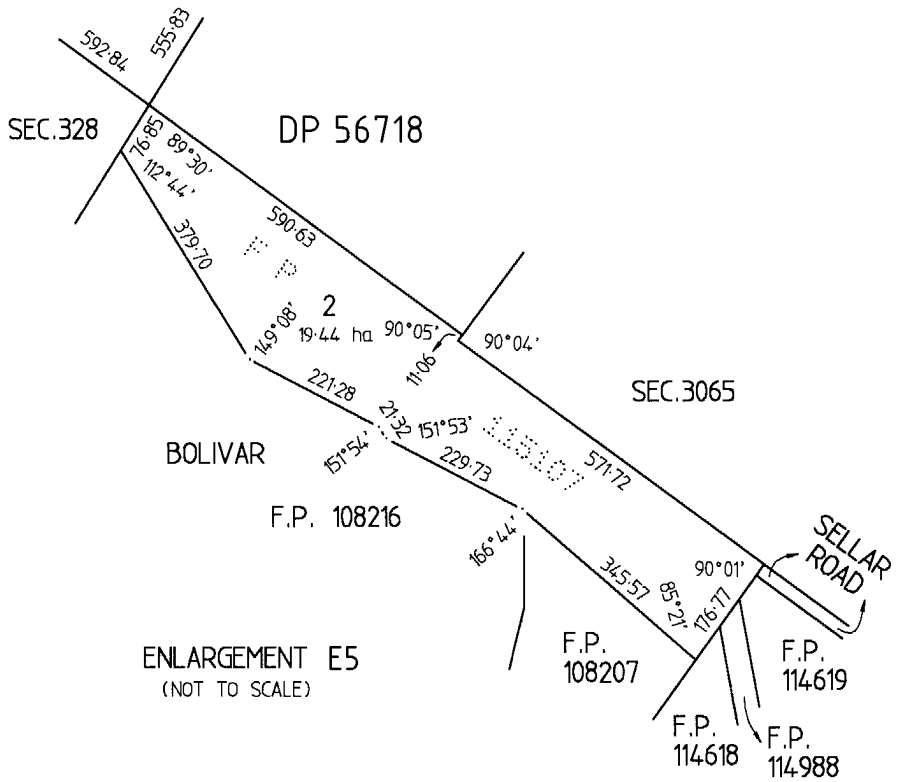

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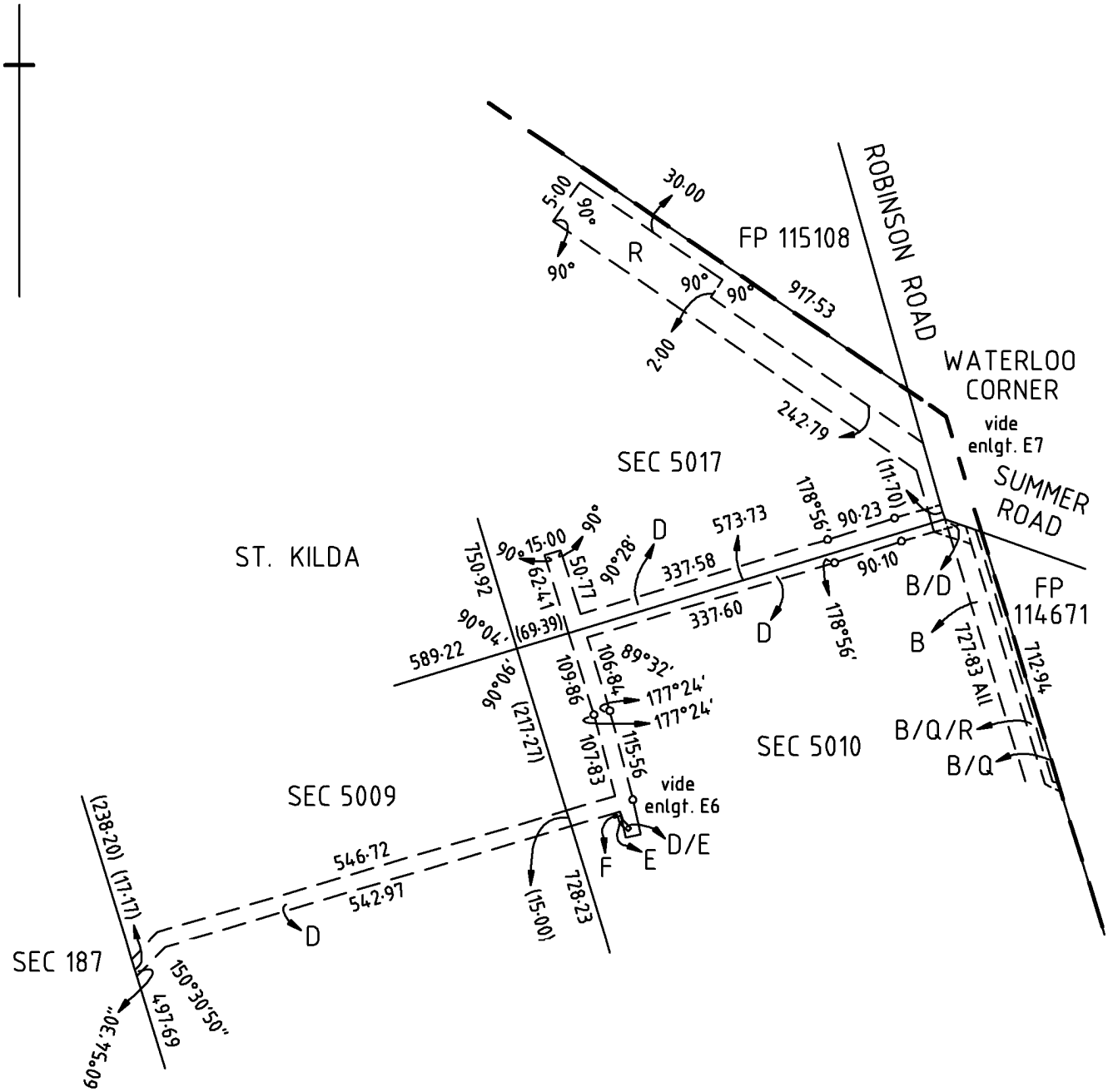

ENLARGEMENT E1
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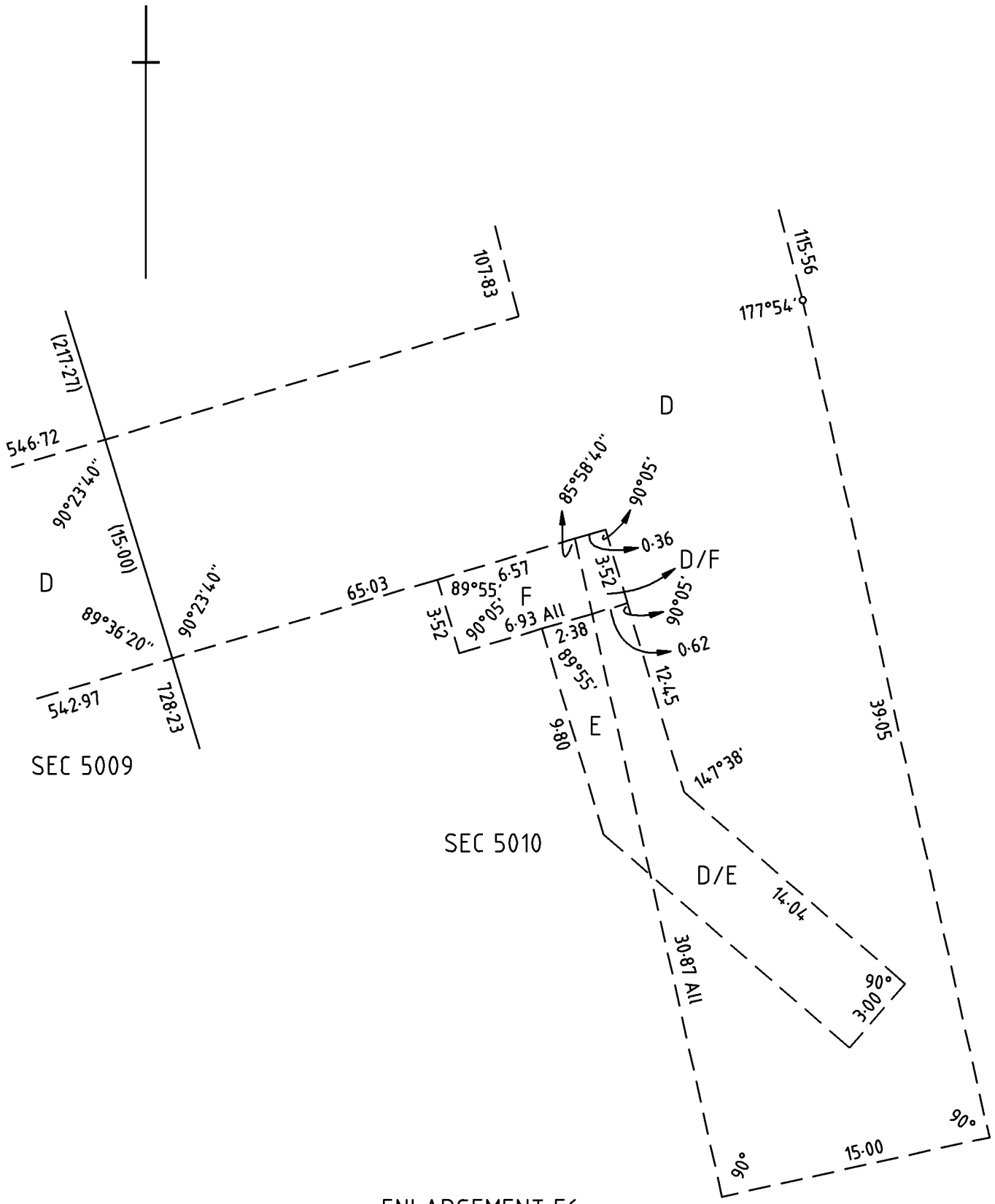

ENLARGEMENT E6
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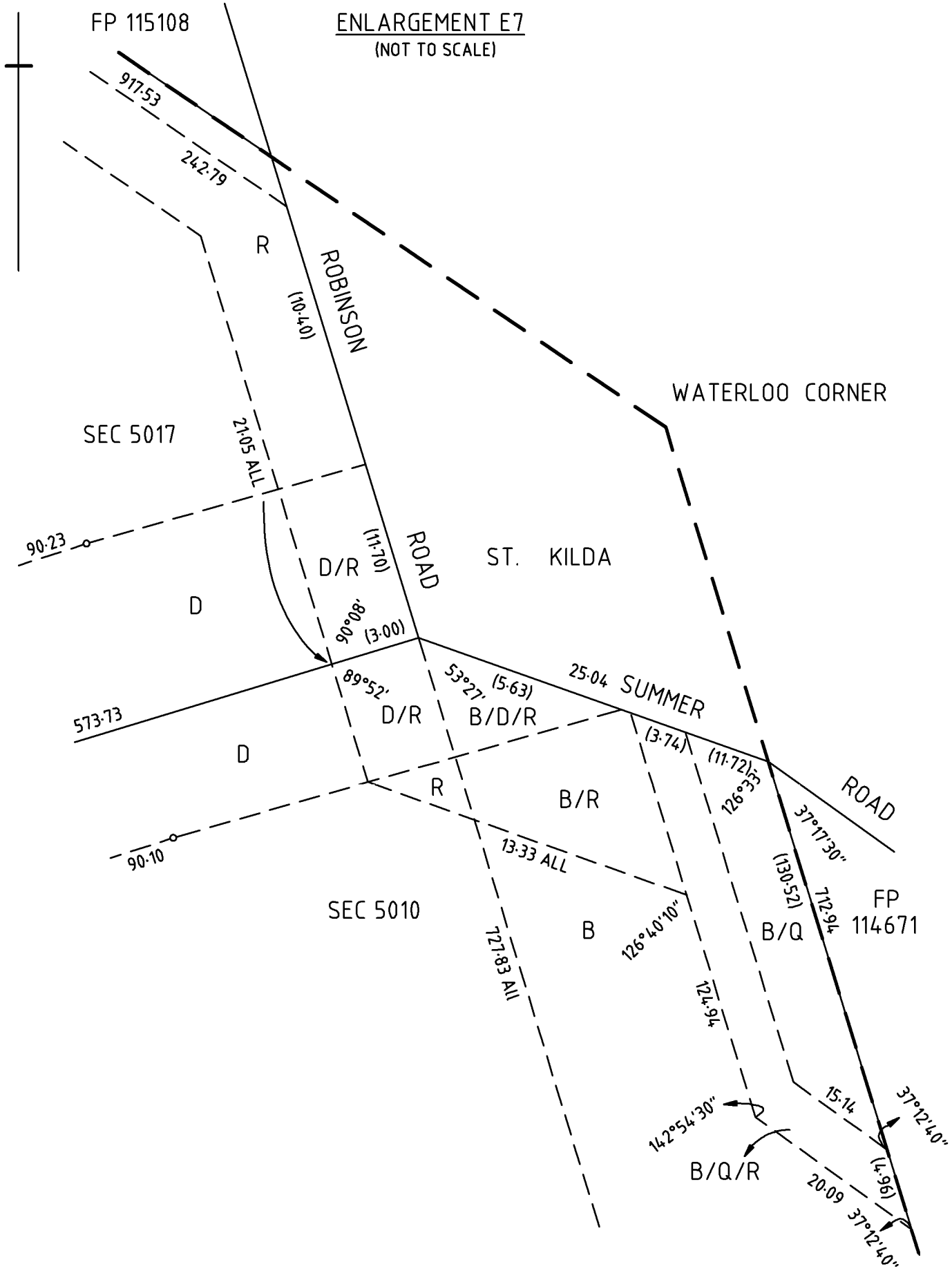

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Certificate of Title

Title Reference:	CT 6257/133
Status:	CURRENT
Parent Title(s):	CT 5922/939
Dealing(s) Creating Title:	RTC 13559060
Title Issued:	28/07/2021
Edition:	1

Dealings

No lodged Dealings found.

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Appendix 02 Site plans and layouts

Conceptual Location of Signage
Watercourse
Discharge Pipeline
Suction Pipeline
State Maintained Roads
Subject Site
Stormwater Easement
Property Boundary
Cadastre

JBS&G

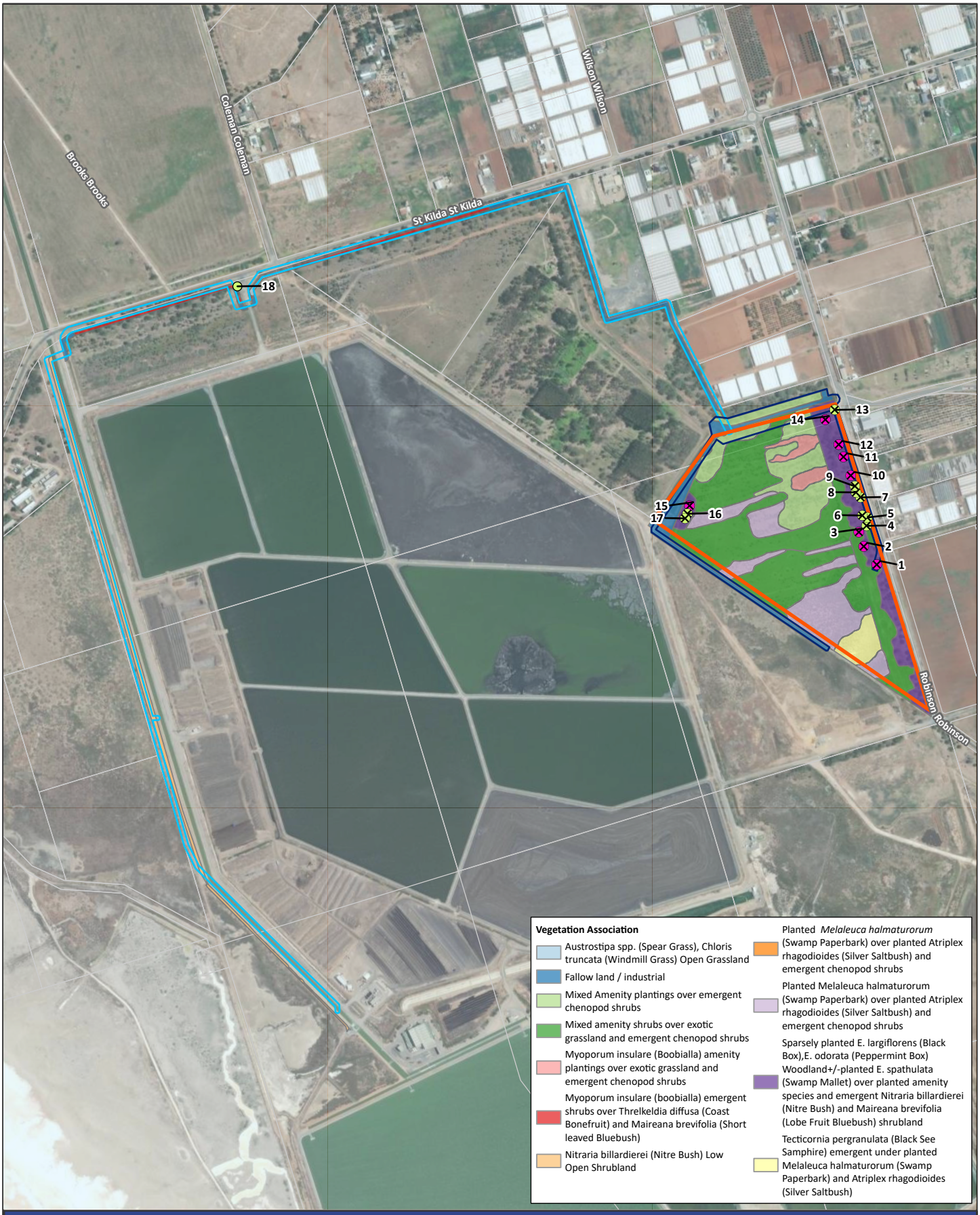
N

0 0.5 1 km

GDA2020 MGA Zone 54

Drawn By: rtandon on 25/03/2024

WWW.JBSG.COM.AU



State Maintained Roads
10m Pipeline Easement
Stormwater Easement
Cadastre
Subject Site

Significant Tree (To remain)
Regulated Trees (To be removed)
Significant Trees (To be removed)

JBS&G

N

0 100 200 m

GDA2020 MGA Zone 54

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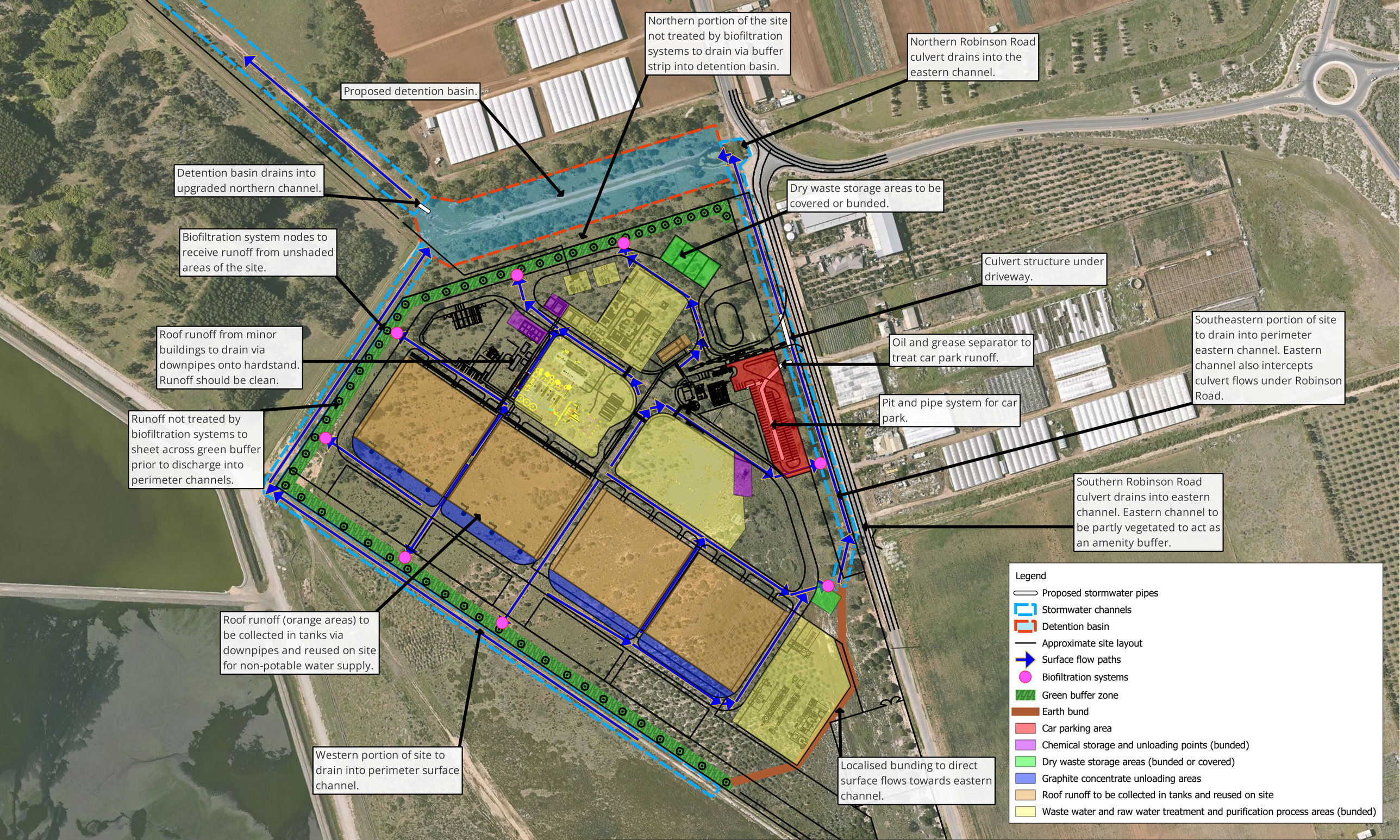


tonkin

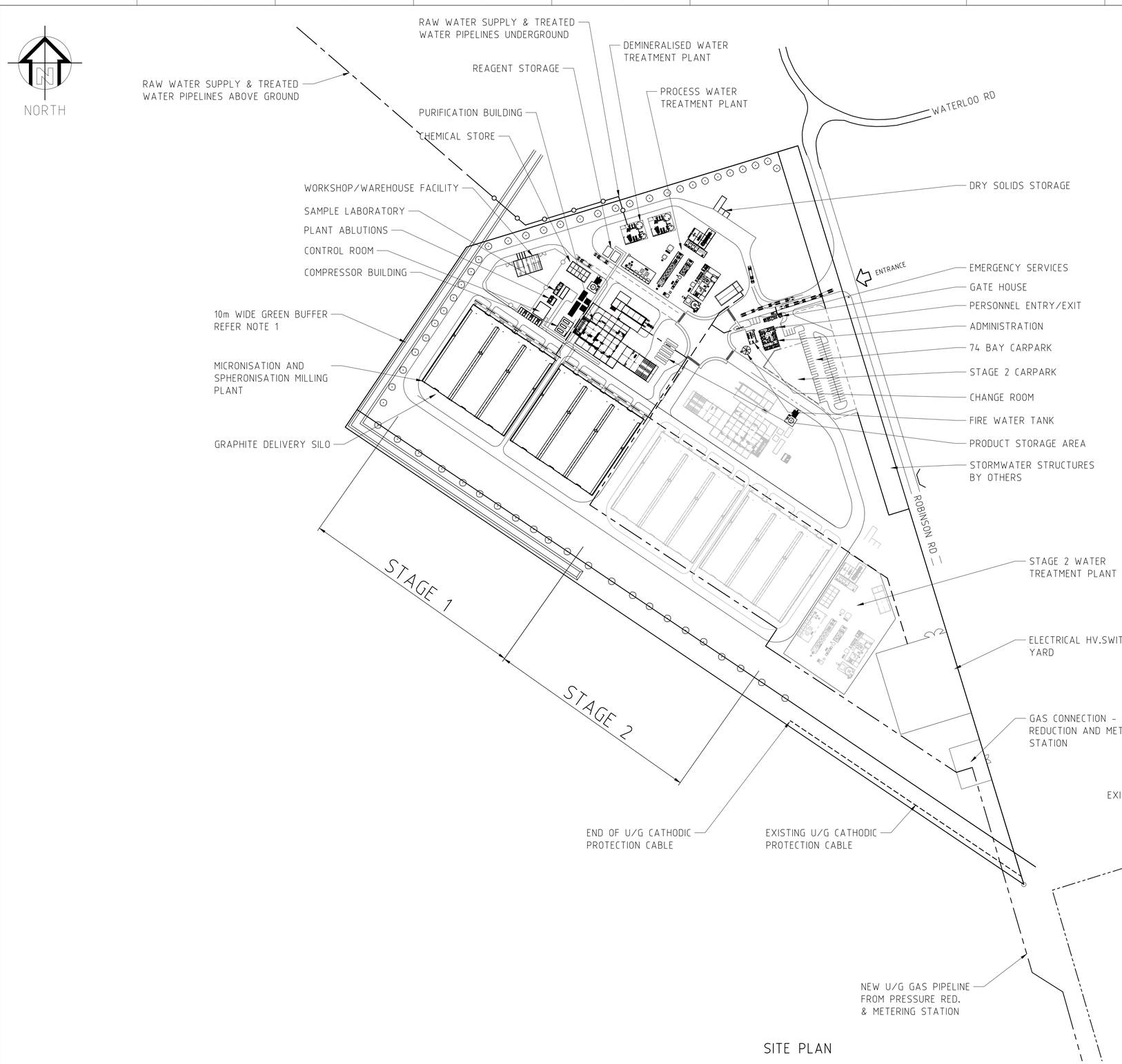
Job Number: 221223
Filename: 221223 Renascor SMP
Revision: Rev B
Date: 2024-03-05 08:26
Drawn: JW / WG

Data Acknowledgement:
Metromap (2024)

Renascor Resources

Renascor - Robinson Road Site
Stormwater Management Plan

Figure 4



SITE PLAN

GENERAL NOTES

1-THIS DEVELOPMENT WILL INCLUDE A GREEN BUFFER ZONE 10m WIDE ON THE NORTH, NORTH-WEST & SOUTH-WEST BOUNDARIES. NATIVE TREES AND VEGETATION WILL CREATE A SCREEN FOR PROCESS PLANT INFRASTRUCTURE.

2-STORMWATER STRUCTURES IN CORRIDOR ALONG ROBINSON ROAD BY OTHERS.

LEGEND

- EXISTING U/G GAS PIPELINE
- NEW U/G GAS PIPELINE TO BAM INFRASTRUCTURE
- EXISTING U/G CATHODIC PROTECTION CABLE
- U/G ELECTRICAL CABLES
- RAW WATER SUPPLY & TREATED WATER ABOVE GROUND
- RAW WATER SUPPLY & TREATED WATER UNDERGROUND

REFERENCE DRAWINGS	DWG No	REV	DATE	REVISIONS	DRN	CHK	DSGN	TECH APP	PROJ APP

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CHECKED	
DESIGNED	
TECH APP	
PROJ APP	
CLIENT APP	

RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - UPSG
SITE LAYOUT
GENERAL ARRANGEMENT

A1	SCALE 1:2000	JOB No 12813	DRG No 12813-L-200	REV A

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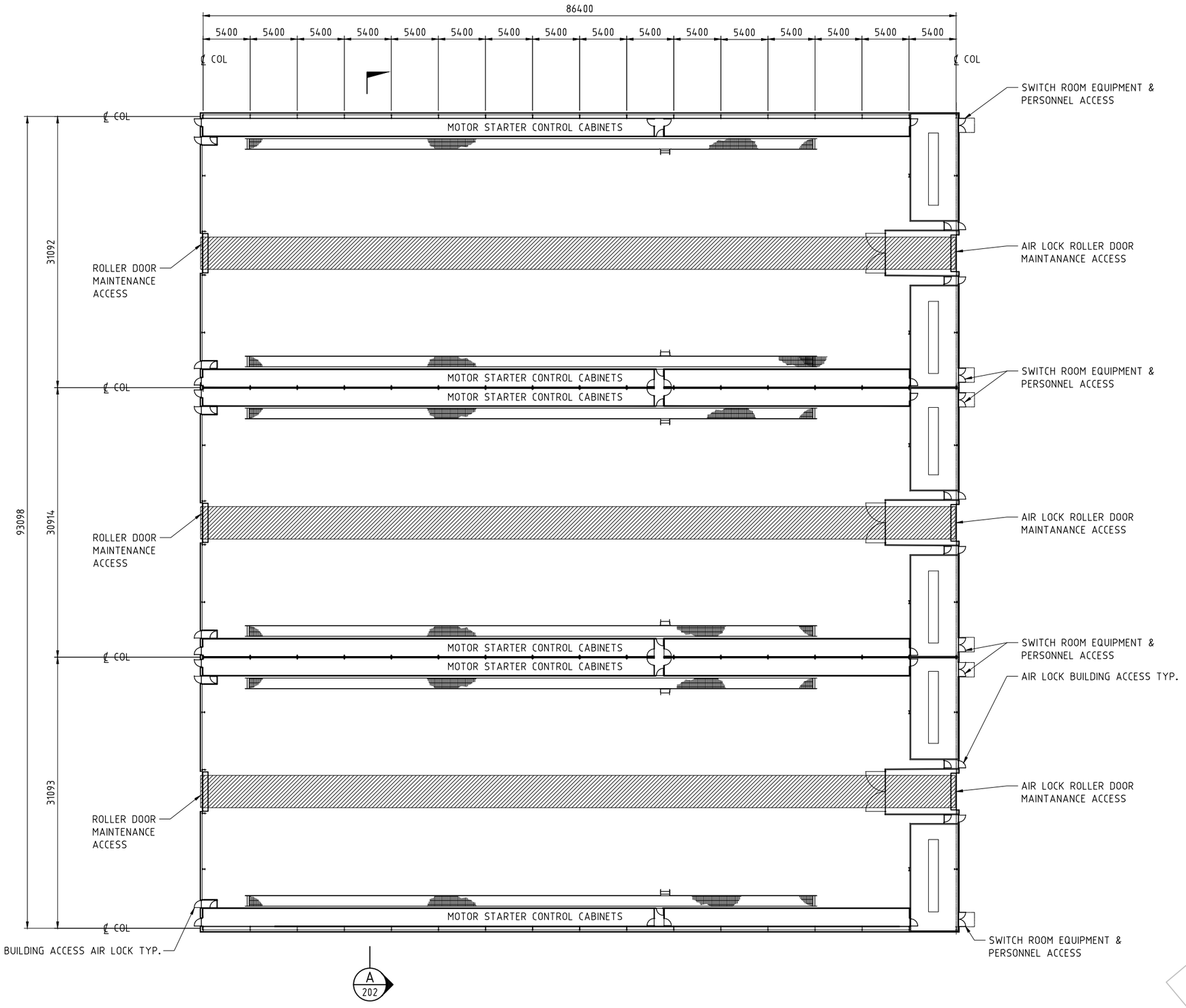

PLAN

PRELIMINARY / NOT FOR CONSTRUCTION

5,000 0 5,000 10,000 15,000 20,000 25,000mm

SCALE 1:250

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RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - PSG
MICRONISING & SPHERONISING MILL BUILDING
BUILDING - PLAN

A1	SCALE 1:250	JOB No 12813	DRG No 12813-L-201	REV A

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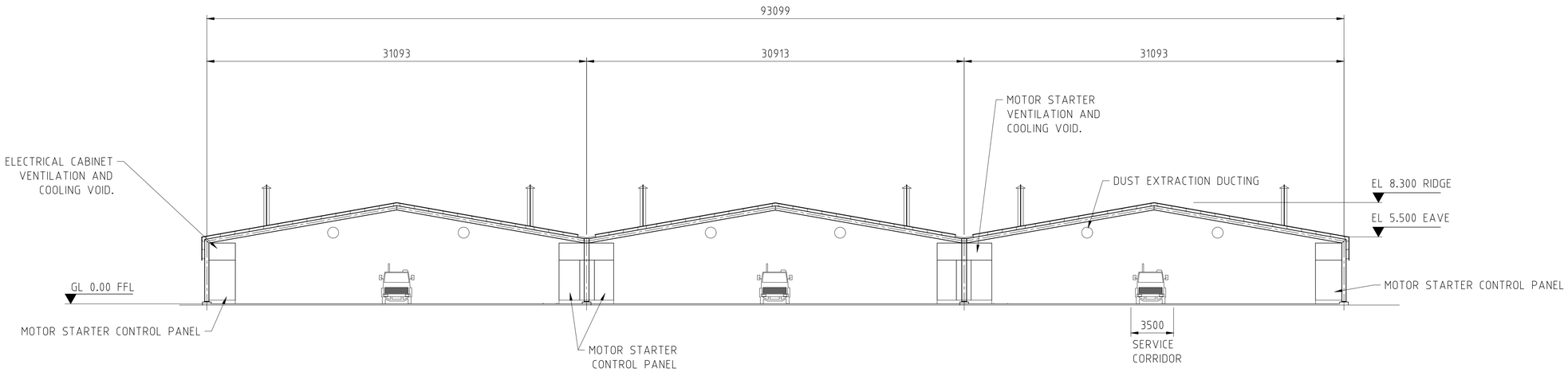

SECTION A 201

PRELIMINARY / NOT FOR CONSTRUCTION

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SCALE 1:200

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RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - PSG
MICRONISING & SPHERONISING MILL BUILDING
BUILDING - SECTIONAL ELEVATION

A1	SCALE 1:200	JOB No 12813	DRG No 12813-L-202	REV A

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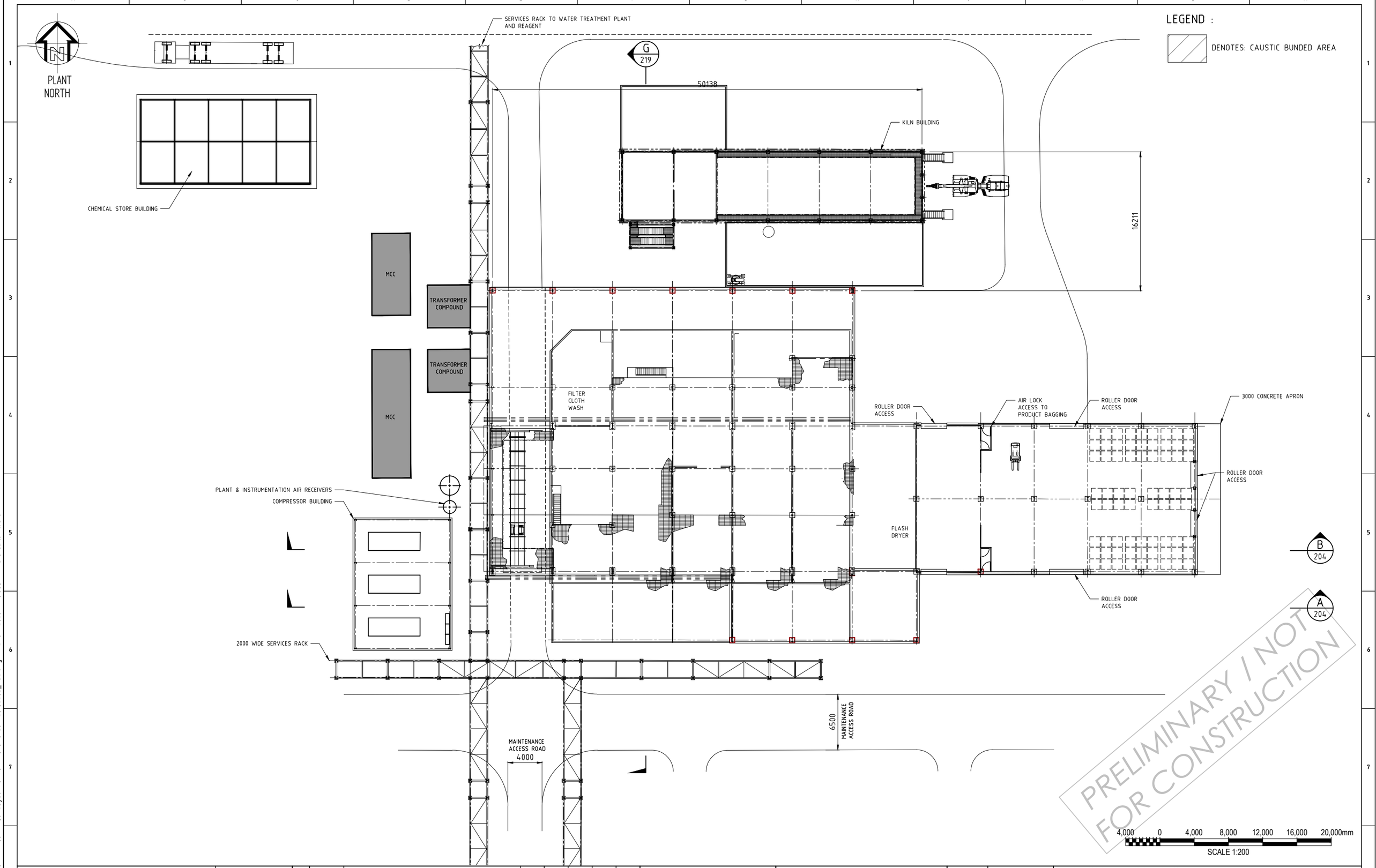

REFERENCE DRAWINGS	DWG No	REV	DATE	REVISIONS	DRN	CHK	DSGN	TECH APP	PROJ APP

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RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - UPSG
PURIFICATION AREA LAYOUT
GENERAL ARRANGEMENT

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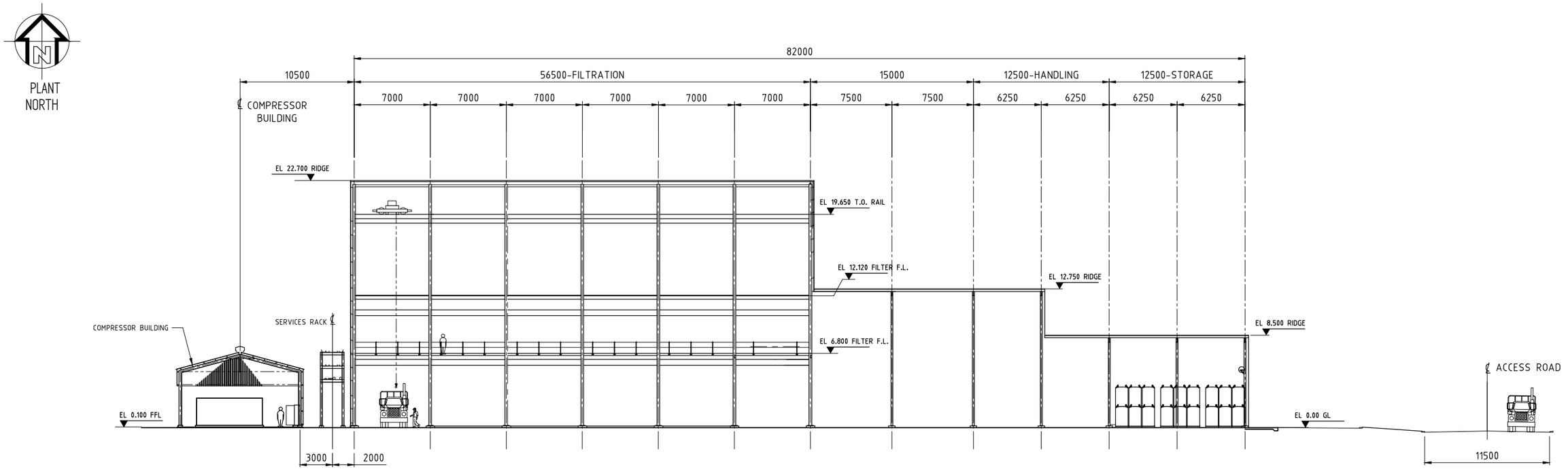

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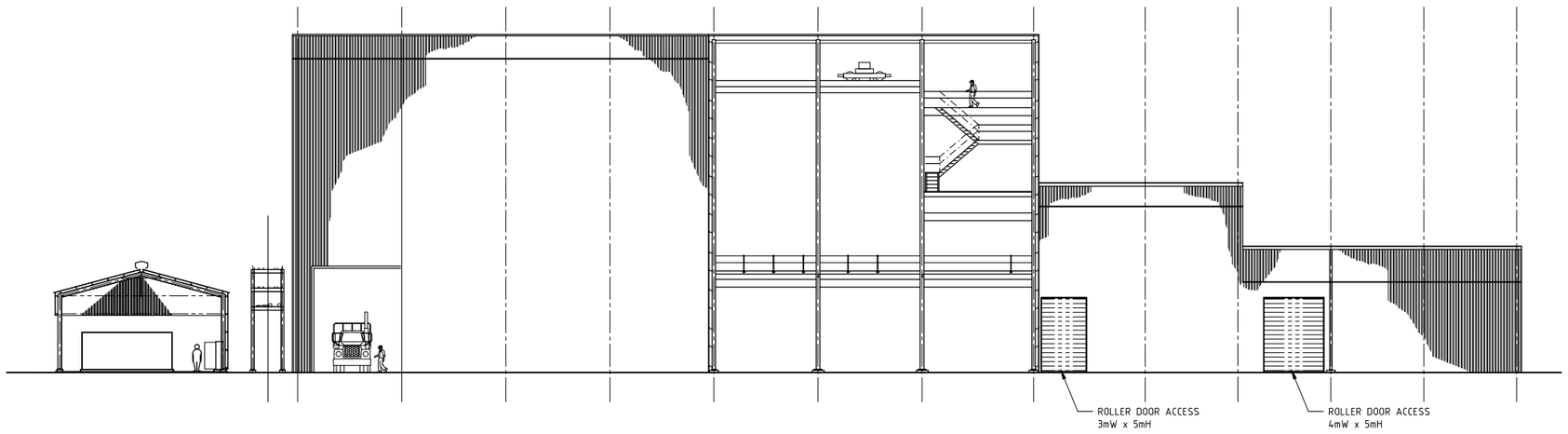

SECTION A 203

PRELIMINARY / NOT FOR CONSTRUCTION

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SCALE 1:200

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RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - PSG
FILTER BUILDING
SECTIONS

A1	SCALE 1:200	JOB No 12813	DRG No 12813-L-204	REV A

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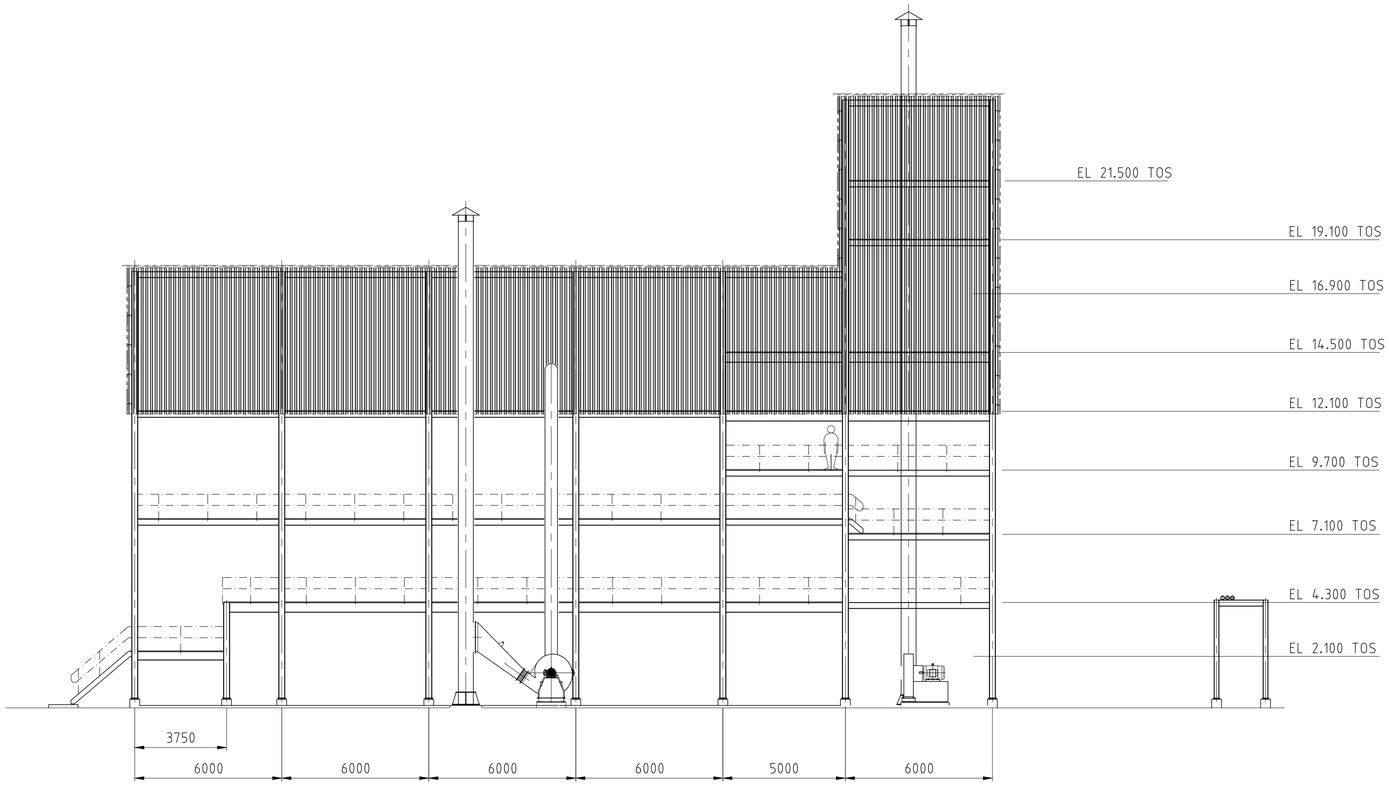

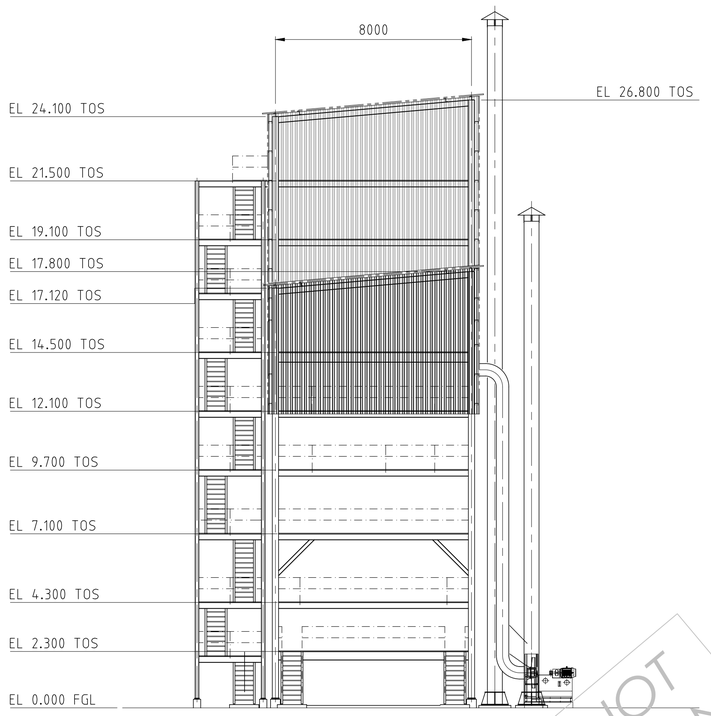

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REFERENCE DRAWINGS	DWG No	REV	DATE	REVISIONS	DRN	CHK	DSGN	TECH APP	PROJ APP
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RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - UPSG
A3510 - KILN BUILDING
ARRANGEMENT - ELEVATIONS

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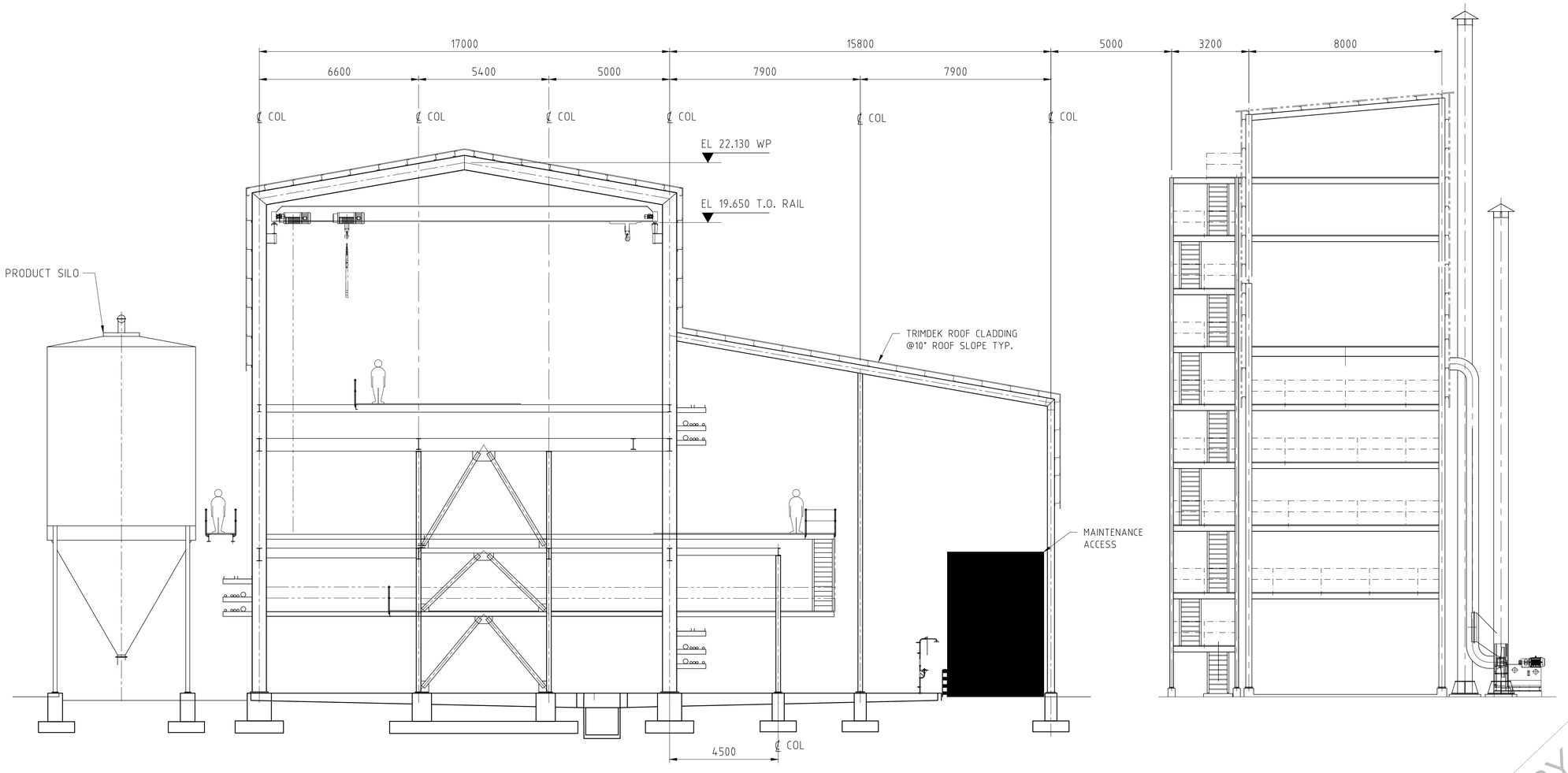

SECTION G 203

PRELIMINARY / NOT FOR CONSTRUCTION

REFERENCE DRAWINGS	DWG No	REV	DATE	REVISIONS	DRN	CHK	DSGN	TECH APP	PROJ APP
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RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - PSG
PURIFICATION BUILDING
SECTIONS

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Appendix 03 Assessment Requirement Checklist

Assessment Requirement Checklist

EIS Guideline and Assessment Requirements	Where addressed in the EIS
EIS GUIDELINES SECTION 5: CONTENT REQUIREMENT FOR THE EIS	
Statutory Requirements	
1. A statement of the expected, predicted or potential environmental, social and economic effects of the development, whether positive, neutral or negative. The assessment of effects should include all issues identified in the Assessment Requirements and be cross referenced to supporting technical studies.	**Chapters 8 - 16**
2. A statement of the expected impact of the development on the climate and any proposed measures designed to mitigate or address those effects.	**14.3** Climate Change Adaptation
3. A statement of the extent to which the expected, predicted or potential effects of the development are consistent or at variance with the provisions of—	
a. Any relevant State Planning Policy	**5.4** Assessment Against State Planning Policies
b. Any relevant Regional Plan(s), including the 30-Year Plan for Greater Adelaide (if applicable)	**5.5** Assessment Against 30-Year Plan for Greater Adelaide
c. The Planning and Design Code	**5.6** Assessment Against the Planning and Design Code
d. Any matters prescribed by the Regulations.	**5** Planning Report
4. If the development involves, or is for the purposes of, a prescribed activity of environmental significance as defined by the Environment Protection Act 1993, a statement of the extent to which the expected, predicted or potential effects of the development are consistent or at variance with—	
a. The objects of the Environment Protection Act 1993	**4.4** Environment Protection Act 1993 and policies
b. The general environmental duty under that Act	**4.4** Environment Protection Act 1993 and policies
c. Relevant environment protection policies under that Act.	**4.4** Environment Protection Act 1993 and policies
5. If the development will, or is likely to, significantly impact one or more MNES under the EPBC Act, a statement of:	**10** Biological Environment **Appendix 9** Ecology Assessments
a. The expected, predicted or potential effects of the development on each identified MNES	

b. The extent to which the expected, predicted or potential effects of the development are consistent or at variance with the provisions of any relevant Commonwealth of Australia conventions, agreements or obligations under international agreements or treaties as they relate to MNES aspects	
c. The extent to which the expected, predicted or potential effects of the development are consistent or at variance with any relevant Commonwealth plans (such as threat abatement plant and recovery plans), conservation or management principles.	
6. If the development is to be undertaken within an area of the State that is specifically subject to a special legislative scheme—a statement of the extent to which the expected, predicted or potential effects of the development are consistent or at variance with the State Planning Policy that specifically relates to that special legislative scheme.	**5.5** Assessment Against 30-Year Plan for Greater Adelaide
7. A statement of the proponent's commitments to avoid, mitigate and satisfactorily manage and/or control any potential or likely adverse impacts of the development on the environment (including any proposed offsets to reduce residual significant impacts) or any matter that may be directly relevant to a special legislative scheme.	**Chapters 8 - 16**
8. Any other particulars in relation to the development required by the Regulations, relevant Practice Direction or by the Minister.	**4** Statutory & Strategic Framework
• The proponent's commitment to meet conditions proposed to avoid, mitigate and satisfactorily manage and/or control any potential or likely adverse impacts of the development on the physical, social or economic environment, must be clearly articulated in the EIS.	**Chapters 8 - 16**
• The design and construction of the proposed development should be flexible enough to incorporate changes to minimise any impacts highlighted by this evaluation.	
Summary of the EIS	
• The EIS should include a summary of the matters set out in the Practice Direction prepared pursuant to Section 109 of the PDI Act and include mention of all environmental attributes set out in the Assessment Requirements. The reader should be able to obtain a quick but thorough understanding of the proposal and associated environmental impacts. The summary should convey the most important aspects and environmental management commitments relating to the proposed project in accessible, easily understood language.	Executive Summary
• The summary should aim to construct a narrative around what is being proposed in the EIS, alternatives that were considered, what the broad environmental implications are of the proposal and how they will be managed to provide a net benefit. The summary should be logical and easy to read and need not reflect the precise order of chapters within the EIS itself. Images and graphics are suggested as a means of assisting to succinctly communicate the contents of the summary.	Executive Summary
• Content should be summarised accurately and objectively. It should report all of the EIS's key conclusions and be consistent with the rest of the EIS. Specific issues and impacts should be addressed at an appropriate level of detail proportionate to their potential for significant impact and depth of study undertaken.	Executive Summary
Introduction to the EIS	

• Set the context for detailed assessment of the project in subsequent sections of the EIS.	**1 Introduction**
• Background to, and objectives of, the proposed project	**1.5** Objective of the Project
• Proponent details, including:	
– Contact information for the proponent or representatives of a proponent organisation for the project, including full name, street and postal address, Australian Business Number, telephone, fax, email and other details as appropriate	**1. 2** Details of the Proponent
– Identify the legal entities that would develop, manage and operate the project	**1. 2** Details of the Proponent
– Provide a description of corporate structure including joint ventures, corporate policies and objectives relating to the project, in particular environmental policies	**1. 2** Details of the Proponent **Appendix 5** Renascor's Environmental Policy
– Specify mechanisms used to ensure that corporate policies will be implemented and adhered to for the project in addition to requirements for Environmental Management Plans	**1. 2** Details of the Proponent
– Identify key personnel, contractors, and/or subcontractors responsible for preparing the EIS	**1.9.4** EIS Project Team
• Staging and timing of the proposal, including expected dates for construction and operation	**1.7** Staging and Timing
• Relevant legislative requirements and approval processes	**1.8** Overview of the Regulatory Approvals process **4** Statutory & Strategic Framework
• Purpose and description of the EIS process	**1.9** Purpose and Description of the EIS
Need for the Proposal	
• Statement of the objectives and justification for the proposal including:	**2** Project Justification
– the specific objectives that the proposal is intended to meet, including market requirements	**2.1** Introduction
– expected local, regional and State benefits and costs, including those that cannot be adequately described in monetary or physical terms (e.g. effects on aesthetic amenity)	**2.3** Project Benefits
– a summary of environmental economic and social arguments to support the proposal including the consequences of not proceeding with the proposal.	**2.2** Need for the Proposal **2.4** Alternatives to the Project
Description of the Proposal	
• Address all aspects of the proposed project that are assessed by the EIS, and address the following information:	**3** Description of the project
– Nature of the proposal and location	**3.3** Project Location **3.6** Nature of the Proposal
– Scale and intensity of the project	**3.5** Project Overview
– Key elements of the receiving environment	**3.4** Existing Environment Overview

– A project plan to outline objectives, constraints, key activity schedule and quality assurance	**3.10** Project Plan
– Site layout plans (including indicative land division plan if relevant)	**Appendix 2** Site Plans and Layout
– Construction and commissioning timeframes (including staging)	**3.10** Project Plan
– Description of working hours	**3.15** Workforce and Working hours
– Description of the existing environment (including the immediate and broader location, identifying sensitive receptors and adjacent land uses which may lead to cumulative impacts)	**3.4** Existing Environment Overview
– Description of the current commercial activities occurring in the area	**3.4** Existing Environment Overview
– Details of all buildings and structures associated with the proposal	**3.7** Key Infrastructure **3.8** Supporting Services
– Details of any other infrastructure requirements and availability	**3.9** Utility Requirements
– Details on the operation of the proposal, including operating hours	**3.11** Key Activities **3.16** Workforce and Working hours
– Relevant Zones and Overlays defined by the Planning and Design Code	**5** Planning Report
– Management arrangements for the construction and operational phases (including Environmental Management and Monitoring Plans)	**17** Environmental Management
– A contingency plan for delays in construction	**3.10.3** Construction
Project Alternatives	
• Feasible alternatives considered for the proposed project should be presented in the EIS described and evaluated the comparative environmental, social, and economic impacts (including the option of not proceeding). • Each alternative and its potential impacts should be discussed in sufficient detail to enable an understanding of the reasons for preferring certain options and courses of action while rejecting others. This may be used to inform a justification of why the proposed project and preferred options should proceed.	**2.4** Alternatives to the Project
Summary of Preceding Actions	
• The EIS should provide a summary of actions and activities that have been undertaken prior to or as part of the preparation of the EIS. These could include prior engagement with the Commission, government agencies, local councils and other stakeholders, engagement with the local community, the process of project development, pre-feasibility studies and any technical reports which may have bearing on the level of detail required by a relevant Assessment Requirement.	**2.5** Summary of Preceding Actions
Consultation process	
• The EIS must include an appropriate public consultation program, outlined within a Community Engagement Plan. The Community Engagement Plan must detail:	**6** Stakeholder and Community Engagement **Appendix 4** Community Engagement Plan

– All legislated notification requirements to be undertaken by the Minister pursuant to the PDI Act and Practice Direction.	**6.4** Further opportunities to provide feedback
– The Proponent's overall engagement and collaboration strategy including scope and guiding principles.	**6** Stakeholder and Community Engagement **Appendix 4** Community Engagement Plan
– Engagement undertaken to date on the proposed project.	**6.3.4** Engagement tools **6.3.5** Feedback and response **Appendix 4** Community Engagement Plan
– Engagement activities proposed throughout the EIS process including performance outcomes, level of public participation, techniques, indicative timeframes, responsibilities and measures for measuring performance.	**6.3** Better Together Approach to Stakeholder and Community Engagement **Appendix 4** Community Engagement Plan
– A list of affected stakeholders, interest groups and other relevant parties.	**6.3.2** Stakeholder identification **Appendix 4** Community Engagement Plan
• Prior to the public release of the EIS, the Community Engagement Plan will be reviewed by the Minister with regard to the principles of the State Planning Commission's Community Engagement Charter. The Minister may require alterations to the Community Engagement Plan to ensure consistency with the Charter and an appropriate level of public participation in the EIS process.	**6.3** Better Together Approach to stakeholder and community engagement
Required Plans and Forms	
• Current Certificate(s) of Title	**Appendix 1** Certificates of Title
• Context and locality plans should illustrate and analyse the existing environment and site conditions and the relationship of the proposal to surrounding land and buildings. Plans should be drawn to a large scale to allow presentation on a single sheet and be readily legible, according to standard mapping conventions. Plans should include:	**Appendix 2** Site Plans and Layout
– Any neighbouring buildings, infrastructure or facilities, including identification of all nearby sensitive receptors and the likely use of existing or proposed neighbouring buildings (e.g. dwelling, farm outbuildings, shop, office)	
– Locations of any watercourses, surface water bodies (including dams), underground water sources, and any other sensitive environmental receptors/areas in the locality	
– Locations of any State heritage places in relation to the site	
– Existing native vegetation, regulated or significant trees	
– Known sites for State or Nationally listed protected or threatened species (including migratory species) or ecological communities on the site, adjoining land and marine environments	
– Existing roads (public and private)	
– Potential areas of habitat for native fauna, including relevant vegetation communities	
– Any other information that would help to set the context for the locality	

• Site plans (drawn at a scale of 1:100 or 1:200) clearly indicating all proposed buildings, structures and works	**Appendix 2** Site Plans and Layout
• Elevations (drawn at a scale of 1:100 or 1:200) showing all sides of buildings, structures and works with levels and height dimensions provided in Australian Height Datum.	**Appendix 2** Site Plans and Layout
• Cross sections of the buildings, structures and works, including stockpile and storage facilities showing ground levels, floor levels, ceiling heights and maximum heights in Australian Height Datum	**Appendix 2** Site Plans and Layout
• Floor plans (drawn at a scale of 1:100 or 1:200) for each building or structure demonstrating what is proposed at each floor, with indicative internal layouts.	**Appendix 2** Site Plans and Layout
• Site survey plan demonstrating the development will be contained within relevant allotment boundaries	**Appendix 2** Site Plans and Layout
• A schedule of construction materials, finishes and colours	**Table 5-4** Assessment against relevant state planning policies **Table 5-5** Assessment against the 30 Year Plan for Greater Adelaide **Table 5-7** General Development Policies **16.3** Urban Design and Placemaking
• Location and dimensions of any external advertising displays, including information as to whether signs are to be illuminated or contain a moving display.	Not Applicable
PROJECT SPECIFIC ASSESSMENT REQUIREMENTS	
Amenity and Environmental Quality (AEQ)	
Air quality (AEQ1) – Detailed Assessment *To ensure the development does not have unacceptable adverse air quality impacts on the surrounding receiving environment, in particular sensitive receivers in proximity to polluting development.*	
• Provide an air quality impact assessment prepared by an appropriately qualified specialist for all potential sources of dust / particles and gaseous pollutants associated with the construction and ongoing operation of the proposed development, to identify any known or potential human health and amenity effects of air emissions (including point source and diffuse sources) on the residential population and local businesses and describe how these would be mitigated, minimised, managed and monitored.	**11.2** Air Quality **Appendix 11** Air Quality Assessment
• The impact assessment must include modelling undertaken in accordance with the Environment Protection (Air Quality) Policy 2016 and the EPA's Ambient Air Quality Assessment 2016 guidance document. Techniques used to obtain the predictions should be referenced and key assumptions and data sets explained.	**11.2** Air Quality **Appendix 11** Air Quality Assessment
• Impact assessment must outline the impacts of dust / particles and gaseous pollutants on existing food production / horticultural / agricultural activities, commercial operations and any other identified nearby sensitive receivers in the vicinity of the proposed development, including cumulative impacts.	**11.2** Air Quality **Appendix 11** Air Quality Assessment

Noise (AEQ2) – Standard Assessment *To ensure the development does not have unacceptable adverse noise impacts on the surrounding environment, in particular sensitive receivers in proximity to noise sources.*	
• Provide an impact assessment of noise associated with the construction and ongoing operation of the proposed development, prepared in accordance with the Environment Protection (Noise) Policy 2007 by a suitably experienced, professional acoustic engineering consultant.	**11.3** Noise **Appendix 12** Environmental Noise Assessment
• Describe and design strategies to mitigate noise impacts and how environmental management objectives for noise would be achieved.	**11.3** Noise **Appendix 12** Environmental Noise Assessment
Transport and Traffic (AEQ3) – Standard Assessment *To ensure impacts to the safety and efficiency of transport modes and the broader transport and traffic system and infrastructure are avoided or mitigated.*	
• A Transport and Access Impact Assessment should be prepared by a suitably qualified traffic engineer, evaluating current and proposed traffic generation and access arrangements including the effect on the network (including arterial roads) and car parking, and vehicle interface with the local road network. The assessment must address:	**11.4** Transport and traffic **Appendix 13** Traffic Impact Assessment **Appendix 14** Heavy Vehicle Route Assessment
– Implications for the entire supply chain.	
– Implications for road safety, particularly with respect to existing road users in the locality.	
– Impacts over the construction, operation, maintenance and decommissioning phases.	
– Any upgrades or modifications to transport infrastructure required to support the development or mitigate its impacts.	
• The assessment should determine the transport system asset improvements, asset management / maintenance requirements, and operational management requirements to accommodate the increase in movements and/or vehicle sizes/mass for affected transport assets and services across all modes for the proposal's construction / implementation and operational phases.	**11.4** Transport and traffic **Appendix 13** Traffic Impact Assessment **Appendix 14** Heavy Vehicle Route Assessment
Visual Amenity (AEQ4) – Detailed Assessment *To ensure adverse effects on visual amenity, landscape and open space values are avoided or minimised and opportunities to enhance these values are maximised.*	
• Provide a description of the landscape character, features and values of the development area and its environs.	**11.5** Visual Amenity
• Describe the effects of the development on visual amenity and landscape quality for residents and visitors for both near and distant views, from important viewing points. This should include construction, operations and closure / rehabilitation aspects of the proposal and address light spill from the development.	**11.5** Visual Amenity **Appendix 15** Visual Amenity Impact Assessment
• Provide a visual analysis of the development from key viewpoints, including photomontages or perspectives showing the proposed and likely future development.	**Appendix 15** Visual Amenity Impact Assessment
• Describe the rationale for the major design elements of the proposed development and measures to mitigate their visual impact.	**11.5** Visual Amenity **Appendix 15** Visual Amenity Impact Assessment

• Describe how the design and construction of all buildings and structures will be controlled to ensure cohesive visual amenity, including details of construction materials, colours and landscaping for all buildings and structures.	**11.5** Visual Amenity **16.3.4** Appearance and Screening
• Describe the use of screening / amenity / landscape plantings and potential broad scale revegetation, including the opportunities for the use of locally endemic species.	**11.5** Visual Amenity **16.3.4** Appearance and Screening
Biological Environment (BE)	
Biosecurity (BE1) – Standard Assessment *To ensure that construction and operation of the development avoids the introduction or spread of biosecurity threats including pest or nuisance animal and plant species (including marine pests), diseases and pathogens.*	
• Identify the potential for the introduction or dispersal of new, and/or increased distribution and abundance of existing, exotic, pest or nuisance plant and animal species, diseases and pathogens, and the associated implications for native species, habitat, agricultural land and other environmental values.	**10.3** Terrestrial Flora and Fauna
• Propose measures to remove, control and limit the introduction or spread of exotic, pest or nuisance plants and animals, diseases and pathogens on the development site and any areas under the proponent's control (e.g. decontamination of vehicles, mobile plant, equipment and materials), having regard to the effectiveness of such mitigation measures in the past. This includes declared plants and animals under relevant State and Commonwealth legislation.	**10.3** Terrestrial Flora and Fauna
Marine Flora and Fauna (BE2) – Detailed Assessment *To ensure that the nature and scale of the development avoids or minimises adverse effects on biodiversity, threatened and protected marine flora and fauna species, their ecological communities and habitat.*	
• Describe the development activities with the potential to impact on threatened and protected marine species and habitats, and listed threatened, protected and migratory fauna species, and provide an assessment of how those impacts will be avoided or mitigated. Address discharge to marine waters.	**10.4** Marine Flora and Fauna
• The assessment of impacts to threatened and protected species and habitat will consider:	
– The potential impacts of water discharge on the Bolivar channel, other users of the channel and the receiving environment.	**9.5** Coastal and Marine **10.4** Marine Flora and Fauna
– Impact on conservation parks, marine reserves, the Adelaide International Bird Sanctuary and the Adelaide Dolphin Sanctuary.	**9.5** Coastal and Marine **10.4** Marine Flora and Fauna
– Cumulative impacts, noting that the receiving environment is already a stressed ecosystem.	**9.5** Coastal and Marine **10.4** Marine Flora and Fauna
• If potential impacts on MNES require approval under the EPBC Act, an assessment of impacts on the affected MNES must be prepared by an appropriately qualified specialist.	**Appendix 9** Ecology Assessments

• Prepare a Discharge Criteria Management Plan, prepared by a suitably qualified expert, which details the existing environment and identifies any marine features or habitats. The plan will focus on the management measures and strategies adopted to ensure water discharge to the Bolivar Channel meets compliance criteria.	**Appendix 18** Discharge Criteria Management Plan
Terrestrial Flora and Fauna (BE3) – Standard Assessment *To ensure that the nature and scale of the development avoids or minimises adverse effects on biodiversity, threatened and protected terrestrial and aquatic flora and fauna species, their ecological communities and habitat.*	
• Describe the development activities with the potential to impact on native vegetation and listed threatened flora species and ecological communities and provide an assessment of how those impacts will be avoided, mitigated or offset.	**10.3** Terrestrial Flora and Fauna
• The assessment of impacts to terrestrial flora and fauna will consider impact beyond the site, with respect to dust and noise.	**10.3** Terrestrial Flora and Fauna
• If potential impacts on MNES require approval under the EPBC Act, an assessment of impacts on the affected MNES must be prepared by an appropriately qualified specialist.	**Appendix 9** Ecology Assessments
• Prepare a Native Vegetation Clearance Data Report prepared by an Accredited Consultant approved by the Native Vegetation Council. The assessment should undertake a survey of the vegetation and fauna (including EPBC Act Listed threatened species and communities), detail compliance with the impact mitigation hierarchy and describe how the significant environmental benefit would be achieved.	**Appendix 9** Ecology Assessments
• Outline measures to mitigate effects on native vegetation by addressing the mitigation hierarchy, including any compensatory activities in already degraded areas and use of existing easements. Refer to guidelines produced by the Native Vegetation Council and outline the likely effectiveness of any mitigation measures adopted during both construction and maintenance.	**10.3** Terrestrial Flora and Fauna
Climate Change and Resource Efficiency (CCRE)	
Climate Change Adaptation (CCRE1) – Standard Assessment *To ensure that development and design are climate resilient and risks from climate change are reduced.*	
• Undertake a climate risk assessment of the relevant potential impacts on the development of projected climate change over the lifetime of the development (e.g. increasing temperatures, extreme heat and heat waves, decline in rainfall, increased drought, extreme rainfall events, harsher fire weather, and sea level rise). Include proposed adaptive management strategies.	**14.3** Climate Change Adaptation
• For developments with a lifetime to 2050 or before, the risk assessment should be based on climate projections from the RCP 8.5 scenario (high greenhouse gas emissions scenario). For developments with a lifetime beyond 2050, the risk assessment should be based on climate projections under both the RCP 8.5 and RCP 4.5 scenario (moderate greenhouse gas emissions scenario).	**14.3** Climate Change Adaptation
• Examine the potential cumulative effects of climate change from a risk management perspective (including adaptive management strategies).	**14.3** Climate Change Adaptation
• Outline the potential effects of, and identify strategies to protect against, extreme weather events, including a 1% AEP storm event and sea level rise as per Coast Protection Board policy and allowances from a risk management perspective, including adaptive management strategies. Include mitigation strategies should the structure not withstand such an event.	**14.3** Climate Change Adaptation **15.4** Flooding

Greenhouse Gas Emissions (CCRE2) – Detailed Assessment *To ensure the development minimises greenhouse gas emissions associated with its construction and operation so as to meet South Australia's goal to reduce greenhouse gas emissions by more than 50% below 2005 levels by 2030 and achieve net zero emissions by 2050.*	
• Undertake a greenhouse gas assessment that:	**14.4** Greenhouse Gas Emissions
– identifies all sources GHG emissions that would be generated	**14.4** Greenhouse Gas Emissions
– provides the estimated annual GHG emissions from each source	**14.4** Greenhouse Gas Emissions
– provides an estimate of yearly net GHG emissions and emissions intensity, including an uncertainty assessment	**14.4** Greenhouse Gas Emissions
– provide an inventory of projected annual Scope 1 and Scope 2 emissions for each GHG over the life of the development. Provide an estimate of annual Scope 3 GHG emissions for the life of the development.	**14.4** Greenhouse Gas Emissions
• Describe how the project will contribute to South Australia's emissions targets i.e. 100% renewable energy target by 2030, 50% emissions reduction below 2005 level by 2030 and zero net emissions by 2050.	**14.4** Greenhouse Gas Emissions
• Describe measures that have been incorporated in the design to minimise, reduce and ameliorate greenhouse gas emissions, particularly the use of alternative or renewable energy sources and off-sets, energy efficiency and energy conservation measures, and if it incorporates integrated passive design principles and climate-responsive techniques and features and identify barriers to implementation.	**14.4** Greenhouse Gas Emissions
Sustainable Use of Resources (CCRE3) – Standard Assessment *To ensure opportunities to procure and use resources efficiently and sustainably are maximised, supporting South Australia's transition to the circular economy.*	
• Describe the sustainability objectives of the development and the approach and methodology used to achieve these objectives.	**14.5** Sustainable Use of Resources
• Describe design guidelines for aspects of the development (including transport options) that would be adopted to ensure sustainability.	**14.5** Sustainable Use of Resources
• Describe how sustainability of the development will be audited.	**14.5** Sustainable Use of Resources
• Identify ways in which power use can be minimised or supplemented, especially using alternative energy sources, energy efficient measures and energy conservation.	**14.5** Sustainable Use of Resources
• Identify ways in which water use can be minimised or supplemented, especially using sustainable water sources, water efficiency measures, and recycling.	**14.5** Sustainable Use of Resources
• Describe the proposed approach to matters such as design, construction methods, materials and equipment to reduce energy use (including vehicle emissions), disposal of waste, water use efficiency during construction and operation over the life of the project.	**14.5** Sustainable Use of Resources
• Detail the infrastructure and service requirements for the development including power, water and waste management; identify required infrastructure upgrades or new installations; and consider access and easement requirements.	**3.9** Utility requirements
• Assess the impact of resource use on existing users including food production / horticultural / agricultural activities, and commercial operations.	**8.4** Impact Assessment

Waste Management (CCRE4) – Standard Assessment *To ensure that waste generated, transported or received as part of the development is managed in accordance with the waste hierarchy and in a manner that protects all environmental values.*	
• Identify, quantify and classify all the expected waste streams to be generated from the proposed project activities during the construction, operation, rehabilitation and decommissioning phases of the development.	**14.6** Waste Management **Appendix 17** Waste Management and Minimisation Strategy
• Assess and describe the proposed management measures against the waste management hierarchy, namely: avoid and reduce waste generation, recycle, reuse, recover, treatment and disposal. This includes the generation, storage and transport of waste.	**14.6** Waste Management **Appendix 17** Waste Management and Minimisation Strategy
• Prepare a waste management and minimisation strategy (for demolition, construction and operation where relevant), detailing the sources of waste, the location of waste storage (including separation of waste streams, such as recyclables, hard waste and e-waste) and disposal facilities on the site or development -related sites (e.g. laydowns) and provide details of how these facilities will be serviced.	**14.6** Waste Management **Appendix 17** Waste Management and Minimisation Strategy
• Identify if any waste outputs require further treatment before waste can be disposed of (e.g. low level contaminated waste disposal) and describe any management measures.	**14.6** Waste Management **Appendix 17** Waste Management and Minimisation Strategy
Local, Regional and State Economies (LRSE)	
Local, regional and state economies (LRSE1) – Detailed Assessment *To ensure adverse economic impacts arising from construction and operation of the development are avoided or mitigated, and net economic benefits to the region and state are created*	
• Provide a full economic analysis of the development including the long-term economic viability and efficiency of the operational aspects of the development, incorporating a regional impact analysis (RIA) and cost-benefit (risk return) analysis (CBA).	**12.8 – 12.13** Local, Regional and State Economies **Appendix 16** Economic Impact Assessment
• The RIA should focus on the direct impact of the project on the local, regional and state economies. The identification of economic impacts should include the prediction of spending on goods, services, taxes etc. during construction and operation of the project and the distribution of income generated by the project.	**12.8 – 12.13** Local, Regional and State Economies **Appendix 16** Economic Impact Assessment
• The CBA should assess the impact of the project on the economic welfare of the economies of interest by estimating a dollar value for as many economic, social and environmental benefits and costs as can reasonably be predicted.	**12.8 – 12.13** Local, Regional and State Economies **Appendix 16** Economic Impact Assessment
Hazards and Risks (HR)	
Hazards – General (HR0) – Standard Assessment *To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.*	

• Undertake a risk assessment which describes the potential risks to people and property that may be associated with the proposed project for all components of the development.	**15** Hazards and Risks
• The assessment will address the specific requirements listed in HR 1, 2, 3, 4 below.	**15** Hazards and Risks
Bushfire / Fire (HR1) – Standard Assessment *To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.*	
• Evaluate and identify any bushfire risks on the site, in particular how risks from bushfire will be minimised with regards to the potential for uncontrolled bushfire events, high levels and exposure to ember attack, impact from burning debris, radiant heat, likelihood and direct exposure to flames from a fire front.	**15.3** Fire Hazard
• Evaluate the risk of fire explosion the site and any potential impacts on human health and to the environment.	**15.3** Fire Hazard
• Describe measures that would be taken to minimise the risks of these events during all stages of development.	**15.3** Fire Hazard
Flooding (HR2) – Detailed Assessment *To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.*	
• Assess the vulnerability of the area to flooding. Describe the history of flooding onsite and in proximity to the development site.	**15.4** Flooding **Appendix 10** Flood modelling
• Identify the potential impacts on people, property, infrastructure and the environment from potential flood risk.	**15.4** Flooding **Appendix 10** Flood modelling
• Identify the wider impacts of stormwater and flooding from existing and planned upstream growth areas of the 30-Year Plan for Greater Adelaide.	**15.4** Flooding **Appendix 10** Flood modelling
• Include modelling that considers future increased rain intensity scenarios as a result of climate change and future land use change scenarios in the area that may also increase runoff.	**15.4** Flooding **Appendix 10** Flood modelling
• Describe measures that would be taken to minimise the risks of these events during all stages of development.	**15.4** Flooding **Appendix 10** Flood modelling
Site and Groundwater Contamination (HR3) – Detailed Assessment *To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.*	
• Detail any known or potential sources of contaminated soil and/or groundwater that could be impacted by the development.	**9.3** Soils, Landform and Geology **9.4** Surface Water and Groundwater **15.5** Site and Groundwater Contamination

	Appendix 7 Preliminary Site Investigation
• Identify the potential impacts on people, property, infrastructure and the environment from potential soil and/or groundwater contamination.	**9.3** Soils, Landform and Geology **9.4** Surface Water and Groundwater **15.5** Site and Groundwater Contamination **Appendix 7** Preliminary Site Investigation
• Describe measures that would be taken to minimise the risks of these events during all stages of development.	**9.3** Soils, Landform and Geology **9.4** Surface Water and Groundwater **15.5** Site and Groundwater Contamination **Appendix 7** Preliminary Site Investigation
Dangerous Substances (HR4) – Detailed Assessment *To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.*	
• Identify all dangerous and hazardous substances and any explosives to be used, transported, stored, processed or produced and the rate of usage.	**9.3** Soils, Landform and Geology **9.4** Surface Water and Groundwater **15.6** Dangerous Substances
• Describe the use, handling and disposal of these materials during construction and operation, with reference to storage (including any associated fire protection facilities).	**9.3** Soils, Landform and Geology **9.4** Surface Water and Groundwater **15.6** Dangerous Substances
• Describe how hazardous contaminants and waste substances produced by the development will be treated or contained until their disposal at an approved facility.	**9.3** Soils, Landform and Geology **9.4** Surface Water and Groundwater **15.6** Dangerous Substances
• Evaluate the potential effects of any accidents involving dangerous substances on the environment and public health in the vicinity of the site.	**9.3** Soils, Landform and Geology **9.4** Surface Water and Groundwater **15.6** Dangerous Substances
• Describe measures that would be taken to minimise the risks of these events during all stages of development.	**9.3** Soils, Landform and Geology **9.4** Surface Water and Groundwater **15.6** Dangerous Substances
Land Use and Site Conditions (LUSC)	
Land tenure, protected areas and land use (LUSC1) – Standard Assessment To ensure that the impacts of development on environmental, social and economic values of adjoining land uses, land tenures and protected areas are avoided or minimised.	

• Provide details of the development (activities or structures) with the potential to impact on existing land uses, future (envisaged) land uses, land tenures and protected areas that overlap, adjoin or are in the region of the development.	**8.** Land Use and Site Conditions
• Provide an assessment of local impacts to adjoining land uses and describe any measures to mitigate these impacts.	**8.** Land Use and Site Conditions
• Assessment to consider City of Salisbury's Strategic Growth Framework – Waterloo Corner and Bolivar Corridor.	**8.** Land Use and Site Conditions **5.** Planning Report
Physical Environment (PE)	
Coastal (PE1.1) – Standard Assessment *To ensure the natural features and processes of coastal systems are protected so that the environmental values of the coast are maintained.*	
• Describe existing coastal environmental values including estuarine, littoral and marine environmental values that could be impacted by construction or operation of the development.	**9.5** Coastal and Marine
• Identify the flooding and erosion risks to the site (including flooding and erosion exacerbated by sea level rise and extreme weather events) and measures to reduce the risks.	**15.4** Flooding **14.3** Climate Change Adaptation
• Identify any potential for Coastal Acid Sulfate Soils (CASS) to be encountered on the site and how this might be mitigated (refer to the Coast Protection Board policy on CASS).	**9.3** Soils, Landform and Geology
• Assess the potential impacts to the coastal system and existing uses from the development and propose mitigation measures to avoid or minimise those impacts during construction and operation.	**9.5** Coastal and Marine
• If MNES have been identified, undertake an assessment of potential impacts relevant to the MNES	**Appendix 9** Ecology Assessments
Marine (PE1.2) – Detailed Assessment *To ensure the quality and productivity of marine waters, sediment and biota are protected so that environmental values are maintained.*	
• Assess the potential impacts of the proposed project's activities in marine waters including any potential impacts on marine parks, commercial or recreational fisheries, effects of the development on nursery habitat (e.g. seagrass beds, reefs, or, mangroves) and target species (such as prawns and fish).	**9.5** Coastal and Marine **10.4** Marine Flora and Fauna
• The assessment of impacts will:	
– Consider spills of fuels and chemicals from the development.	**9.5** Coastal and Marine **10.4** Marine Flora and Fauna
– Consider run-off / discharge from the development.	**9.5** Coastal and Marine **10.4** Marine Flora and Fauna
– Propose mitigation measures to avoid or minimise those impacts during construction and operation.	**9.5** Coastal and Marine **10.4** Marine Flora and Fauna

– Consider the potential impacts of water discharge on the Bolivar channel, other users of the channel and the receiving environment.		**9.5** Coastal and Marine **10.4** Marine Flora and Fauna
• If MNES have been identified, undertake an assessment of potential impacts relevant to the MNES		**Appendix 9** Ecology Assessments
Soils, Landform and Geology (PE2) – Standard Assessment *To ensure development is undertaken in a manner that protects the productivity and quality land including, soil, subsoil and landform and avoids impact to other environmental values.*		
• Provide a detailed description of the soils, landform and geology in the area of the development including the potential for water and wind erosion, soil salinity, acid sulfate soils and soil contamination		**9.3** Soils, Landform and Geology **Appendix 7** Preliminary Site Investigation **Appendix 8** Geotechnical Investigation
• Describe the development activities with potential to impact on soils and ground stability.		**9.3** Soils, Landform and Geology **Appendix 8** Geotechnical Investigation
• Identify the risks of contamination of land from spills of fuel (or other toxic substances). Describe measures for the prevention and containment of spills, describe the contingency plans to be implemented in the event of spills, and comment on their expected effectiveness.		**9.3** Soils, Landform and Geology **Appendix 7** Preliminary Site Investigation
• If acid sulfate soils would be disturbed or unexpectedly encountered during construction, describe measures to avoid oxidation of the sulfides, treat and neutralise the acid if it forms and manage any excavated material.		**9.3** Soils, Landform and Geology
• Ensure that appropriate soil contamination investigations have been undertaken and that soil generated from earthworks is managed in accordance with EPA guidelines, including for re-use on site or removal of material off-site for re-use, treatment or disposal.		**9.3** Soils, Landform and Geology **Appendix 7** Preliminary Site Investigation **Appendix 8** Geotechnical Investigation
Surface Water and Groundwater (PE3) – Standard Assessment *To ensure the quality of groundwater and surface water is protected so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.*		
Surface Water	• Describe existing surface water conditions upstream and downstream of the site (including seasonal variations and variations with flow). Water quality, any existing site contamination and potential sources of surface water pollution should be addressed.	**9.4** Surface Water and Groundwater **9.3** Soils, Landform and Geology **Appendix 7** Preliminary Site Investigation
	• Describe the potential for pollution (e.g. sediment plumes, spills to land and water, discharge of stormwater and wastewater, dewatering) of water bodies, watercourses, drainage channels, wetlands and floodplains during construction and operation.	**9.4** Surface Water and Groundwater **9.3** Soils, Landform and Geology **9.5** Coastal and Marine
	• Describe potential alteration to surface water flows as a result of the development.	**9.4** Surface Water and Groundwater **15.4** Flooding

	• Impact assessment to consider impacts to downstream water users including food production / horticultural / agricultural land uses.	**9.4** Surface Water and Groundwater **9.5** Coastal and Marine
	• Describe the proposed mitigation measures to protect environmental values and downstream water users. Provide details of proposed wastewater and stormwater management, as well as any water sensitive design features as part of the development.	**9.4** Surface Water and Groundwater **9.5** Coastal and Marine
	• Describe the options for supplying water to the development including potable water (if relevant) and temporary demands during the construction period. Describe on-site storage and treatment requirements for wastewater from accommodation and/or offices and workshops.	**3.9** Utility requirements **3.12** Process by-products **9.4** Surface Water and Groundwater **9.5** Coastal and Marine
	• Describe measures for storage and management of stockpiled topsoil and subsoils during the construction phase.	**3.11** Key Activities **9.3** Soils, Landform and Geology
Ground Water	• Describe the known groundwater related environmental conditions including quality and significance of groundwater in the area of the development and any surrounding area potentially affected by the proposed development's activities. Groundwater testing is required.	**9.4** Surface Water and Groundwater **15.5** Site and Groundwater Contamination **Appendix 7** Preliminary Site Investigations **Appendix 8** Geotechnical Investigations
	• Describe the potential changes to hydrology (including water quality), as a result of the proposal, and the implications of these changes. Consider impacts to existing groundwater wells and aquifers.	**9.4** Surface Water and Groundwater
	• Describe stormwater and wastewater management and the potential impact on groundwater resources with regard to fuel and chemicals used in construction and / or operation of the development. Describe measures proposed for management of stormwater and wastewater during construction and operation to avoid impacts to groundwater.	**3.11** Key Activities **3.12** Process by-products **9.4** Surface Water and Groundwater **15** Hazard and Risks
Design (DQ)		
Urban Design and Place-Making (DQ1) – Standard Assessment *To ensure development promotes the value and quality of good design across South Australia's built environments, and that contributes to healthy neighbourhoods, supports innovation and the integration of smart and sustainable technologies.*		
• Demonstrate the proposal's servicing strategy including the location of any required services infrastructure and the proposed material/screening treatment of any visible services.		**3.8** Supporting Services **16.3.3** Servicing Strategy
• Describe the proposal's Environmentally Sustainable Design (ESD) strategy and targets.		**16.3.7** Environmentally Sustainable Design
• Describe how the proposal considers Crime Prevention Through Environmental Design (CPTED) principles.		**16.3.6** Crime Prevention Through Design

• Provide visualisations (including long view perspectives) to demonstrate the proposal in context.	**Appendix 15** Visual Amenity Impact Assessment
• Provide a full set of documentation including site plan, plans, elevations (including streetscape elevations where relevant), sections/site sections and shadow diagrams.	**Appendix 2** Site Layout and plans **Appendix 15** Visual Amenity Impact Assessment
Social and Community (SC)	
Aboriginal Cultural Heritage (SC1) – Detailed Assessment *Avoid adverse effects on Aboriginal cultural heritage values and maximise opportunities to appropriately complement and preserve these values.*	
• Describe how the proposed location and /or design avoids and / or mitigates potential impacts and risks to known and unknown Aboriginal heritage. Where impacts to Aboriginal heritage cannot be avoided, provide detailed justification for this.	**13** Cultural Heritage
• Undertake an on-ground cultural heritage survey undertaken by qualified heritage experts (ideally an anthropologist and an archaeologist) in consultation with the RARB/Traditional Owner representatives. This survey should cover the entirety of the project area.	**13** Cultural Heritage Note: The heritage survey is confidential, a summary has been provided in Chapter 13.
• Preparation of a subsequent Aboriginal heritage report which should:	**13** Cultural Heritage Note: The heritage survey is confidential, a summary has been provided in Chapter 13.
– be prepared by a suitably qualified heritage expert	
– clearly outline the results of the heritage survey, including the location of Aboriginal heritage within the project area, as well as any areas where unrecorded sub-surface Aboriginal heritage is likely to occur	
– consider the results of the AAR central archives search results, as well as any other searches of local archives or other relevant databases	
– consider the views of the RARB, or where no RARB is appointed, Traditional Owner representatives. Note that any sensitive or restricted information relating to Aboriginal heritage must remain confidential, and should not be publicly disclosed	
– consider both the archaeological and anthropological/ethnographic values of the area, based on relevant literature, previous heritage assessments etc.	
– consider the project's potential impacts to known and unknown Aboriginal heritage	
– provide recommendations for the management of Aboriginal heritage during project works, in light of the above	
• Preparation of a Cultural Heritage Management Plan (CHMP) by an appropriately qualified heritage expert in consultation with the RARB/Traditional Owner representatives that:	**13** Cultural Heritage Note: The CHMP is confidential, a framework has been provided in Chapter 13.
– addresses the potential for the project to impact known and unknown Aboriginal heritage	
– outlines measures agreed with the RARB/Traditional Owner representatives to be taken in order to manage and protect Aboriginal cultural heritage wherever possible	

– establishes processes for the management and protection of Aboriginal heritage before, during and after the proposed development, which may include:	
○ establishment of avoidance or 'no-go' zones to avoid known heritage or areas of identified high risk	
○ establishment of bunting or fencing around known Aboriginal heritage	
○ conditional access areas (e.g. limits on heavy machinery in particular areas)	
○ the engagement of Aboriginal heritage monitors to observe ground disturbing works in high risk areas - noting that the location and details about the heritage must not be made public.	
– the engagement of Aboriginal heritage monitors to observe ground disturbing works in high risk areas - noting that the location and details about the heritage must not be made public	
Community Wellbeing / Social Impact Assessment (SC2) – Standard Assessment *To ensure adverse effects on the community near the development are avoided or minimised including with regard to community cohesion, access to services and facilities and health impacts and capitalise on opportunities to enhance benefits for communities.*	
• Provide a social impact assessment (SIA) of the development which addresses:	
– the existing social environment of communities potentially impacted by the project	**12.1 – 12.7** Social and Community
– the potential social impacts (both positive and negative) of the project, and how they will be managed and monitored	**12.1 – 12.7** Social and Community
– workforce management, housing and accommodation	**12.1 – 12.7** Social and Community
– local business and industry procurement	**12.1 – 12.7** Social and Community
– health and community wellbeing	**12.1 – 12.7** Social and Community
Heritage Places and Areas (SC3) – Standard Assessment *To ensure that the nature and scale of the development does not compromise the recognised heritage significance of a heritage place or heritage area.*	
• Provide details of the location, nature and known potential heritage values of all historic heritage potentially affected by the development particularly State and Commonwealth-listed places and areas.	**13** Cultural Heritage

Appendix 04 Community Engagement Strategy and Plan

Consentium JBS&G

Renascor BAM Stakeholder Management Strategy

Document Number: 149,031

Scope

This is an engagement strategy designed to support regulatory approvals and ongoing maintenance of social licence to commission and operate the proposed Renascor Resources Limited (Renascor) Battery Anode Material (BAM) Facility in Bolivar, South Australia. It includes an initial up to date analysis of key stakeholders, risks and opportunities, and a best practice approach to communication and engagement with consideration of the local stakeholder and social setting. It is possible that additional stakeholders may be identified during the engagement process and these can be incorporated in this strategy as required.

This overarching strategy is supported by a live stakeholder management plan which will continue to be developed as the project evolves, and to respond to emerging community and stakeholder contexts. While this strategy remains the core reference document, the management plan outlines the planned action as the development progresses.

Background

Renascor plans to develop the BAM facility at Bolivar, an outer northern semi-industrial/horticultural suburb of Adelaide, to produce purified spherical graphite (PSG) specifically required for lithium-ion batteries. The BAM facility will process graphite sourced from Renascor's Siviour Graphite mine located near Arno Bay on the Eyre Peninsula and deliver it by truck to the Bolivar facility. Processed graphite would then be delivered by truck to outer harbour (Port Adelaide) and then shipped to export customers.

Strategic approach

Communication and engagement purpose

The purpose of this strategy is to support Renascor's social licence which requires authentic engagement with the local community and key stakeholders. The initial phase of engagement supports the approval process required for development of the BAM facility and supports Renascor in identifying, understanding and responding to possible stakeholder queries and concerns. Communication and engagement objectives are set out in the table below.

This approvals phase also provides an opportunity for Renascor to conduct engagement activities in a manner that sets the foundation for positive future relationships with stakeholders

Table 1: Communication and engagement objectives

Objective	Detail	Timing

Foster good relations with local stakeholders	• Renascor's community engagement principles and the purpose of engagement are communicated early in the process. This will include:
	  ○ Publicly available engagement principles and purpose of engagement
	  ○ How the community and stakeholders will be informed and engaged
	  ○ Opportunities to participate in the engagement process.
	• Periodically review, map and document community members and stakeholders who have an interest in, or will be impacted by, the Project.
	• Develop an understanding of community and stakeholder concerns and aspirations regarding the Project and:
	  ○ Respond to these in accessible and relevant ways.
	• Adapt the Project where practicable to address and minimise community concerns and support.
		Ongoing

Minimise risk of negative sentiment and scrutiny	• Potential concerns of the community are identified early and responded to in a timely manner. • Potential risks and how they will be managed, or the process that will be followed to determine how they will be managed is clearly communicated. • Ensure Renascor's narratives to different stakeholders are aligned, as well as targeted, eg to local government, sensitive receptors and landholders and the broader community around the site. • Ensure other relevant agencies (eg Project service companies, and organisations who the local community will make contact with such as local government) have the information they require to respond appropriately.	Ongoing

Principles of engagement

Engagement principles guide how engagement with communities and stakeholders is planned and delivered.

Table 2: Principles of engagement

Principle	What this looks like
Timely and purposeful start	Consider the timing of engagement carefully. Engage with people early in the process, time engagement around scheduled activity, making it early enough for people to be involved genuinely and purposefully without a long delay between engagement and on ground activity. Ensure clarity on the engagement purpose, objectives, and processes from commencement.
Genuine, inclusive and respectful	Engage authentically, with honesty and transparency. Listen and work to understand different views.
Relevant, accessible and engaging	Engagement is purposeful, suiting the context and the people it is designed for. Keep jargon to an absolute minimum, and make provisions for different cultural and language groups, physical abilities, and literacy levels.
Clear and transparent	Clarity, trust and transparency are important. Provide the relevant information at the time its needed, and help people understand what is happening, why it is happening, consequences, and what they can and cannot influence. Clearly explain reasons behind decisions.

Internationally recognised framework for engagement

The community and stakeholder engagement approach has been informed by the International Association for Public Participation (IAP2) spectrum of public participation. The spectrum assists designing engagement depending on the context (goals, time frames, resources and levels of concern in the decision to be made) and sets out the promise being made to the public at each engagement level.

This Spectrum has been used to guide the level of engagement for each stakeholder group within this strategy.

Figure 1. IAP2 Spectrum of Public Participation.

Source: International Association for Public Participation. iap2.org.au

Stakeholders

Stakeholder landscape (local community)

The location of the proposed BAM facility is a sparsely populated light industrial and horticultural precinct. There are three dwellings within 100 metres of the facility and ten within 500 metres. It is unclear at this point if all dwellings are occupied. It appears that these dwellings are connected to on-premise commercial activity including olive oil production and market gardening. Title searches indicate that property owners may be culturally and linguistically diverse which could require some engagement communication materials to be translated (into Vietnamese). Noise, traffic, air quality, dust, and light are possibly issues of interest to these stakeholders. One local landowner contacted Consentium/JBS&G during noise monitoring activity, alerting us to possible future sensitivities.

The small coastal township of St Kilda (population~100 people) lies some three kilometres to the west of the proposed facility. This community is likely to have a heightened interest in potential environmental impacts primarily related to water quality and the possible flow on effect to local mangroves.

There are a small number of commercial enterprises in the area. The Adelaide Zoo grows animal fodder on a 40-acre site adjacent to the proposed facility. Buckland Dry Creek is a commercial salt field operation. Engagement with these stakeholders has already commenced. Other commercial operations include Iberdrola (gas peaking power plant), Marubeni (hydrogen demonstration plant). Southern Go-Karts and the Adelaide Gun Club are near neighbours. SA Water are also a key stakeholder as owners of the land on which the proposed facility is to be constructed.

Stakeholder classification

To enable effective stakeholder and reputation management, a stakeholder tier level assessment is applied to assist in defining stakeholder groups using the matrix tool below. It considers the:

- Level of interest the stakeholder has in the Project
- The real or perceived impact of the Project on that stakeholder
- The ability of that stakeholder to influence the outcome of the Project.

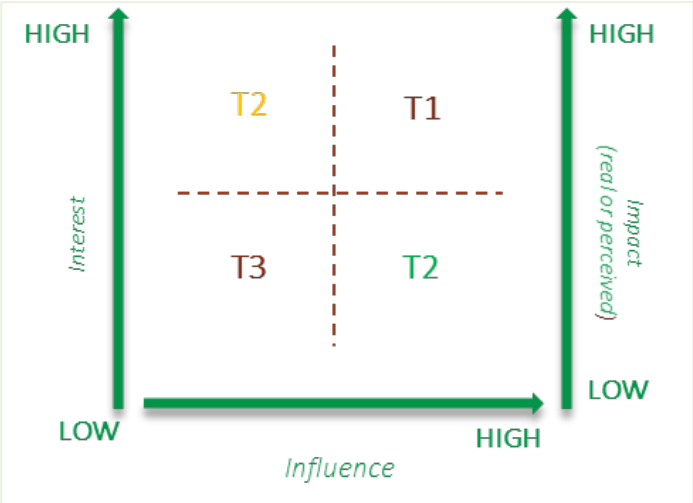


Figure 2: Stakeholder tier level assessment tool

Assumptions have been made on stakeholder's levels of impact/interest/influence, as well their concerns and aspirations, informed by:

- The sentiment analysis undertaken in October 2022 and since refreshed
- The workshop held in October 2022
- JBS&G / Consentium staff expertise and experience.

Recommended engagement levels (Tiers 1 to 3) are consistent with the levels of engagement described in the IAP2's Spectrum of Public Participation:

- Tier 1 – Collaborate
  - Goal: Create working partnerships and support involvement with decisions
    (Renascor will look to these stakeholders for direct input in the development of outcomes and decision making)

- Tier 2 – Involve
  - Goal: Work with stakeholders to understand issues and identify options.
    (Renascor will work with these stakeholders to develop outcomes and provide feedback on how their input has influenced decisions).

- Tier 3 – Inform / Consult
  - Goal: Provide relevant information to stakeholders, obtain feedback, and consider the issues, concerns and suggestions
    (Renascor will keep these stakeholders informed, listen to their concerns, and provide feedback on how their input has influenced decisions.)

Stakeholder mapping

Stakeholder mapping is presented in the table below. It details the stakeholders that will be impacted, have an interest in, or can influence the Project. We recommend interrogating and refining this stakeholder mapping periodically throughout the engagement process. The map below (Figure 3) below shows 100 m and 500 m distances from the Project boundary to potential sensitive (residential) receptors.

WILSON STREET
ST KILDA ROAD
ROBERTS LANE
NORTH-SOUTH MOTORWAY
WATERLOO CORNER INTERCHANGE CONNECTOR
ROBINSON ROAD
DRIVER ROAD
R01
R02
R03
R04
R05
R07
R08
R09
R11
R12
R13
R14
R15
R16
R17
R20
R21
R22
CT | 5395 | 689
CT | 5427 | 926
CT | 5553 | 275
CT | 5710 | 802
CT | 5710 | 798
CT | 5755 | 245
CT | 6088 | 360
CT | 5606 | 363
CT | 5808 | 917
CT | 5808 | 918
CT | 6161 | 442
CT | 6206 | 190
CT | 5916 | 884
CT | 6179 | 957
CT | 5111 | 400
CT | 5383 | 171
CT | 5383 | 533
CT | 6177 | 367
CT | 5383 | 534
CT | 5383 | 157
CT | 5383 | 536
CT | 5747 | 216
CT | 5753 | 590
100m
500m
State Maintained Roads
Council Stormwater Channel
Discharge Pipeline
Suction Pipeline
Cadastre
Stormwater Easement
Subject Site
Sensitive Receptors
Buildings
Property Boundary
Sensitive Receptor Buffer Distance
100m
500m
JBS&G
N
0 100 200 m
GDA2020 MGA Zone 54
Drawn By: jstrauss on 24/05/2023
www.jbsg.com.au

Figure 3.

The map below (Figure 4) shows the location of residential and commercial stakeholders in the vicinity of the proposed project. This map corresponds with the Sensitive Receptor Report published by JBS&G and is annexed in this document.

Figure 4.

Table 3: Stakeholder mapping

Adjacent landholders (within 100/500m buffer)

Receptor number	Reference	Level	Address / Identification	Land Use	Potential concerns
R22	CT5753/590	T3	Southern Go-Kart Club	Recreational – Open Space	Impact on operation, access for customers
R22	CT5753/590	T3	Adelaide Gun Club	Recreational – Open Space	
R20	CT5383/533	T2/T3	32-40 Driver Road	Vacant / Rural Horticulture – non-residential	Impact on operation
R16	CT5383/171	T1	79-81 Robinson Road	Residential / Rural Horticulture (Appears in poor repair)	Impact on operation, amenity (noise, dust, truck movement)
R14	CT6179/957	T1	87-89 Robinson Road	Residential / Rural Horticulture (Orchard/packing sheds on corner)	Impact on operation, amenity (noise, dust, truck movement)
R15	CT5111/400	T1	83-85 Robinson Road	Residential / Rural Horticulture (Appears in poor repair)	Impact on operation, amenity (noise, dust, truck movement)

Receptor number	Reference	Level	Address / Identification	Land Use	Potential concerns
R13	CT6206/190	T1	95-97 Robinson Road	Residential / Rural Horticulture (Opposite Robinson/Waterloo junction)	Impact on operation, amenity (noise, dust, truck movement)
R07	CT5755/245	T2	111 Robinson Road	Residential / Rural Horticulture	Impact on operation, amenity (noise, dust, truck movement)
R07	CT6088/360	T2	107-109 Robinson Road	Residential / Rural Horticulture	Impact on operation, amenity (noise, dust, truck movement)
R08	CT5606/363	T2	108-122 Robinson Road	Residential / Rural Horticulture	Impact on operation, amenity (noise, dust, truck movement)
R11	CT6161/442	T2	98-106 Robinson Road	Residential / Rural Horticulture	Impact on operation, amenity (noise, dust, truck movement)
R09	CT5808/917 & 5808/918	T3	103-105 Robinson Road	2 Allotments – Vacant Urban Land	Impact on land value

Receptor	Reference	Level	Address / Identification	Land Use	Potential concern
R03	CT5427/926	T3	118 St Kilda Rd	Residential Allotment	Impact on operation, amenity (noise, dust, truck movement)
R04	CT5710/802	T3	120-132 St Kilda Rd		Impact on operation
R05	CT5553/275	T2	102-114 St Kilda Rd	Residential / Rural Horticulture	Impact on operation, amenity (noise, dust, truck movement)
R02	CT5395/689	T2	134-144 St Kilda Rd	Residential / Rural Horticulture (Adjoins Allotment 4 of Subject Land)	Impact on operation, amenity (noise, dust, truck movement)
R01	CT5710/798	T3	146-156 St Kilda Rd	Light Industrial / Warehousing / Packing Facility (Adjoins Allotment 4 of Subject Land)	Impact on operation
R12	CT5916/884 & CT5916/885	T2	84-96 Robinson Rd	Horticulture / Greenhouses, non-residential. (Adjoins Allotment 4 of Subject Land)	Impact on operation
R22	CT5747/216	T3	1-61 Driver Rd	Vacant Land with derelict/ruined building	Impact on land value
R21	CT6177/367	T2	42-50 Driver Rd	Horticulture - Orchard	Impact on operation
R17	CT5383/157, 534, 536	T3	22-30 Driver Rd 12-20 Driver Rd 2-10 Driver Rd	Vacant Land	Impact on land value

Table:4 Non-residential stakeholders

Stakeholder Group	Level	Identification	Potential concern
Landowner	T1	SA Water Corporation	Regulatory compliance
Traditional Owners	T1	Kaurna Yerta Aboriginal Corporation (KYAC)	Cultural heritage
Commercial Operators	T1	Buckland Dry Creek	Impingement on operations.
	T1	Zoos SA	Impingement on operations.
		Marubeni	Impingement on operations.
	T2	Iberdrola	Impingement on operations.
Commonwealth Government Agencies	T2	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Regulatory compliance
Service Providers	T1	SA Water Corporation	Regulatory compliance
	T2	ElectraNet	Regulatory compliance
	T2	SA Power Networks	Regulatory compliance
	T2	SEA Gas	Regulatory compliance
State Government Agencies	T1	Department for Trade and Investment, Planning and Land Use Services (DTI-PLUS)	Regulatory compliance
	T1	Department of Infrastructure and Transport (DIT)	Regulatory compliance
	T1	Department of Environment and Water (DEW)	Regulatory compliance
	T1	Department of Energy and Mining (DEM)	Regulatory compliance
	T1	Environment Protection Authority (EPA)	Regulatory compliance/Water discharge

	T1	Aboriginal Affairs and Reconciliation (AAR)	Regulatory compliance
State Politicians	T1	Nick Champion MP (as State Minister for Planning, Housing and Urban Renewal) *recused from BAM project. Andrea Michaels MP currently deputising.	Community concern, planning
	T1	Susan Close MP, Deputy Premier, State Minister for Climate, the Environment and Water	Environmental impact
	T1	Tom Koutsantonis MP, Minister for Infrastructure and Transport	Infrastructure and transport
Federal Politicians	T2	Tanya Plibersek MP, Minister for the Environment	Environmental impact
Local Government – City of Salisbury	T1	Mayor - Gillian Aldridge OAM	Community concern, regulatory compliance
	T2	Deputy Mayor - Chad Buchanan JP	Community concern, regulatory compliance
	T1	Councillor - Sharon McKell	Community concern, regulatory compliance
	T1	West Ward Councillor – Beau Brug	Community concern, regulatory compliance
	T1	CEO – John Harry	Community concern, regulatory compliance
	T1	General Manager City Development – Michelle English	Community concern, regulatory compliance
	T1	General Manager City Infrastructure – John Devine	Community concern, regulatory compliance
	T2	Manager, Governance – Rudi Deco	Community concern, regulatory compliance

Risks and opportunities

Risks and opportunities have been summarised below. These were developed based on the sentiment analysis, the Project kick-off workshop, and input from Renascor and JBS&G / Consentium expertise and experience.

Table 5: Key risks and opportunities

Key Risks and Opportunities					
Risk Area	**Potential Issues & Risks**	**Concerns**	**Potential Mitigation**	**Project Phase**	**Key Messages**
Water	Water Discharge and Quality	Linked to perception rather than actual (negligible) impact	Direct engagement with any community member or group who directly contacts Renascor. Carry out community meetings on a regular basis.	Approvals, Construction, Operations	The BAM facility will have a very low risk of environmental impact. The water being returned to the Bolivar Waste Water Channel will be treated on site. The returned water will be similar to the existing water in the channel, will be of a low volume, and will be monitored.
			Develop fact sheet regarding water quality	Approvals	
		Concern is linked to legacy issues related to other Projects in the area.			
		Specific concern related to mangroves due to a past			

		incident where mangroves in the St Kilda area died off.			
		There is an interest group focused on the mangroves "Save St Kilda Mangroves".			
	Water Usage	The area includes intensive horticultural activities which rely on high quality water.	Provide information on BAM facility design and flood mitigation measures as they become available and can be released to the public. Develop fact sheet regarding water sources and flooding	Approvals, Construction	The BAM facility will source all water from the Bolivar Waste Water Channel and will not draw on water from existing water supply sources.
		Construction of the facility will change the flood characteristics of the local area.		Approvals	The BAM facility will be built to mitigate flooding of the site and ensure those adjacent are not further impacted by flooding due to the constructed facility.
Air Quality	Dust	Dust emissions from BAM facility impacting local amenity, public health, and horticultural operations	Develop fact sheet regarding very low potential for dust emissions and low potential for health or contamination	Approvals	Dust emissions will be minimal and the potential for health or contamination issues is low. The material being processed at the site is graphite which is an inert and non-toxic material.

			issues due to composition.		
	Stack Emissions	Unknown emissions from the stacks at the facility.	Develop fact sheet regarding what could be emitted from the stacks and how this will be prevented, including how the stacks will meet all required standards.	Approvals	All stacks will have equipment installed which will ensure emissions are controlled and reduced to below any allowable criteria in the relevant standards and guidelines.
	Odour	Odour generated from the facility could impact the local area, particularly near neighbours.	Develop fact sheet regarding what odours could be expected and how this is related to the existing operations in the area.	Approvals	It is not expected there will be any nuisance odour generated at the BAM facility that will be noticeable above the existing odour generated form current operations in the area.
Noise	Noise	Noise generated from the facility itself and the traffic, particularly trucks coming and going from the site.	Develop fact sheet detailing expected noise generation and noise mitigation measures.	Approvals	Noise from the plant will be well below the criteria set by relevant standards. Traffic noise will be minimal and will be well below the existing noise levels generated by the Northern Motorway located nearby.

Light	Light Amenity	Light generated by the facility as it is a 24-hour operating site may impact local amenity, particular closest neighbours.	Engage in direct dialogue with near neighbours and provide assurance that screening planting will be implemented, and lights will be installed to reduce light spill	Approvals, Construction, Operations	Existing tall trees will be retained wherever possible and further trees will be planted along the Robison Road boundary to provide a screen between the neighbours and the facility.
	Light Safety	Lights at facility designed to meet the National Airports Safeguarding Framework	Engage with the Edinburgh Airforce Base to ensure lights are designed and installed in line with the Guideline "Managing the risk of distractions to pilots from lighting in the vicinity of airports".	Approvals, Construction	
Fire	Fire Hazards	The BAM facility may pose a fire or explosion hazard to the local community	Engage in direct dialogue with near neighbours and provide assurance that all safety measures will	Approvals, Construction, Operations	There will be no flammables or combustibles stored on site. The BAM Facility will be built to the highest standards including the best technology to ensure fire and explosion potential is reduced to the lowest possible risk.

			be in place to ensure fire and explosion risk is managed to the highest standards.		
Traffic	Noise	As for Noise above			
	Traffic Volume	Extra traffic and trucks will have an impact on local road safety. Traffic volumes will increase impacting on the time taken to get around the local area by road and reduce road quality over time.	Cover traffic during any community meetings. Engage in direct dialogue with near neighbours to communicate road upgrade plans and expected traffic volumes during construction and operations.	Approvals, Construction, Operations	It is expected that road upgrades will be undertaken. Traffic volumes will be higher during construction, but this will be for a short period. Operations traffic will be relatively low.

Media

A separate media strategy is in place that will be adapted to consider and respond to stakeholder engagement activity as required.

Key messages

Key messages are broken into 'Project' and 'Stakeholder' level categories. These will be reviewed and updated as more becomes known about the Project and the environmental management requirements.

Project level

Sustainable, safe, and innovative production

As a core element of battery technology, graphite is playing a crucial role in the world's green energy transition, while it is also used in a vast range of other industries we rely on each day from medicine to transport, electronics, and desalination.

Renascor's development of a purification process that avoids the use of Hydrofluoric ("HF") acid will also deliver a cleaner HF-free alternative to prevailing processing methods at other plants outside of Australia. Bolivar also meets and often exceeds the highest environmental standards.

An exemplar of Australia's emerging critical minerals industry

The vertically integrated Battery Anode Material (BAM) project is a strong example of the potential for Australia's critical minerals industry and the opportunity to drive more value up the supply chain to Australia.

Raw material will be mined from the world's second largest proven reserve located in South Australia and refined at Renascor's Bolivar production facility for export. The company's operations represent a major advance in South Australia's mining capacity which will deliver considerable economic development to the state.

Stakeholder level

Stakeholder level key messages provide nuanced messaging that is specifically relevant for key groups. It outlines the most important themes or key messages to emphasise. These will require updating as more becomes known about the project and the key concerns and aspirations for each stakeholder. Nb – formal messaging for some T1 stakeholders is not necessary as established communications are already underway.

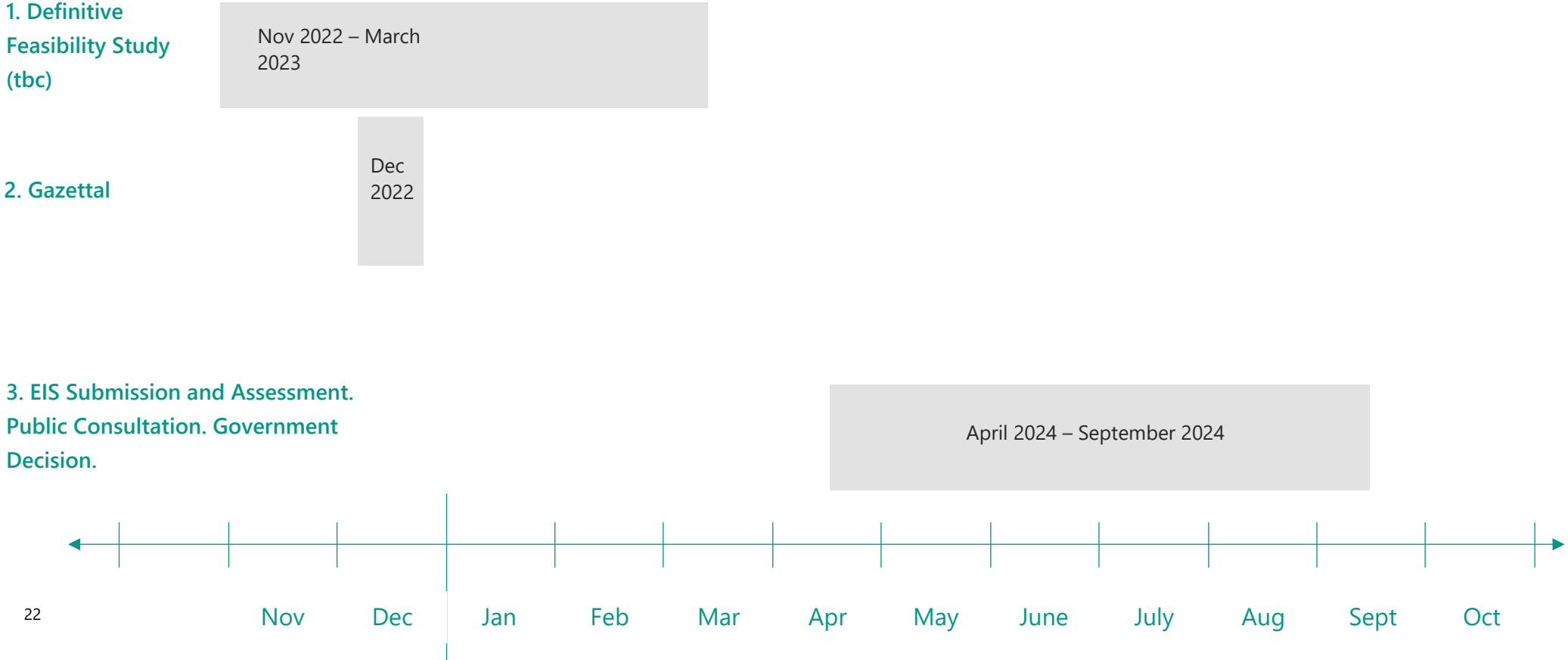
Table 6: Customised key messages for stakeholders

Stakeholder group	Key messages
Local residents & Owners of local residential properties	• Our planned operations at Bolivar will have no adverse impact on established local residential, community and commercial activity. • We value and respect residents' and landholder's rights to use and maintain their land. • We are fully committed to genuine, transparent engagement with local residents and will provide opportunities to learn more about the project. • We will develop a variety of avenues for local residents and community members to raise inquiries and concerns and be kept up to date with the Project. • The facility does not encroach on any established properties and no land needs to be acquired for the project. • The site has met all Environmental Approval processes.
Adelaide Zoo Fodder Operation	• We understand the role of your operations and the need to protect the fodder being grown at your Bolivar facility. • Our operations pose no threat to fodder production with processing being undertaken in a fully enclosed facility. • We are committed to maintaining ongoing dialogue with the Adelaide Zoo.
Rural horticulturalists	• We value and respect landholder's rights to use and maintain their land and we are aware of the established horticulture operations in Bolivar. • Water usage at our processing operations will at no point impede the water requirements of local horticulture operations. • We value local horticulturalists' opinions and potential concerns and welcome inquiries.

Stakeholder group	Key messages
Community and community groups	• It is important to us to build strong relationships with our community that deliver shared and sustainable value, based on mutual respect. • We understand the concern for the local environment, particularly the coastal and marine areas, and we will continue consultation with stakeholders involved in its protection.
Southern Go-Kart Club and Adelaide Gun Club	• The BAM project doesn't affect the access to or running of the Clubs.
State Politicians	• Renascor's operations represent a major advance in South Australia's mining industry which will deliver considerable economic development to the state. • The eco-friendly Battery Anode Material (BAM) project is also an example of what a South Australian critical minerals industry could look like with vertically integrated operations capturing more value in South Australia rather than further down the supply chain. • The operation at Bolivar has a low environmental impact, requires no land acquisition, and has negligible impact on established local residential, community and commercial activity. • The Project provides State and Local economic development, jobs and in-direct business opportunities.
Government agencies	• See above.
Local government	• See above

Indicative Stages 2024

Communication and engagement approaches will align with the broader stages of the overall Project. Timeframes will be overlayed with these broader stages once more is known about regulatory approval requirements. Further stages will be added as the project evolves.



Tools and tactics

An indicative summary of recommended communication and engagement tools and tactics is provided below, as well as a broad indication of stakeholder groups and stages for delivery. A Stakeholder Consultation Plan (Appendix A) covering the assessment and approval period for 2023 has been developed and implementation commenced.

Table 7: Tools and tactics

Type	What	Purpose	Stakeholders	Lead	Timing
Adjacent Residences	Introductory letter and/or email to residences and owners	Introduce project.	Residents and/or Property Owners within 500m	Renascor	During EIS assessment process
	Letter Requesting face to face meetings with residents and owners	Discuss any possible issues or concerns	Residents and/or Property Owners within 100m	Renascor	During EIS assessment process
Cultural heritage	Develop cultural heritage strategy	Meet Govt and Traditional Owner requirements for cultural heritage assessment	Kaurna Yerta Aboriginal Corporation (KYAC).	Renascor	Prior to EIS submission.

Type	What	Purpose	Stakeholders	Lead	Timing
Environmental Impact Statement (EIS) approvals	Targeted meetings and correspondence Face-to-face or online meetings Emails and letters	Confirm and support the approval process	Regulatory bodies Local government	JBS&G	TBC to meet requirements of EIS process
Print	Factsheets; Project overview Water Air Quality Noise	Highlights benefits and addresses concerns	All stakeholders	Renascor with support from Consentium where requested	As required for community consultation
Online	Website – updated as Project progresses	Provide information on the BAM Project when appropriate Enable online feedback and questions	All stakeholders	Renascor	Ongoing
Community enquiries	Project dedicated: Email address Phone number Postal address	Enable feedback and questions	All stakeholders	Renascor	During EIS assessment process.

Appendix A

Renascor BAM Facility Stakeholder Consultation Plan: 2023

This plan is an Annex to the Renascor BAM Stakeholder Management Strategy.

The plan outlines the actions that has been, or will be taken, during the assessment and approvals process to ensure stakeholders are aware and informed of the project and have the opportunity to consult with Renascor where appropriate.

All engagement is registered and tracked in the Renascor Stakeholder Register.

In-direct stakeholder engagement

Community webpage

Renascor will publish a Community Page on the main Renascor website, which provides details for stakeholders to contact the company with comments or inquiries.

Status: Ongoing

Community factsheet

Renascor will develop and publish factsheets outlining the project and the key areas of potential interest to stakeholders.

The factsheets will be available at information sessions and placed on the Renascor Community Web Page.

Status: Ongoing.

Direct stakeholder engagement

Adjacent landholders and residents

Adjacent landholders have been identified and sent a Letter detailing information about the Project and its location and an invitation to contact Renascor via phone or email with any queries or comments.

Status: Complete

Community groups and wider stakeholders

Renascor has identified a group of community organisations who may want to be informed about the Project. These groups are mapped and listed in the annex of this plan.

These Organisations have been sent a letter detailing information about the Project and its location and an invitation to contact Renascor via phone or email with any queries or comments.

Status: Complete

Community Information Sessions

Renascor will hold at least one community information session which will be open to any stakeholder to attend. Stakeholders directly impacted by the project, including local residents and land-holders will be specifically notified of the session.

Status: In progress: Notifications sent out to all identified Stakeholders, Community Information Session Scheduled for 2 August 2023.

Monitoring and reporting

Correspondence with stakeholders will be logged on the Renascor Stakeholder Register.

Annex

Interest group stakeholders

Group	Position	Title	First	Last
SARDI	Manager – Information Services	Mr	Angelo	Tsolos
South Australian Recreational Fishers Association	President	Mr	Gary	Clifford
St Vincent Gulf Prawn Boat Owner's Association	Executive Officer	Mr	Neil	MacDonald
Marine Fishers Association	Executive Officer	Mr	Nathan	Bicknell
Cruising Yacht Club of SA	Chief Executive Officer	Mr	Craig	Evans
Royal South Australian Yacht Squadron	Chairman	Mr	Kingsley	Haskett
Port Environment Centre	Coordinator	Ms	Emma	Sandery
Australian Marine Wildlife Research and Rescue organisation	President	Mr	Aaron	Machado
Estuary Care Foundation SA Inc.	Founder	Ms	Catherine	McMahon
Adelaide Dolphin Sanctuary Action Group	President	Ms	Nikki	Zanardo
Friends of the Gulf of St Vincent	President	Ms	Angela	Gackle

WDC Australia	Executive Director (Australia)	Mr	Declan	Andrews
WDC Port River Dolphins	Research Fellow & Lead	Dr	Mike	Bossley
Save St Kilda Mangroves & The St Kilda Mangroves Alliance	Consultant	Ms	Peri	Colman

Appendix 05 Renascor Environmental Policy

ENVIRONMENTAL POLICY

Renascor Resources Limited (Renascor) is committed to minimising the environmental impact of our exploration, mining and rehabilitation activities through identifying and implementing best practice environmental planning, management and monitoring techniques and continuous improvement of environmental performance.

It is Renascor's policy to:

Strive to continuously improve our environmental performance.

Responsibly use our own and our community's resources.

Constantly seek to implement improvements in efficient use of energy, water and consumables in reducing consumption in our operations where economically feasible.

Educate our employees and contractors about environmental matters and our associated responsibilities to ensure our employees and contractors have the appropriate degree of awareness, environmental skills and training.

Seek to preserve the environmental and community values associated with the land.

Seek to ensure that our activities wherever possible, prevent, minimise, mitigate and remediate any harmful effects of our operations on the environment.

Support the use of sound scientific principles in decisions relating to environmental issues by conducting or supporting appropriate research, studies and evaluations to develop more effective methods for the protection of the environment and mitigation of impacts relating to our activities.

Monitor and report openly on environmental performance to shareholders and the community.

Work with stakeholders to further understand direct and indirect environmental impacts of our operations and identify mutually acceptable outcomes.

Comply with applicable environmental laws, regulations and mandatory standards. Where these do not exist, apply appropriate internal standards that reflect Renascor's commitment to prevent or minimise adverse environmental impacts resulting from our operations, products and services.

Ensure our environmental systems and procedures are appropriate and fully integrated into our business.

Richard Keevers, Chairman
Board of Directors
Renascor Resources Limited

Renascor Resources Limited	ASX: RNU ABN 90 135 531 341
Address	36 North Terrace, Kent Town Adelaide 5067
Version: Draft	May 2021

Appendix 06 Environmental Impact Assessment Tables

Impact Event Uncertainty Evaluation

This appendix provides a summary of the evaluation of uncertainty for all potential impact events that have been identified for the BAM Facility EIS with the exception of Social and Economic impacts and benefits. These are not included in the table due to the differing impact assessment methodology (outlined in Chapter 7). The evaluation follows the method outlined in Chapter 7 Impact Assessment Methodology.

For each impact event, Table 0-1 below outlines:

- the predicted level of impact, as presented in the relevant impact assessment chapter in the EIS
- Acceptability of the level of impact (including assessment of the level of certainty in the assessment of predicted impact (classified using the factors outlined in Table 7-1 in Chapter 7)
- an evaluation of uncertainty using the risk assessment process outlined in Table 7-3 and Table 7-4 in Chapter 7, for impact events with a 'Low' or 'Medium' level of certainty.

Where the level of certainty in assessment of predicted impacts is 'High', uncertainty is not evaluated further.

Table 0-1 Evaluation of uncertainty for potential impact events

Description of impact	Impact consequence[1]	Impact acceptability	Level of certainty in assessment	Risk rating	Risk acceptability
8 – Land Use and Site Conditions					
Development creates overshadowing of adjacent private open space, habitable rooms in dwellings, and/or agricultural land within prescribed timeframes.	Negligible	Acceptable	High	Low	Acceptable
Loss of productive land due to activities not associated with agriculture or horticulture.	Negligible	Review	Medium	Low	Acceptable

[1] Assessment considers the credible worst-case consequence that could occur (and the likelihood of such a consequence occurring) if assumptions made in the impact assessment were found to be incorrect

Description of impact	Impact consequence[1]	Impact acceptability	Level of certainty in assessment	Risk rating	Risk acceptability
Dust deposition on vegetation results in reduced plant growth or additional washing requirements.	Minor	Acceptable	Medium	Low	Acceptable
Amenity issues (dust, odour, noise or visual changes) discouraging patrons of nearby commercial / tourism operations.	Minor	Acceptable	High	Low	Acceptable
Illumination at facility (during construction or operations) creates light spill resulting in pilot distraction at Edinburgh RAAF base.	Catastrophic	Review	High	High	ALARP
9 – Soils, Landform and Geology					
Erosion of soils and runoff from stockpiles and disturbed surfaces during construction leads to erosion / gullying and secondary sedimentation of water courses	Minor	Acceptable	Medium	Low	Acceptable
Imported materials including fill leads to contamination of site or unstable placement leads to erosion or stability issues with facility	Moderate	Review	Medium	Medium	ALARP
Erosion of soils and runoff from stockpiles and disturbed surfaces during operation leads to erosion / gullying and secondary sedimentation of water courses	Minor	Acceptable	Medium	Low	Acceptable
Accidental spills / loss of containment to land (secondary pathways include surface water and groundwater)	Minor	Acceptable	High	Low	Acceptable
Excavation and earthworks disturb existing acid sulphate soils leading to generation of acid leachate	Moderate	Review	High	Low	Acceptable
Excavation and earthworks disturb existing contamination (including asbestos)	Major	Review	High	Medium	Acceptable
Following completion, the soil beneath the disturbance area is likely to be compacted due to presence of infrastructure with little organic matter, seed bank or nutrients.	Minor	Acceptable	High	Low	Acceptable
9 – Surface Water & Groundwater					

Description of impact	Impact consequence[1]	Impact acceptability	Level of certainty in assessment	Risk rating	Risk acceptability
Groundwater management during construction of footings results in land contamination	Negligible	Acceptable	High	Low	Acceptable
Catchment of surface water onsite reduces availability to other users (including vegetation downgradient and GW)	Negligible	Acceptable	High	Low	Acceptable
Surface water run off contaminating downstream users	Minor	Acceptable	High	Low	Acceptable
9 – Coastal and Marine					
Treated process water from site introduces excess nutrients or heavy metals into the Bolivar outfall channel impacting the coastal and marine environment.	Minor	Acceptable	High	Low	Acceptable
10 – Biosecurity					
Introduced pests, pathogens or weeds cause production losses or introduction of invasive species through construction and operational activities	Moderate	Review	Low	Low	Acceptable
10 – Terrestrial Flora and Fauna					
Land / habitat clearing (clearing more than predicted)	Minor	Acceptable	High	Low	Acceptable
Removal of Regulated and Significant Trees	Minor	Acceptable	High	Low	Acceptable
Vegetation clearance impacts listed threatened ecological communities and flora	Negligible	Acceptable	High	Low	Acceptable
Vegetation clearance impacts fauna	Negligible	Acceptable	High	Low	Acceptable
Dust deposition on native vegetation/listed flora and ecological communities results in reduced plant growth during construction	Minor	Acceptable	Medium	Low	Acceptable
Dust deposition on native vegetation/listed flora and ecological communities results in reduced plant growth during operations	Minor	Acceptable	High	Low	Acceptable

Description of impact	Impact consequence[1]	Impact acceptability	Level of certainty in assessment	Risk rating	Risk acceptability
Noise and vibration from plant machinery (including trucks) (construction and operation) impacting fauna on and beyond the Project site	Negligible	Acceptable	Medium	Low	Acceptable
Erosion of soils and runoff from stockpiles and disturbed surfaces leads to erosion / gullying and secondary sedimentation of native vegetation off site	Minor	Acceptable	Medium	Low	Acceptable
Vehicle strike leads to fauna mortality	Negligible	Acceptable	High	Low	Acceptable
Accidental spills / loss of containment spreading to native vegetation, with fauna eating contaminated vegetation.	Minor	Acceptable	High	Low	Acceptable
Introduction or spread of weeds, pests or pathogens impacting habitat value and native flora elsewhere	Negligible	Acceptable	High	Low	Acceptable
Vehicle movements leads to introduction and / or spread of weeds, pests or pathogens to surrounding horticultural / agricultural areas	Minor	Acceptable	High	Low	Acceptable
Introduction or spread of pest, or nuisance species, diseases and pathogens	Minor	Acceptable	High	Low	Acceptable
Impacts of illumination on native fauna (Inc. migrating birds and nocturnal fauna)	Minor	Acceptable	High	Low	Acceptable
Bushfire/Fire	Minor	Acceptable	High	Low	Acceptable
10 – Marine Flora and Fauna					
Impact of treated process water on nursery habitat.	Negligible	Acceptable	High	Low	Acceptable
Impact of treated process water on MNES.	Negligible	Acceptable	High	Low	Acceptable
Impact of treated process water on conservation areas.	Negligible	Acceptable	High	Low	Acceptable
11 – Air Quality					

Description of impact	Impact consequence[1]	Impact acceptability	Level of certainty in assessment	Risk rating	Risk acceptability
Construction activities including land clearing and material movement and vehicles on unpaved roads generate particulate emissions (PM2.5 and PM10) that result in health impacts to the local community	Minor	Acceptable	Medium	Low	Acceptable
Construction activities including land clearing and material movement and vehicles on unpaved roads generate dust emissions that result in amenity impacts to the local community.	Minor	Acceptable	Medium	Low	Acceptable
Manufacturing emissions (including particulate matter, CO, NOx) during operations result in health impacts to the local community.	Minor	Acceptable	High	Low	Acceptable
Activities including land clearing and material movement and vehicles on unpaved roads generate dust emissions that result in amenity impacts to the local community.	Minor	Acceptable	High	Low	Acceptable
Graphite dust from manufacturing process impacting adjacent powerlines.	Minor	Acceptable	Medium	Low	Acceptable
Odour from manufacturing process that result in amenity impacts to the local community.	Minor	Acceptable	High	Low	Acceptable
11 - Noise					
Construction noise decreasing amenity of adjacent landowners	Minor	Acceptable	High	Low	Acceptable
Operational noise decreasing amenity of adjacent landowners	Minor	Review	High	Low	ALARP
11 – Traffic					
Interaction between pedestrians, light and heavy vehicles	Catastrophic	Review	High	High	ALARP
Increase in traffic volumes disrupting the existing transport network	Negligible	Acceptable	High	Low	Acceptable
Increased traffic resulting in degradation of road pavements	Minor	Acceptable	High	Low	Acceptable
11 – Visual Amenity					

Description of impact	Impact consequence[1]	Impact acceptability	Level of certainty in assessment	Risk rating	Risk acceptability
Reduced visual amenity for landowners along Robinson Road, east of site.	Moderate	Review	High	High	ALARP
Reduced visual amenity for landowners north of the site	Minor	Acceptable	High	Medium	ALARP
Reduced visual amenity from main roads	Negligible	Acceptable	High	Low	Acceptable
Reduced visual amenity to tourism locations	Negligible	Acceptable	High	Low	Acceptable
13 – Cultural Heritage					
Impacts to Aboriginal sites, objects or remains during construction	Moderate	Review	High	Low	Acceptable
Impacts to Aboriginal sites, objects or remains during operations	Moderate	Review	High	Low	Acceptable
Impacts to Heritage Places or Areas as a result of construction or operation	Negligible	Acceptable	High	Low	Acceptable
15 – Hazard and Risks					
Ignition source from Project starting a fire	Catastrophic	Review	High	High	ALARP
Fire on site (started internally or externally) resulting in a chemical spill	Minor	Acceptable	High	Low	Acceptable
Flooding resulting in a loss of containment of dangerous substances.	Minor	Acceptable	High	Low	Acceptable
Development of site increasing flooding risk on adjacent land.	Minor	Acceptable	High	Low	Acceptable

Appendix 07 Baseline Environmental Investigation

Renascor Resources

Baseline Environmental Investigation

Robinson Road, Waterloo Corner

22 December 2022

63155-146,681_Rev1

JBS&G

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Renascor Resources

Baseline Environmental Investigation

Robinson Road, Waterloo Corner

22 December 2022

63155-146,681_Rev1

JBS&G

Table of Contents

Abbreviations v

Executive Summary 1

1. Introduction 2
   - 1.1 Scope of Work 2
   - 1.2 Methodology 2

2. Site Details 4
   - 2.1 Site Identification 4
   - 2.2 Site Description and Land Use 4
   - 2.3 Development Zoning 4
   - 2.4 Site Inspection 4
   - 2.5 Interviews 5

3. Site History 6
   - 3.1 Review of Land Ownership Records 6
   - 3.2 Review of Aerial Photographs 6
   - 3.3 Review of SA EPA Records 7
     - 3.3.1 Section 7 Searches 7
     - 3.3.2 Site Contamination Index 7
   - 3.4 Review of SafeWork SA Dangerous Goods Records 9
   - 3.5 Review of State and National Heritage Records 9
   - 3.6 Review of Data Integrity 10

4. Environmental Setting 11
   - 4.1 Regional Topography 11
   - 4.2 Regional Hydrology 11
   - 4.3 Geology 11
   - 4.4 Hydrogeology 11
   - 4.5 Acid Sulphate Soils 12

5. Potentially Contaminating Activities 13

6. Limited Soil Investigation 15
   - 6.1 Soil Sampling Plan and Rationale 15
   - 6.2 Soil Sampling Methodology 15
   - 6.3 Soil Analytical Program 15
   - 6.4 Soil Criteria 16
   - 6.5 Field Observations 17
   - 6.6 Laboratory Testing Results 17

7. Groundwater Investigation 19

7.5 Groundwater Conditions 21
7.6 Groundwater Analytical Results 22
8. Quality Assurance / Quality Control 23
8.1 Soil QA/QC 23
9. Conceptual Site Model 25
10. Conclusions 27
11. Limitations 29

List of Tables

Table 1: PSI Components 3
Table 2: Site Details 4
Table 3: Site Description 4
Table 4: Historical CT Summary 6
Table 5: Summary of Aerial Photograph Observations 6
Table 6: Summary of Site Contamination Index Information 8
Table 7: Details of Potentially Contaminating Activities 13
Table 8: Soil Screening Criteria 16
Table 9: Relevant Groundwater Environmental Values 21
Table 10: Stabilised Groundwater Parameters 22
Table 11: Summary of Soil QAQC Measures 23
Table 12: Conceptual Site Model 25

Figures

Summary Results Tables (including QA/QC) – Soil

Summary Results Tables (including QA/QC) – Groundwater

Appendices

Appendix A – Current Certificate of Title
Appendix B – Preliminary Development Plan
Appendix C - Site Inspection Photographs
Appendix D – Historical Certificates of Title
Appendix E – Historical Aerial Photographs
Appendix F - Government Records
Appendix G – Groundwater Database Information (Water Connect)
Appendix H – Soil Logs

Appendix I – NATA Laboratory Documentation (SOIL)

Appendix J – Groundwater Logs

Appendix K – Groundwater Field Sampling Sheets

Appendix L – NATA Laboratory Documentation (Groundwater)

Abbreviations

Term	Definition
AHD	Australian Height Datum
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013
BTEXN	Benzene, Toluene, Ethylbenzene, Toluene & Naphthalene
COC	Chain of Custody
COPC	Chemicals of Potential Concern
CSM	Conceptual Site Model
CT	Certificate of Title
DBYD	Dial Before You Dig
DEW	Department for Environment and Water
DIT	Department for Infrastructure and Transport
EIL	Ecological Investigation Levels
EPA	Environment Protection Authority (SA)
ESL	Ecological Screening Levels
HIL	Human Investigation Levels
HSL	Human Screening Levels
JBS&G	JBS&G Australia Pty Ltd
LOR	Limit of Reporting
LTO	Lands Title Office
m	Metre(s)
m bgl	Metre(s) Below Ground Level
µS/cm	Micro Siemens per Centimetre
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
NATA	National Association of Testing Authorities
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCA	Potentially Contaminating Activity(ies)
PD14	Practice Direction 14
PID	Photo-ionisation Detector
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance / Quality Control
RPD	Relative Percentage Difference
SAPPA	South Australian Property Planning Atlas
SARIG	South Australian Resources Information Gateway
SB	Soil Borehole
TRH	Total Recoverable Hydrocarbons
USCS	Unified Soil Classification System

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by Renascor Resources (the client) to undertake a Baseline Environmental Investigation comprising a site history and a limited soil and groundwater investigation for the site located on portions of Allotments 3 & 4 Robinson Road, Waterloo Corner.

It is understood the site is owned by SA Water. The client is looking to develop the site into an industrial graphite refinery and that due diligence works are required prior to entering into a long-term lease agreement with SA Water. The report forms a baseline for future comparison noting the limitations on this current investigation. In particular, groundwater was not assessed due to site access restrictions.

Site History

The available historical information indicates that the site has been used for agricultural purposes since at least the 1860s to present day, consisting mainly of broadacre cropping and grazing. More recently, broadacre grazing activities are minimal with only a small flock of sheep kept at the site.

The main potential sources of contamination associated with past and present site uses include:

- Historical use of fill from various unknown sources brought onto the site including unsealed tracks/driveways) and possible small mounds of fill material previously located in the north-western portion of the site.
- Cement sheet fragments containing asbestos across the ground surface in the western portion of the site (adjacent the western fence line). It is likely the fragments have been illegally dumped at the site, given there have been no sheds / structures at the site.
- Use of pesticides, herbicides and fertilisers during use of the site for agricultural purposes

The site is located adjacent to the Bolivar WWTP and during high winds, the wastewater from the adjacent Bolivar settling ponds is understood to aerosolise and reach across the subject site. Additionally, any potentially impacted groundwater underlying the WWTP site may be migrating under the subject site, although it is noted the treatment plant is located in the inferred down-hydraulic gradient direction of the site.

Soil investigation

A limited soil investigation was undertaken at the site comprising the drilling of 20 grid-based soil bores to a maximum depth of 0.5 m below ground level (bgl). It is noted that some areas of the site could not be accessed due to an indigenous exclusion zone and inaccessible flooded areas. Selected samples from each soil bore were analysed at the laboratory for a range of potential contaminants of interest identified in the site history and those relevant to form a baseline for future comparison. All laboratory results reported below the adopted ecological and health-based investigation / screening levels.

Recommendations

Based on the limited assessment works completed at the site, the field observations and the soil results documented herein, site contamination of soils has not been identified in the context of proposed industrial land use (graphite refinery). It is noted that groundwater was not assessed, noting that due to the wet conditions at the site, SA Water advised that vehicles could not be driven across the site (including a vehicle mounted auger/corer).

Asbestos cement sheet fragments in the western portion of the site should be removed prior to any development works and wastewater from the adjacent Bolivar settling ponds, known to aerosolise and reach the subject site, should be considered in terms of any future construction workers and future site users.

1. Introduction

JBS&G Australia Pty Ltd (JBS&G) was engaged by Renascor Resources (the client) to undertake a Baseline Environmental Investigation for the site located on portions of Allotments 3 & 4 Robinson Road, Waterloo Corner. The approximate location of the site is presented in **Figure 1**.

It is understood the site is owned by SA Water. The client is looking to develop the site into an industrial graphite refinery and that due diligence works are required prior to entering into a long-term lease agreement with SA Water. The report forms a baseline for future comparison noting the limitations on this current investigation. In particular, groundwater was not assessed due to access restrictions.

1.1 Scope of Work

The scope of the assessment works have comprised:

- Review of the history of ownership (all CTs pertaining to the site);
- Historical aerial photograph review;
- Interviews with people involved in historical site activities (if available) and sources of information which may relate to chemical storage, waste and wastewater disposal occurring onsite;
- Identification of potential issues associated with surrounding properties, including observation of the surrounding land uses and a search of the SA Environment Protection Authority (EPA) Public Register Directory, which lists all sites for which the SA EPA has knowledge of contamination;
- Review of historical uses of the site;
- Review of local geology, hydrology and hydrogeology;
- Review of other available relevant information detailing activities that have taken place on
- the site;
- Search of EPA records for the site (Section 7 Search);
- Council records and historical searches;
- Current and historical dangerous goods licences;
- Inspection of the site by a Senior Environmental Scientist consisting of a walkover of priority areas of the site identified during a desktop review; and
- Observation of land uses in the area immediately surrounding the site.

1.2 Methodology

This PSI and soil investigation have been undertaken in general accordance with the procedures outlined in the National Environment Protection (Assessment of Site Contamination) Measure[1] (ASC NEPM) with particular consideration given to Schedule B2 – *Site Characterisation*.

In addition to the ASC NEPM, local legislation and guidelines provided additional guidance for the PSI with respect to site contamination and potentially contaminating activities (PCA), including:

- *Environment Protection Act*[2] (the Act)*;*

[1] NEPC 2013, National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013
[2] SA Government 1993, Environment Protection Act 1993 (South Australia)

- *Guide to the investigation and sampling of potentially contaminated soil*[3];
- *Environment Protection Regulations*[4]; and
- *Guidelines for the Assessment and Remediation of Site Contamination*[5].

A summary of the PSI components considered in this PSI is included in **Table 1**:

Table 1: PSI Components

Component	Report Section
Development Zoning	**Section 2.3**
Site Inspection	**Section 2.4**
Ownership Records	**Section 3.2**
Aerial Photography	**Section 3.3**
South Australian Environment Protection Authority (EPA) Records	**Section 3.4.1**
SafeWork SA Dangerous Goods Records	**Section 3.5**
Heritage Records	**Section 3.6**
Data Integrity	**Section 3.7**
Environmental Settings	**Section 4**
Summary of PCAs On Site	**Section 5**
Preliminary Conceptual Site Model (CSM)	**Section 10**

[3] Australian Standard 'Guide to the investigation and sampling of potentially contaminated soil'; AS4482.1-2005.
[4] SA Government 2009, Environment Protection Regulations 2009 (South Australia)
[5] EPA 2018, Guidelines for the Assessment and Remediation of Site Contamination

2. Site Details

2.1 Site Identification

The site location is shown in **Figure 1**. The site details are presented in **Table 2** below:

Table 2: Site Details

Category	Description
Street Address	Robinson Road, Waterloo Corner, SA 5110
Certificate of Title (CT)	CT Volume 5723 Folio 299
Plan	Filed Plan 115108; Portions of Allotment 3 and Allotment 4
Site Area	Hundred of Port Adelaide
Local Government Area	City of Salisbury
Current Zoning	Rural Horticulture

A copy of the current certificate of title is included in **Appendix A**.

2.2 Site Description and Land Use

Site details including the land use and that of neighbouring properties are presented in **Table 3**.

The current site layout is included in **Figure 2**.

Table 3: Site Description

Item	Details
Historic Use(s)	Agricultural land use
Current Land Use	Vacant / broadacre gazing
Proposed Development	The site is proposed to be developed as an industrial graphite refinery (refer **Appendix B** for preliminary development plan)
Site Occupier	SA Water
Area	~21.5 hectares (Ha)
Topography	The site is essentially flat
Site Description	The site is an irregular shaped allotment and is situated on the western side of Robinson Road. The site is currently vacant with no structures located at the site. The site is unsealed and is covered with sparse vegetation.
Neighbouring Land Uses	North – Horticultural greenhouses, orchards, plantations, and residential properties East – Horticultural greenhouses, recreational use (shooting range, go-karts track), and the North-South Motorway South – Bolivar Wastewater Treatment Plant (WWTP) West – Bolivar WWTP

2.3 Development Zoning

In accordance with the South Australian Property and Planning Atlas (SAPPA), the site is zoned as a 'Rural Horticultural Zone'. The desired outcomes for this zone include:

- The establishment of agriculture or horticulture, as well as value adding processing, warehousing, and distributing activities, including developments such as sheds, dwellings, low-intensity animal husbandry, warehouses, small-scale solar, and distilleries; and
- The proliferation of other land uses that may be sensitive to these activities is avoided.

2.4 Site Inspection

A site inspection was conducted by an experienced JBS&G senior field scientist on 29 June 2022 to locate and identify obvious visual indicators of contamination.

As stated in **Table 3**, the site is vacant with no structures. The items of note during the inspection are as follows:

- The majority of the site is covered with dense grass and weeds with portions also vegetated with native flora. A small flock of sheep are also kept at the site.

- The north-east corner of the site was not able to be inspected due to an indigenous heritage exclusion zone (refer **Section 2.5**).
- Significant surface water was observed on the southern portion of the site due to recent rainfall events, and therefore could not be inspected in detail. It is understood this portion of the site experiences annual ephemeral flooding (refer **Section 2.5**).
- During JBS&G's site inspection, fragments of cement sheet were observed across the ground surface in the western portion of the site (adjacent the western fence line). The fragments were scatted across an area measuring approximately 50 m x 25 m. A sample of the cement sheet (ACM01) was collected from this area and tested as part of the soil investigation (refer **Section 6**).
- Illegal dumping of household inert waste was observed along the eastern site boundary (adjacent Robinson Road). The waste included clothing, blankets and plastic.

Relevant photos from the site inspection are included in **Appendix C** and a map of site inspection features is included in **Figure 2**.

2.5 Interviews

During the site inspection, JBS&G spoke to Dr Harry Roberts (Environmental Performance and Compliance for SA Water) to obtain relevant information relating to the site. The following is a summary of the information provided:

- Historically, the site has been used for sheep grazing and farmland before being purchased by the government as part of the Bolivar WWTP. Sheep are still present on the western side of the internal fence line.
- Dr. Roberts advised there is an indigenous heritage exclusion zone located in the north-eastern portion of the site, although the exact location of this area was not provided. He advised the area must not be disturbed without cultural heritage monitors being present.
- The site has been re-vegetated by SA water within the last 10 years.
- During high winds, wastewater from the adjacent Bolivar settling ponds can aerosolise and be deposited across the site.
- The southern portion of the site floods readily after rainfall events and the ground surface becomes very soft. This is said to occur on a regular basis and can prevent both vehicle and pedestrian access due to significant surface water.
- Illegal dumping of household waste regularly occurs on the fence line along Robinson Road.
- A cathodic protection cable belonging to SEAGas runs along the western fence line for a portion of the site.

3. Site History

3.1 Review of Land Ownership Records

JBS&G obtained land ownership records through the historical CT searches from the Lands Titles Office (LTO) in order to assess the potential for site contamination as a result of present or historical land uses. The historical CTs are included in **Appendix D.**

The sequence of ownership is summarised in **Table 4.**

Table 4: Historical CT Summary

Date Range	Owner(s) and Occupation
1860s to 1920s	Farmer
1924 to 1928	Sinclair Scott & Co. Limited
1928 to 1954	Various individuals (Dentist, Company Manager, married woman)
1954 to 1960s	Farmer and Wife
1960s to 2000	Minister for Works
2000 to current	South Australian Water Corporation

3.2 Review of Aerial Photographs

Aerial photographs of the site dating from 1949 have been reviewed by JBS&G. Copies of the aerial photographs were obtained from the Department for Environment and Water (DEW) Mapland with more recent images being used from NearMap or Google Earth. The aerial imagery is presented in **Appendix E**.

A summary of the observations made from the historical aerial photographs of the site and surrounds is provided in **Table 5**.

Table 5: Summary of Aerial Photograph Observations

Year	Description
1949	The 1949 aerial photograph is of poor quality and site details are difficult to determine. The site appears to be vacant and part of a larger parcel of broad acre farmland. The surrounding areas are of a similar landscape.
1959	The 1959 aerial photograph shows the ground surface in the north-western portion of the site appears to be disturbed, which extends off site to the north. There are no significant changes to the surrounding land with the exception of the construction of what appears to be some residential dwellings and sheds to the west of the site.
1969	The 1969 aerial photograph shows there are two unsealed tracks across the site; one extending along the northern end of the site and the other along the eastern boundary. The disturbed area in the north-western portion is no longer evident. The site use remains as cleared broadacre farmland. Large sludge ponds, associated with the Bolivar WWTP, are now evident to the immediate west, across an unsealed unnamed track. These remain as is until current day.
1979	The 1979 aerial photograph shows there is a small plantation / vegetation cover across a narrow portion of land in the north-western portion of the site. Some additional trees / vegetation are also evident in the eastern portion of the site adjacent the present day Robinson Road. The unsealed track in the northern end of the site is no longer present. The surrounding land use is relatively unchanged with only some additional livestock and associated sheds and feedlots to the northeast of the site, as well as some residential dwellings.
1989	The site and surrounding area remain largely unchanged from the previous aerial data. The site, excluding a strip along the eastern portion, appears to be actively involved in broadacre cropping. Three of the visible sludge ponds appear full, and two partially filled. The adjacent property to the southwest seems to have undergone some earth moving activities, potentially bringing in fill material.

Year	Description
1999	The 1999 aerial shows the site remains as cleared broadacre agricultural land. A number of greenhouses are present to the east of the site. Five of the six sludge ponds located to the south west are filled, and the property between the sludge ponds has new areas of bare earth.
2009	The site appears to be disused agricultural land and remains cleared. Additional greenhouses and orchards are present to the north of the site. Two of the sludge ponds located on the Bolivar WWTP have now been drained and approximately half of one of these has been processed. The other four are full.
2019	The site shows miscellaneous vegetation growth from disuse of the site. Some small stockpiles/mounds are evident in the north-western portion of the site which may be from recent excavation works on the adjacent site to the south. The greenhouses to the east appear in bad condition and have piled of associated debris. The major development of the Northern Connector Motorway and Waterloo Corner Rd lies nearby to the east. There appears to have been some level of flooding in the property between the site and the sludge ponds due to the appearance of surface water. Half (three) of the sludge pools have been drained for processing.

3.3 Review of SA EPA Records

JBS&G conducted a review of records held by the EPA in relation to the site including section 7 searches and the EPA Site Contamination Index[6], the results of which are described below.

3.3.1 Section 7 Searches

Section 7 of the Land and Business (Sale and Conveyancing) Act 1994 specifies that a statement of government interests (SA EPA in this case) be provided by the vendor or their agent to a prospective purchaser prior to settlement of the land or small business. SA EPA provide Section 7 information on charges and or encumbrances on the land, licences and exemptions both current and historical as well as various site contamination records.

A search of the SA EPA Section 7 information identified a 'yes' result for the following:

- Details of a current licence issued under Part 6 of the *Environment Protection Act 1993* to conduct any prescribed activity of environmental significance under Schedule 1 of that Act at the land.

JBS&G obtained a copy of the EPA licence (Licence No. 1534) which relates to the broader Bolivar Wastewater Treatment Plant. The current licence is held by South Australian Water Corporation who is authorised to undertake the following prescribed activities of environmental significance:

- wastewater treatment works, including discharge to surface water at designated locations; and
- fuel burning - not coal or wood.

This licence commenced on 1 December 2020 and will expire on 30 November 2025. The Section 7 information is included in **Appendix F**.

3.3.2 Site Contamination Index

JBS&G conducted a search of the EPA's online Site Contamination Index which provides a list of site contamination information received by the EPA and recorded in the public register under the provisions of the Act.

The suburbs of Waterloo Corner and Bolivar (the adjacent suburb) were searched which revealed a number of records listed on the EPA Site Contamination Index which are summarised in **Table 6**.

[6] https://www.epa.sa.gov.au/public_register/site_contamination_index?suburb=waterloo+corner&council=&type= accessed on 14 June 2022

Table 6: Summary of Site Contamination Index Information

Notification No.	Type	Address	PCA	Proximity to the Site?
17355	109 Notification	Lot BOLIVAR SA 5110	Acid sulphate soil generation; Landfill sites; Wastewater storage, treatment or disposal	Directly south-west of site.
60273	109 Notification	Various allotments BOLIVAR SA 5110	Wastewater storage, treatment or disposal	Directly south-west of site.
60475 - 01	S83A Notification	Lot 45 Roberts Lane WATERLOO CORNER SA 5110	Not recorded	~0.7km north-east of site.
60475 - 02	S83A Notification	Lot 45 Roberts Lane WATERLOO CORNER SA 5110	Fill or soil importation	~0.7km north-east of site.
11058	S83 Notification	1175-1187 Port Wakefield Road WATERLOO CORNER SA 5110	Not recorded	~1.1km east of site.
60277	Audit Notification	Port Wakefield Road WATERLOO CORNER SA 5110	Fill or soil importation	~1.2km east of site.
60568	Audit Notification	Pieces 10-11 Brown Road & Lots 12, 51-52 Port Wakefield WATERLOO CORNER SA 5110	Not recorded	~1.2km east of site.
60277 - 001	Audit Report	Port Wakefield Road WATERLOO CORNER SA 5110	Fill or soil importation	~1.2km east of site.
60568	Audit Termination	Pieces 10-11 Brown Road & Lots 12, 51-52 Port Wakefield WATERLOO CORNER SA 5110	Not recorded	~1.2km north-east of site.
60331 - 01	S83A Notification	Lots 51-52 Port Wakefield Road WATERLOO CORNER SA 5110	Agricultural activities	~1.2km east of site.
60331 - 02	S83A Notification	Lots 51-52 Port Wakefield Road WATERLOO CORNER SA 5110	Fill or soil importation	~1.2km east of site.
60566 - 02	S83A Notification	Lots 76 & 77 Port Wakefield Road WATERLOO CORNER SA 5110	Fill or soil importation	~1.2km east of site.
61112 - 01	S83A Notification	Lot 76 and 77 Port Wakefield Road WATERLOO CORNER SA 5110	Agricultural activities	~1.2km east of site.
62311	109 Notification	2-26 Mumford Road WATERLOO CORNER SA 5110	Asbestos disposal	~1.2km north-east of site.
62311	109 Notification	2-26 Mumford Road WATERLOO CORNER SA 5110	Asbestos disposal	~1.3km north of site
61522 - 01	S83A Notification	Allotments 2, 308 & 309 Coleman Road WATERLOO CORNER SA 5110	Landfill sites	~1.3km north of site.
61522 - 02	S83A Notification	Allotments 2, 308 & 309 Coleman Road WATERLOO CORNER SA 5110	Landfill sites	~1.5km north-west of site.

Notification No.	Type	Address	PCA	Proximity to the Site?
15435	109 Notification	Coleman Road WATERLOO CORNER SA 5110	Not recorded	~1.5km north-west of site.
11448	S83 Notification	SA Museum Maceration Complex BOLIVAR SA 5110	Not recorded	~1.5km north-west of site.
60848 - 01	S83A Notification	965-977 Port Wakefield Road BOLIVAR SA 5110	Listed Substances (storage)	~1.7km south of site.
62273 - 01	S83A Notification	21 Hodgson Road BOLIVAR SA 5110	Works depots	~1.7km south-east of site.
62369 - 01	S83A Notification	21 Hodgson Road BOLIVAR SA 5110	Fill or soil importation	~2.7km south of site.
60566 - 01	S83A Notification	Lot 76-77 Port Wakefield Road WATERLOO CORNER SA 5110	Not recorded	~2.7km south of site.
61338 - 01	S83A Notification	Lots 3, 94, 95, 202 & 303 Port Wakefield Road WATERLOO CORNER SA 5110	Fill or soil importation	Ranging between 3.8 & 5.1km east of site.
12066	SAHC	Now Globe Derby Park Lot 8 Whites Road BOLIVAR SA 5110	Not recorded	~5.0 km south-east of site.
61746	Audit Notification	WATERLOO CORNER SA 5110	Not recorded	No street address provided
61746 - 001	Audit Report	WATERLOO CORNER SA 5110	Not recorded	Unknown (no listed street address
61746	Audit Termination	WATERLOO CORNER SA 5110	Not recorded	Unknown (no listed street address)

It is noted there are several records relating to groundwater contamination reported for sites located in the close vicinity of the site, including to the north-east and east of the site in the inferred up-gradient groundwater flow direction of the site, which may be migrating under the subject site.

Additionally, the Bolivar WWTP is located directly south-west of the site in the inferred down-hydraulic gradient direction of the site, however given its close proximity and possible local variations in groundwater flow direction, groundwater underlying the WWTP site may be migrating under the subject site.

3.4 Review of SafeWork SA Dangerous Goods Records

SafeWork SA (under the Department for Premier and Cabinet) was contacted regarding its knowledge of current and historical dangerous goods storage at the site.

The search returned no records of dangerous substances as regulated by SafeWork SA at the site. The Freedom of Information search is included as **Appendix F**.

3.5 Review of State and National Heritage Records

A search of the South Australian Heritage Places Database [7] indicates that the site doesn't hold Federal, State or Local Government heritage status. There no heritage listed sites within the Waterloo Corner area.

[7] https://maps.sa.gov.au/heritagesearch/SearchResultPage.aspx?p_searchtype=LOCATION&p_suburb=ALL&p_lga=Salisbury&p_class=ALL accessed on 14 June 2022

3.6 Review of Data Integrity

The information obtained from the previous sections of this report are considered to be in general agreement. It is therefore concluded that the information provided in this historical assessment has an acceptable level of accuracy for the purposes of the PSI.

4. Environmental Setting

4.1 Regional Topography

A review of published regional topographic data accessed via Google Earth indicates that the site lies at an elevation of approximately 6 m Australian Height Datum (AHD). Regionally, the area around the slight slopes down to the west, towards the Gulf of St Vincent. The change is approximately 1-2 metres in elevation per kilometre.

4.2 Regional Hydrology

A review of aerial imagery has identified no major natural surface water bodies within 2 km of the site. Noting, the St. Kilda mangroves and surrounds are located approximately 2.5 km west of the site, which lead out to the ocean further west.

4.3 Geology

The site geology (from the South Australian Resource Information Gateway, SARIG[8]) indicates that the site overlays quaternary alluvial and fluvial sediments. These sediments contain undifferentiated sediments and quaternary rocks.

4.4 Hydrogeology

The expected groundwater flow direction is likely towards the nearby waterbodies (Barker Inlet to the west and St Kilda mangroves to the north-west) in a northerly to north westerly direction, however it is possible there are local variations.

A search of the Department for Environment and Water's (DEW) groundwater database (WaterConnect[9]) has identified 317 groundwater wells in the vicinity of the site (within a 2 km radius) with similar depths to groundwater.

The following types of bores were removed from the search due to providing no environmental value or human use;

- Bores with a listed drillhole class other than 'water well';
- Bores with a listed status of abandoned, backfilled, not located or dry, and;
- Bores installed to depths greater than 50 metres (deeper than the quaternary aquifer).

After the above exclusions, 82 wells remain, these include;

- 21 groundwater well do not have a listed purpose;
- 47 groundwater wells are listed for investigation / environmental / monitoring / observation purposes;
- Four groundwater wells are listed for domestic irrigation purposes;
- Nine groundwater wells are listed for irrigation / stock purposes; and
- One groundwater well is listed for industrial purposes.

The range for salinity from the WaterConnect data is 907 µS/cm (micro-Siemens per centimetre) to 152,941 µS/cm with the associated total dissolved solids (TDS) ranging between 499 milligrams per litre (mg/L) to 130,000 mg/L. The range of depths to groundwater is from 0.57 m to 24.38 m below ground level.

[8] South Australian Resource Information Gateway: https://map.sarig.sa.gov.au, accessed 9 June 2022

[9] Department of Environment and Water, WaterConnect Database: Groundwater Data Default (waterconnect.sa.gov.au), accessed 9 June 2022

In addition to the above, one groundwater well is also listed on site (unit no. 6628-3879) within the tertiary (T1) aquifer. The well has a maximum depth of 91.44m with a standing water level of 30.48m and a TDS of 715mg/L (last recorded in 1964). The purpose of the well is listed as domestic and the status is listed as unknown. The well was not observed during the site inspection and therefore it is not known if the well still exists. It is noted there is dense vegetation across portions of the site which may have been covering the well.

A number of wells were also located in the direct vicinity of the site, however these are either backfilled and/or targeting deeper aquifers and therefore are not considered significant to this investigation and not discussed further.

A summary of the relevant surrounding groundwater data is included in **Appendix G**.

4.5 Acid Sulphate Soils

A search of the Australian Soil Resource Information System (ASRIS)[10] was undertaken on 9 June 2022. The site lies within an area of 'extremely low probability' of acid sulphate soils, noting there is very low confidence in this assessment.

[10] http://www.asris.csiro.au/mapping/viewer.htm (accessed online 9 June 2022)

5. Potentially Contaminating Activities

The review of the site history has identified several potentially contaminating activities (PCAs). The details of each of the PCAs, contaminant persistence / mobility and commentary about the identified PCA are presented in **Table 7.**

Table 7: Details of Potentially Contaminating Activities

PCA and likely location	Contaminants, Persistence and mobility in soils	Comments regarding the PCAs	Potentially Affected Media (on-site)
On-site			
Historical use of fill from various unknown sources brought onto the site.	Heavy metals - Mobility = low, persistence = high OCP – Mobility = low to moderate, persistence = high PAHs - Mobility = low, persistence = high TRH - Mobility = moderate, persistence = moderate BTEX – Mobility = moderate, persistence = high	Imported fill material may have been used historically across the site (including unsealed tracks/driveways). A recent aerial image (2019) indicates there may be some small mounds of fill material located in the north-western portion of the site. This area was inspected on 29 June 2022 which did not identify any mounds with the ground surface appearing relatively flat. However, it is noted the area was covered with vegetation and ground surface features in the area were difficult to determine. A limited soil investigation was conducted across accessible areas of the site (refer **Sections 6** and **7**) which did not identify any fill material within any of the soil sample locations.	Soil, groundwater
Asbestos containing materials	Asbestos – Mobility = low to high depending on whether friable or not, persistence = high	During JBS&G's site inspection, fragments of cement sheet were observed across the ground surface in the western portion of the site (adjacent the western fence line). It is likely the fragments have been illegally dumped at the site, given there have been no sheds / structures at the site. A sample of the cement sheet (ACM01) was collected from this area and tested as part of the soil investigation, which confirmed the sample contained chrysotile asbestos (refer **Section 6**).	Soil & air
Use of pesticides, herbicides and fertilisers during use of the site for agricultural purposes	Heavy metals – Mobility = low, persistence = high OCP – Mobility = low to moderate, persistence = high OPP – Mobility = low to moderate, persistence = low Herbicides – Mobility = low to moderate, persistence = low TRH – Mobility = moderate, persistence = moderate	The site was historically owned by a farmer and various individuals who may have used the site for farming purposes (from the late 1860s to the 1960s. According to aerial photographs, the site was historically used for broadacre farming. No specific mixing areas were identified at the site during the inspection.	Soil & groundwater

PCA and likely location	Contaminants, Persistence and mobility in soils	Comments regarding the PCAs	Potentially Affected Media (on-site)
		Historically, fuel related compounds and heavy metals were known to be used to control weed or plant growth. Any impacts would likely be limited to near surface soils.	
Illegal dumping	Heavy metals - Mobility = low, persistence = high OCP – Mobility = low to moderate, persistence = high PAHs - Mobility = low, persistence = high TRH - Mobility = moderate, persistence = moderate BTEX – Mobility = moderate, persistence = high Asbestos – Mobility = low to high depending on whether friable or not, persistence = high	Illegal dumping of household inert waste was observed adjacent the eastern site boundary (along Robinson Road). The waste including clothing, blankets and plastic.	Soil, groundwater
Off-site			
Bolivar WWTP	Pathogenic Bacteria - Mobility = moderate, persistence = low Nutrients - Mobility = moderate, persistence = moderate Heavy metals - Mobility = low, persistence = high	The site is located adjacent to the Bolivar WWTP. It is understood that during high winds, wastewater from the adjacent Bolivar settling ponds can aerosolise and be deposited at the subject site. Potentially impacted groundwater underlying the WWTP site may be migrating under the subject site, although it is noted the treatment plant is located in the inferred down-hydraulic gradient direction of the site.	Soil & groundwater & air
Various agricultural land / farmland in the vicinity of the site.	Heavy metals – Mobility = low, persistence = high OCP – Mobility = low to moderate, persistence = high OPP – Mobility = low to moderate, persistence = low Herbicides – Mobility = low to moderate, persistence = low Nutrients - Mobility = moderate, persistence = moderate	The site was historically (and still) surrounded by agricultural properties which may have areas of intensive application of pesticides, herbicides and fertilisers.	Groundwater

6. Limited Soil Investigation

Prior to drilling, all soil sampling locations were cleared of underground services by a suitably qualified and experienced contractor prior to the commencement of drilling. Dial Before You Dig (DBYD) plans were reviewed as part of the service clearance process.

Due to the wet conditions at the site, SA Water advised that vehicles could not be driven across the site (including a vehicle mounted auger/corer), which limited the depth of drilling using hand equipment.

JBS&G was advised that an indigenous heritage exclusion zone is located in the north-eastern portion of the site. Given the area must not be disturbed without cultural heritage monitors being present, no soil investigation works were conducted within this area.

Additionally, significant surface water was present on the southern portion of the site due to recent rainfall events, and therefore no soil sample locations could be placed in this area. It is noted the area is proposed to be a site drainage swale drain with no infrastructure proposed on this portion (refer to **Appendix B** - preliminary development plan).

6.1 Soil Sampling Plan and Rationale

The soil investigation was undertaken on 29 and 30 June 2022 and comprised the drilling of 20 grid-based soil bores across accessible areas of the site to a maximum depth of 0.5 m bgl. As previously mentioned, some of these grid-based locations were moved to avoid heritage exclusion zone and inaccessible flooded areas.

Although this sampling density does not meet the requirements of the minimum sampling points recommended in the relevant Australian Standard (Table E1 in AS4482.1) for a site comprising a total area of 21 hectares, the number of locations is considered appropriate for preliminary due diligence purposes. The bores will be advanced to assess any potentially contaminating activities identified in the PSI, but also provide geographic coverage of the site to the extent practical.

6.2 Soil Sampling Methodology

All soil boreholes were drilled using hand auger equipment. All equipment that was re-used at multiple locations was decontaminated using phosphate free detergent (Decon-90) to minimise the potential for cross contamination between sampling locations.

Soil boreholes were logged by an experienced JBS&G field scientist in accordance with the Unified Soil Classification System (USCS) and soil samples were collected at the surface and at regular depth intervals through the soil profile (ensuring a sample was collected from every soil horizon encountered). The soil logs are included in **Appendix H**.

A fresh pair of disposable gloves was worn by the sampler when collecting each individual sample. Soil samples were placed into acid-rinsed and solvent-washed screw top glass jars supplied by the testing laboratory. Soil samples were stored in a chilled portable cooler immediately following sampling and delivered under similar conditions to the analytical laboratory with accompanying chain of custody documentation. Chain of custody documentation and the laboratory certificates of analysis are included in **Appendix I**.

A figure showing the soil sampling locations is included in **Figure 3**.

6.3 Soil Analytical Program

Selected samples from each soil bore were analysed at the laboratory for a range of potential contaminants of interest identified in the site history and those relevant to form a baseline for future comparison. The analytical program included the following:

- Thirteen samples (BH02_0.0-0.1; BH03_0.0-0.1; BH04_0.0-0.1; BH07_0.0-0.1; BH08_0.0-0.1; BH09_0.0-0.1; BH11_0.0-0.1; BH12_0.0-0.1; BH15_0.0-0.15; BH16_0.0-0.1; B18_0.0-0.1; BH19_0.0-0.1; and BH20_0.0-0.1) were tested for heavy metals.
- Eight samples (BH02_0.0-0.1; BH04_0.0-0.1; BH07_0.0-0.1; BH08_0.0-0.1; BH11_0.0-0.1; BH12_0.0-0.1; BH15_0.0-0.15; and BH16_0.0-0.1) were tested for organochlorine pesticides (OCPs) and organophosphorus pesticides (OPPs).
- Seven samples (BH01_0.0-0.1; BH06_0.0-0.1; BH08_0.0-0.1; BH11_0.0-0.1; BH18_0.0-0.1; BH19_0.0-0.1; and BH20_0.0-0.1) were tested for nutrients,
- Three samples (BH10_0.0-0.1; BH18_0.0-0.1; and BH19_0.0-0.1) were tested for total coliforms.
- Two samples (BH14_0.0-0.15 and BH19_0.1-0.2) were tested for SA waste screen (including heavy metals, OCPs, TRHs, BTEX, polychlorinated biphenyls (PCBs), PAHs, phenols, hexavalent chromium, trivalent chromium, cyanide and tetrachloroethene.
- Six samples (BH01_0.0-0.1; BH05_0.0-0.1; BH06_0.0-0.1; BH10_0.0-0.1; BH13_0.0-0.1; and BH17_0.0-0.1) were tested for metals, for total recoverable hydrocarbons (TRH), benzene, toluene, ethyl benzene, xylenes, and naphthalene (BTEXN) compounds, polycyclic aromatic hydrocarbons (PAHs) and OCPs.
- Four samples (BH03_0.0-0.1; BH09_0.0-0.1; BH18_0.0-0.1; and BH20_0.0-0.1) were tested for PAHs.
- Five samples (BH04_0.0-0.1; BH07_0.0-0.1; BH09_0.0-0.1; BH16_0.0-0.1; and B18_0.0-0.1) were tested for per- and polyfluoroalkyl substances (PFAS).
- One sample (BH05_0.0-0.1) were tested for a NEPM screen for EIL soil classification (including iron, cation exchange capacity, pH, total organic carbon and clay content).

In addition to the above, one cement sheet sample (ACM01) was collected from the western portion of the site which was tested for asbestos.

The laboratories used for the soil testing were Eurofins and Envirolab Services (Envirolab). The laboratories are approved by the National Association of Testing Authorities (NATA), and the analyses conducted are within the NATA registration of the laboratories. Duplicate soil samples were submitted to the primary laboratory (Eurofins) and the secondary laboratory (Envirolab) for quality assurance / quality control (QA / QC) purposes. Results of the QA/QC analyses are discussed in detail in **Section 9.1**.

A summary table of the soil analyses is presented at the end of this report and the results are discussed in **Section 8.2**.

6.4 Soil Criteria

It is understood the site is proposed to be redeveloped into an industrial graphite refinery. As such, the following investigation exposure settings are considered to be the most relevant and have been adopted for the purpose of this investigation (refer **Table 8**):

Table 8: Soil Screening Criteria

Receptor	Criteria	Reference / Source
Commercial	PFAS Health Industrial/Commercial ESLs: Commercial, Fine EILs: Commercial HILs: Commercial HSLs for Vapour Intrusion: Commercial, Clay (0-1m) Management Limits: Commercial, Fine	ASC NEPM

Receptor	Criteria	Reference / Source
Ecological	PFAS Interim Soil - Ecological Direct Exposure PFAS Interim Soil - Ecological Indirect Exposure	

The ecological and health screening levels were selected based on material type. As the predominant near surface soil types encountered were silty sands and clays (as discussed further in **Section 8.1**), investigation exposure settings for sand and fine soils were adopted (where applicable).

Site specific EILs were determined for some chemicals as outlined in the NEPM, based on the proposed residential land use. Site specific EILs were derived using the NEPM toolbox calculator and were based on the following:

- The application of any chemicals and / or importation of material was likely to have been more than two years ago.
- A measured pH of 7.7.
- A measured cation exchange capacity (CEC) of 22 meq/100g.
- A measured clay content of 7.4%.
- A measured electrical conductivity of 240 µS/cm.
- A measured iron content of 0.76%.
- A measured total organic carbon content of 0.6%.
- Ambient background concentrations of 0 mg/kg as a conservative assumption in the first instance.

An exceedance of soil screening criteria does not necessarily indicate that there is a risk to that receptor, but rather that additional work should be carried out to better characterise the contamination and assess the risks associated with the contamination.

A discussion of the results in the context of the screening criteria is included in **Section 8.2**.

6.5 Field Observations

Soil bore locations encountered predominately a fine layer of natural / reworked natural material comprising silty sand overlying natural orange-brown silty clays to 0.5m below ground level (bgl). No odorous or stained soils were noted during the drilling and sampling process. Due to recent rainfall and site topography, soils were moist to wet during drilling.

As previously stated, (refer **Section 2.4**), potential asbestos containing materials were noted on the ground surface, but were not noted at depth within the soil bores.

The soil logs are included in **Appendix H**.

6.6 Laboratory Testing Results

All soil samples were transported to laboratories that were NATA accredited. The results of the soil analyses are summarised in tables at the end of this report and the laboratory certificates are included in **Appendix I**.

All laboratory results reported below the adopted ecological and health-based investigation / screening levels.

The ACM01 cement sheet sample reported the presence of chrysotile asbestos fibres.

Total coliforms were reported in all soil samples tested, ranging from 300 most probable number / gram (MPN/g) at BH19_0.0-0.1 to 17,000 MPN/g at BH10_0.0-0.1. Whilst it is noted that BH10 is located closest to the Bolivar sludge ponds and reported the highest total coliforms result, coliforms are expected to be present in natural, healthy soils and the site is also used for sheep grazing.

Based on the limited assessment works completed at the site, the field observations and the soil results documented herein, site contamination of soils has not been identified in the context of proposed industrial land use (graphite refinery). However, wastewater from the adjacent Bolivar settling ponds, known to aerosolise and reach across the subject site, should be considered in terms of future construction workers and future site users.

7. Groundwater Investigation

The groundwater investigation comprised the installation, sampling and testing of three groundwater wells across the site in November 2022. It is noted that groundwater investigations were conducted a number of months after soil investigation works, due to delays caused by wet weather and the requirement for cultural heritage monitors during groundwater drilling works.

Details of the groundwater investigation are provided in the following sections.

7.1 Groundwater Well Installation

Prior to groundwater installation works, a permit was obtained from the Department for Environment and Water (DEW) for the drilling of the groundwater well location. The installation was undertaken in accordance with the Minimum Construction Requirements for Water Bores in Australia[11] document.

Three groundwater wells were installed on 10 and 11 November 2022 under the supervision of an experienced JBS&G environmental field scientist as follows:

- GW01 was installed to a depth of 4 m bgl in the northern portion of the site in the expected up-hydraulic gradient direction of the site.
- GW02 was installed to a depth of 4 m bgl in the western portion of the site in the expected down-hydraulic gradient direction of the site and the proposed graphite activities.
- GW03 was installed to a depth of 3.8m bgl in the southern portion of the site for site coverage.

Groundwater was encountered during drilling at approximately 1 m bgl. The depth to groundwater is noted to be shallow due to the close proximity to the Gulf of St Vincent. The groundwater monitoring well was drilled using hollow flight auger techniques.

The soils were logged in accordance with the Unified Soil Classification System (USCS) by an experienced Environmental Scientist. The materials encountered were logged and photographed. A new pair of disposable nitrile gloves was worn at each location. The groundwater logs are included in **Appendix J.**

The groundwater wells were constructed using 50 mm, class 18 un-plasticised polyvinyl chloride (uPVC) and were installed with a 3 m screened section at the base. Graded filter sand was installed around the screened interval (to 0.2 m above the top of screen) to allow groundwater movement but minimise sand/silt ingress to the well.

Hydrated bentonite chips and grout were used to seal the well annulus to surface, and a steel gatic cover was installed at the ground surface (flush with ground level) to finish the well.

The groundwater wells were developed following installation to ensure adequate hydraulic connection with the aquifer using a stainless-steel bailer.

The groundwater well location is shown on **Figure 4**.

7.2 Groundwater Sampling

Groundwater sampling of the three wells at the site was undertaken on 18 November 2022 using low flow sampling techniques. All equipment was decontaminated using PFAS free detergent (Liquinox©) prior to the commencement of sampling and between each location to minimise the potential for cross contamination. Equipment rinsate samples were collected daily to demonstrate that decontamination procedures were adequate.

[11] National Uniform Drillers Licensing Committee 2020, Minimum Construction Requirements for Water Bores in Australia, Fourth Edition, dated 2020

All groundwater wells were gauged prior to sampling using an interface probe (IP) to measure the depth to water, the depth to non-aqueous phase liquid (NAPL), if present, and the total depth of the groundwater well.

JBS&G utilised a low-flow peristaltic pump with dedicated tubing to purge and sample the wells. The pump which was then lowered into the groundwater well so that the tubing inlet point was located approximately 0.5m above the base of the well (within the screened interval).

The pump was then used to purge the groundwater well at a rate to establish a stabilised pump rate with minimal drawdown (<100 mm).

After the establishment of the stable flow rate, water quality parameters (dissolved oxygen (DO), redox potential, electrical conductivity (EC), temperature and pH) were measured during groundwater purging using a calibrated water quality meter (WQM) until parameters had stabilised. Olfactory evidence of contamination (if present) was noted on the field sheets for each location (i.e. turbidity, colour, odour etc). Field sheets for sampling are included in **Appendix K**.

Following stabilisation of the parameters, groundwater water samples were collected into laboratory supplied, preserved containers for the chemicals of interest using the same flow rate established for the purging. Replicate samples were also collected at a rate consistent with the ASC NEPM.

Groundwater samples were transported to the NATA accredited laboratory in a chilled cooler under JBS&G chain of custody (COC) documentation.

7.3 Analytical Program

All groundwater samples were analysed for a range of potential contaminants including TDS, TRH, BTEXN, PAH, heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury and zinc), VOC, PFAS and nutrients.

7.4 Assessment Criteria

The groundwater environmental values have been established on the basis of the process outlined in the GAR which considers the salinity of the groundwater, surrounding surface water bodies and the surrounding uses of groundwater in the vicinity of the site. A summary of the relevant environmental values for the site are summarised in **Table 9** below:

Table 7: Relevant Groundwater Environmental Values

Environmental Value	Relevant Criteria	Rationale
Drinking Water & Primary Industries (irrigation & general)	No	It is noted that the groundwater wells reported TDS ranging between 16,000 mg/L (GW02) and 22,000mg/L (GW03). Based on these reported TDS values and the Environment Protection (Water Quality) Policy 2015 (WQEPP) salinity ranges (extract from Schedule 1, Table 3), the salinity of groundwater wells indicates that groundwater is not suitable for drinking and irrigation. A search of groundwater wells within a two-kilometre radius was conducted using the WaterConnect Database. The results of the search indicated the following: • 54 groundwater wells (classed as Water Wells in the data base) with depths ranging from 0m to 15m (considered to be the primary aquifer) were identified. • There are no domestic and irrigation wells present within a 2 km radius of the site. • Several wells had no listed purpose, however none of these are located on residential or farming properties, with the exception of one well located on an agricultural property to the north-east of the site. The well is located in the inferred upgradient hydraulic direction of the site and has a total depth of 0.3m which is unlikely to be a completed well given the shallow depth. Therefore, drinking water and irrigation are not considered appropriated environmental values to be protected.
Primary Industries (livestock)	Yes	Salinity of groundwater wells within a 2 km radius of the site identifies that groundwater is not suitable for livestock, however there are two wells within a 2 km radius of the site with a listed purpose of 'stock'.
Freshwater	No	There are no freshwater bodies within a 2 km radius of the site noting the closest freshwater body is the Little Para River located approximately 4 km south of the site. Therefore, freshwater ecosystems are not considered an appropriate environmental value to be protected.
Marine Water	No	There are no marine water bodies within a 2 km radius of the site. The St. Kilda mangroves and Gulf of St Vincent are located approximately 2.5 km and 2.8 km west of the site, respectively. Therefore, marine water ecosystems are not considered to be impacted.
Recreational	No	The salinity levels do not discount the fact that water may be used for recreational purposes by nearby users. Although it is unlikely that there are any recreational users of groundwater (for filling of swimming pool or water features), it is theoretically possible that groundwater could be extracted for these purposes.

7.5 Groundwater Conditions

No contamination indicators, such as fuel related odours or sheens were noted during sampling.

Field parameters were measured using a calibrated water quality meter prior to the collection of the sample to ensure that sufficient water had been purged to provide a representative sample from the aquifer.

As shown in **Table 10**, the stabilised measured parameters indicate the groundwater is brackish, has a neutral pH level and a positive oxidation-reduction potential (ORP) which correlates with the dissolved oxygen (DO) concentrations. The TDS measurements indicate highly saline groundwater consistent with the close proximity to the coast (approximately 2.8 km west of the site).

Table 8: Stabilised Groundwater Parameters

Well I.D.	Standing Water Level (mbgl)	pH	Temp (°C)	Total Dissolved Solids (mg/L)*	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)
GW01	0.565	7.00	17.1	18,009	99.8	0.15
GW02	0.731	7.09	17.2	18,287	75.4	0.60
GW03	0.15	7.12	18.5	23,311	40.9	0.13

NOTE: *Conversion factor of 0.67 used to convert field conductivity (µS/cm) to TDS (mg/L)

7.6 Groundwater Analytical Results

The groundwater samples and QA samples were transported to laboratories that were NATA accredited. The summary data tables for groundwater are attached to the end of this report and the laboratory certificates of analysis are included in **Appendix L**.

All groundwater results reported below the adopted criteria. JBS&G notes that some individual TRH concentrations reported marginally above the laboratory limits of reporting (LOR), however, this is not considered significant in terms of this investigation given the results reported below all adopted criteria.

8. Quality Assurance / Quality Control

8.1 Soil QA/QC

A summary of the soil quality assurance / quality control (QA/QC) measures are summarised in **Table 11.**

Table 11: Summary of Soil QAQC Measures

QA/QC Item	Detail
QA	
Field procedures	Field procedures were undertaken in accordance with the methodologies and guidelines referenced in **Section 7.2** as well as JBS&G's standard operating procedures.
NATA accredited laboratories	The primary laboratory used was Eurofins and the secondary laboratory used was ALS. Both laboratories are NATA accredited for the analyses undertaken.
Sample tracking	Chain of Custody (COC) documentation was used for the transport of all samples to the laboratory. COC documents are included in **Appendix I.**
Sample preservation & storage	Samples were collected in laboratory supplied, clean glass jars and samples were stored on ice in eskies during the field works and in transit to the laboratory.
Holding times	All samples were extracted and analysed within the recommended holding times.
Data transcription	Results are supplied by the laboratory as CSV files, which minimises the chance of transcription errors as the data is directly exported into files using ESdat.
Laboratory LORs	The LORs are presented in the results tables and NATA certificates in **Appendix I**. The LORs are appropriate for this assessment with all LORs being less than the adopted assessment.
QC – SOIL	
Intra and Inter laboratory duplicates	Intra-laboratory duplicate samples (DUP01; DUP02) and inter-laboratory duplicate samples (SPLIT01; SPLIT02) were collected from its parent samples (BH19_0.1-0.2 and BH15_0.0-0.15, respectively) and tested at the primary (Eurofins) and secondary (Envirolab) laboratories. Relative percentage difference (RPD) calculations were undertaken where concentrations were greater than the estimated quantitation limit (EQL). RPDs from the inter and intra laboratory duplicate soil analyses fell predominately within acceptable levels (<30%). Some elevated RPDs were reported for individual heavy metals (including arsenic, lead, nickel and zinc) and benzo(a)pyrene in both the inter and intra laboratory analyses (ranging between 41% to 89%). It is noted that the samples were collected from surface/shallow soils which may reworked natural, therefore the aforementioned RPDs are considered to be associated with the heterogeneity of soils at the sampling location rather than a product of field-based or laboratory QA/QC issues. The frequency of field duplicate analyses for heavy metals and OCP is acceptable when compared to the 1 per 20 analyses recommended in AS4482.1. Duplicates were tested for the main chemicals of concern (heavy metals, OCPs and OPPs).
Blank samples	One rinsate blank (RB01) and one trip blank sample (TB01) were collected and analysed for metals and BTEXN, respectively. All concentrations were reported as below LOR.
Laboratory QC	The results obtained from the laboratory internal QC samples (including blanks and internal duplicates) were predominately within acceptable limits of repeatability with RPD values reported for all duplicate pairs within the acceptable range and were noted as "Pass" by the laboratory. Chrysene (131%) TOC (32%) and Cobalt (36%) returned elevated RPDs, though this is not considered to impact the interpretation of results. All blank samples reported concentrations below the LORs.
QC – GROUNDWATER	
Laboratory duplicates	Field Duplicate samples were collected and submitted for analyses at the primary and secondary laboratories as follows: • **GW02** – DUP01 (Eurofins) & SPLIT01 (Envirolab) The majority of results reported less than the LOR and therefore the RPDs for the duplicate samples were 0%. Some individual metals and TRH (C10-C14) reported concentrations above the LOR, but the RPDs for these were 50% and below.
Blank samples	One rinsate sample (RB01) and one trip blank sample (TB01) was collected during groundwater sampling and analysed for metals and BTEX respectively. All concentrations were reported as below the laboratory LOR.

QA/QC Item	Detail
Laboratory QC	The results obtained from the laboratory internal QC samples (including blanks and internal duplicates) were within acceptable limits of repeatability, with RPD values reported for all duplicate pairs within the acceptable range and were noted as "Pass" by the laboratory. All blank samples reported concentrations below the LORs.

8.2 Data Quality Analysis

JBS&G has completed a detailed review of the QA/QC activities completed for the current stage of assessment works and considers that the data is of suitable quality for use in meeting the objectives of the assessment.

The soil dataset is considered to be representative of site conditions and of acceptable quality for use in the assessment of risk present at the site.

9. Conceptual Site Model

JBS&G has utilised the information summarised in this report to prepare a CSM for the site. The ASC NEPM identifies the CSM as a critical part of understanding the relationships between any contamination present and any receptors at a site, thereby assisting with the determination of any risks to human health or the environment associated with the contamination. A preliminary CSM has been developed to identify potential for sources and what receptors they may interact with.

The preliminary CSM for the site is summarised in **Table 12** below:

Table 12: Conceptual Site Model

Element of CSM	Discussion
Potential sources of contamination	The following PCAs were identified in the site history investigation: • Historical use of fill from various unknown sources brought onto the site including unsealed tracks/driveways) and possible small mounds of fill material previously located in the north-western portion of the site. • Cement sheet fragments containing asbestos across the ground surface in the western portion of the site (adjacent the western fence line). It is likely the fragments have been illegally dumped at the site. • Agricultural activities (including use of pesticides, herbicides and fertilisers during use of the site for agricultural purposes.
Contaminants of potential concern (COPCs) associated with the potential sources of contamination	The following COPCs are associated with PCAs outlined above: • OCPs • OPPs • Metals • Herbicides • Fertilisers • Asbestos
Potentially affected media	Soil is the most likely media to be affected by the identified PCAs, with groundwater and soil vapour unlikely to be a factor.
Land use and building design	As per **Section 2.2**, it is understood the site is proposed to be developed into an industrial graphite refinery.
Geology	The site geology (from the South Australian Resource Information Gateway, SARIG) indicates that the site overlays quaternary alluvial and fluvial sediments. These sediments contain undifferentiated sediments and quaternary rocks. The soil investigation indicates that soils were generally made up of a fine layer of natural / reworked natural material comprising silty sand overlying natural orange-brown silty clays to the maximum depth of investigation (0.5m bgl).
Hydrogeology	Groundwater was encountered during drilling at approximately 1 m bgl. The depth to groundwater is noted to be shallow due to the close proximity to the Gulf of St Vincent. The expected groundwater flow direction is to the west / north-west which is consistent with the general groundwater flow direction across the Adelaide Plains.
Human and ecological receptors	The following human receptors were identified for the proposed commercial / industrial land use: • Construction workers; and • Site occupants It is understood the majority of the site is proposed to be sealed as part of the proposed industrial graphite refinery (refer **Appendix B**), therefore ecological receptors are not considered likely.
Potential exposure pathways	The following potential exposure pathways have been identified: • **Ingestion / Dermal contact / dermal contact** – No impacted soils and groundwater were identified (exceeding adopted assessment criteria) at the site. • **Inhalation of dust and/or asbestos** – Friable asbestos containing material may be inhaled. Asbestos cement sheet was identified at the site during JBS&G's site inspection, however no friable asbestos was identified. • **Landscaped areas (flora & fauna)** - No impacted soils (exceeding adopted ecological assessment criteria) were identified at the site.
Data gaps	It is noted that this assessment was an environmental due diligence and not a detailed investigation of the site. Additionally, a limited soil investigation has been conducted with no testing conducted within a indigenous heritage exclusion zone located in the

Element of CSM	Discussion
	north-eastern portion of the site. The CSM should be updated following any additional assessment works at the site.

10. Conclusions

JBS&G Australia Pty Ltd (JBS&G) was engaged by Renascor Resources (the client) to undertake a Baseline Environmental Investigation comprising a site history and a limited soil and groundwater investigation for the site located on portions of Allotments 3 & 4 Robinson Road, Waterloo Corner.

The site is currently vacant and is located adjacent the Bolivar Wastewater Treatment Plant. It is understood that the client is looking to develop the site into an industrial graphite refinery and that due diligence works are required prior to entering into a long-term lease agreement with SA Water. The report forms a baseline for future comparison noting the limitations on this current investigation. In particular, groundwater was not assessed due to site access restrictions.

Site History

The available historical information indicates that the site has been used for agricultural purposes since at least the 1860s to present day, consisting mainly of broadacre cropping and grazing. More recently, broadacre grazing activities are minimal with only a small flock of sheep kept at the site.

The main potential sources of contamination associated with past and present site uses include:

- Historical use of fill from various unknown sources brought onto the site including unsealed tracks/driveways) and possible small mounds of fill material previously located in the north-western portion of the site.
- Cement sheet fragments containing asbestos across the ground surface in the western portion of the site (adjacent the western fence line). It is likely the fragments have been illegally dumped at the site, given there have been no sheds / structures at the site.
- Use of pesticides, herbicides and fertilisers during use of the site for agricultural purposes

The site is located adjacent to the Bolivar WWTP and during high winds, the wastewater from the adjacent Bolivar settling ponds is understood to aerosolise and reach across the subject site. Additionally, any potentially impacted groundwater underlying the WWTP site may be migrating under the subject site, although it is noted the treatment plant is located in the inferred down-hydraulic gradient direction of the site.

Soil investigation

A limited soil investigation was undertaken at the site comprising the drilling of 20 grid-based soil bores to a maximum depth of 0.5 m below ground level (bgl). It is noted that some areas of the site could not be accessed due to an indigenous exclusion zone and inaccessible flooded areas, and therefore some of the locations were moved to avoid these areas.

Soil bore locations encountered predominately a fine layer of natural / reworked natural material comprising silty sand overlying natural orange-brown silty clays to 0.5m below ground level (bgl). No odorous or stained soils were noted during the drilling and sampling process and no potential asbestos containing materials were noted at depth within any of the soil bores.

Selected samples from each soil bore were analysed at the laboratory for a range of potential contaminants of interest identified in the site history and those relevant to form a baseline for future comparison. All laboratory results reported below the adopted ecological and health-based investigation / screening levels.

Groundwater Investigation

The groundwater investigation comprised the installation and sampling of three monitoring wells across the site (GW01, GW02 and GW03) targeting the proposed graphite activities as well as coverage of the site. Groundwater was encountered at a shallow depth of approximately 1m bgl likely due to the close proximity to the Gulf of St Vincent.

The most appropriate environmental values of groundwater to be protected were determined to be livestock water and recreation primary contact / aesthetics (in the context of swimming pool filling or filling of water features). No elevated results above the adopted groundwater quality criteria were reported for any of the analytes tested.

Recommendations

Based on the assessment works completed at the site, the field observations and the soil and groundwater results documented herein, site contamination of soils has not been identified in the context of proposed industrial land use (graphite refinery).

Asbestos cement sheet fragments in the western portion of the site should be removed prior to any development works and wastewater from the adjacent Bolivar settling ponds, known to aerosolise and reach the subject site, should be considered in terms of any future construction workers and future site users.

11. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

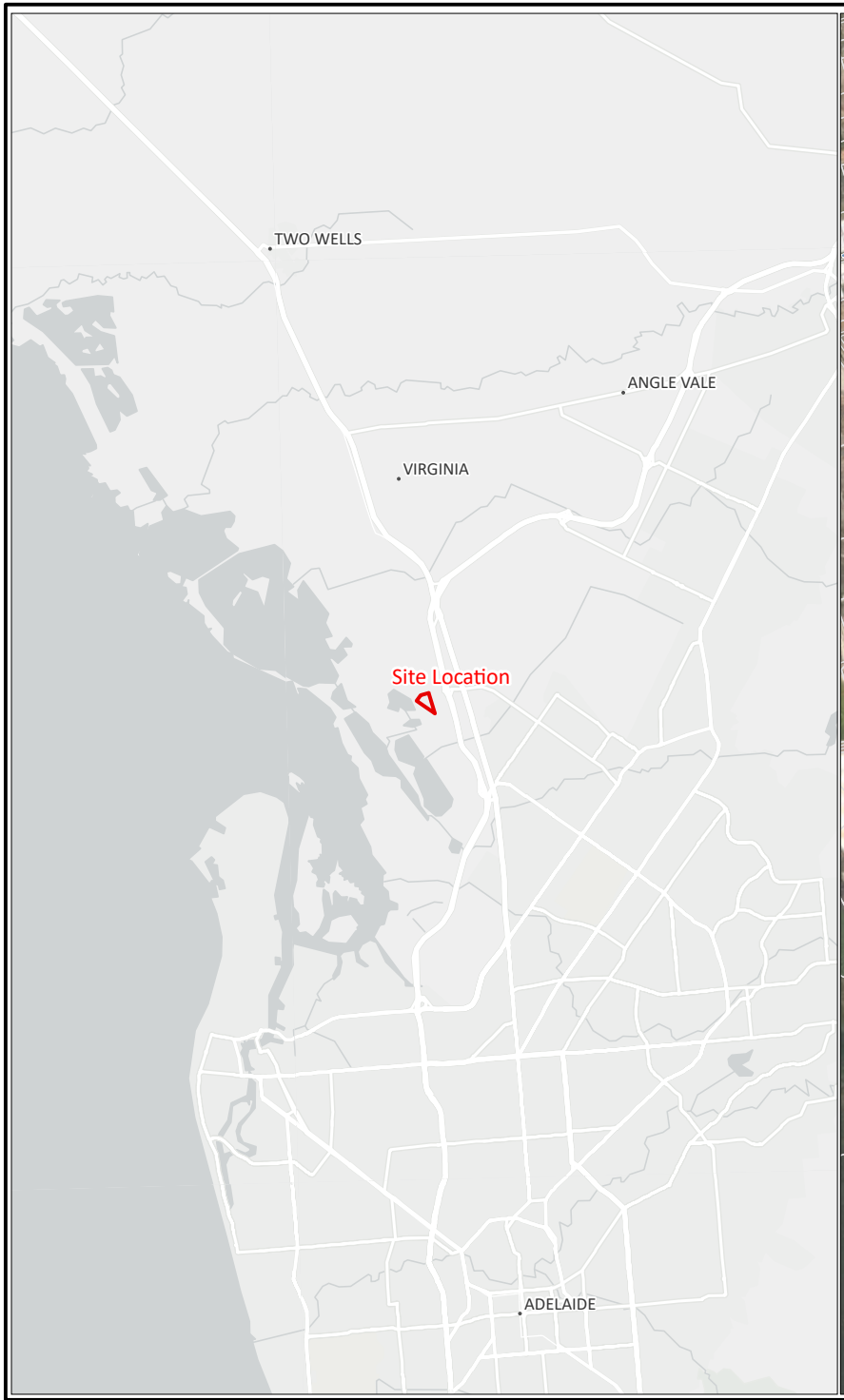
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

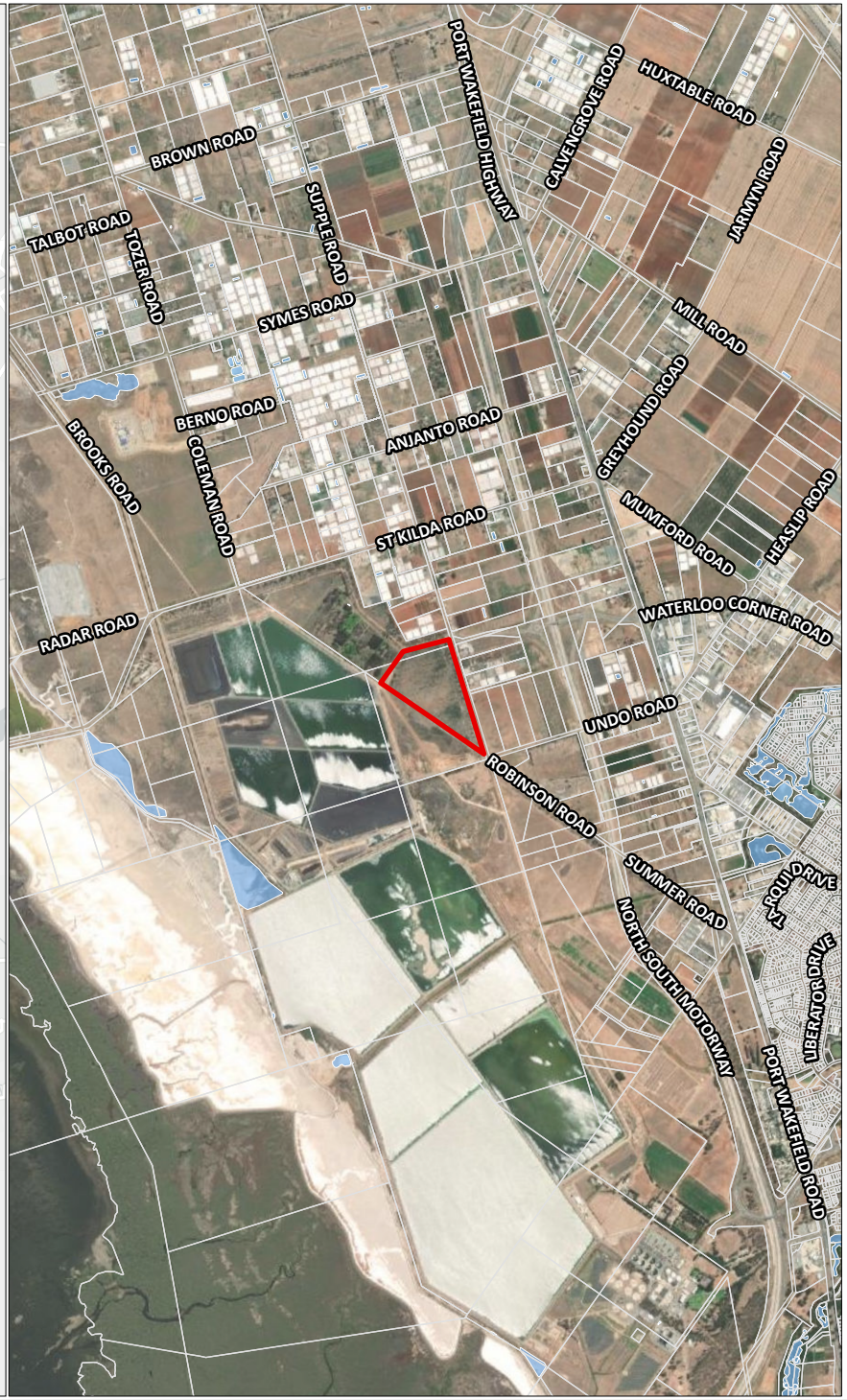
Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures





Legend

- Cadastre
- Site Boundary
- Waterbody

JBS&G

Job No: 63155	
Client: Renascor	
Version: FINAL	Date: 27-Jul-2022
Author: twilliamson	Checked By: MS
Scale 1:45,000	

0 500 1,000
metres

Coord. Sys. GDA2020 MGA Zone 54

Robinson Road, Waterloo Corner, South Australia

SITE LOCATION

FIGURE 1

File Name: C:\Users\twilliamson\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Renascor\GIS\63155 PSI and Soil Investigation, Waterloo Corner\02_MapProjects\63155_Renascor_WaterlooCorner_PSI_v11.aprx/61355_001_SiteLocation
Reference: ESRI Topographic Basemap - Accessed Imagery: 27/07/2022

Legend

- Cadastre
- Site Boundary

Site Areas

- Flood Area
- Heritage Area
- Asbestos Containing Material

JBS&G

Job No: 63155	
Client: Renascor	
Version: FINAL	Date: 27-Jul-2022
Author: twilliamson	Checked By: MS
Scale 1:4,000	

0 50 100
metres

Coord. Sys. GDA2020 MGA Zone 54

Robinson Road, Waterloo Corner, South Australia

SITE LAYOUT

FIGURE 2

File Name: C:\Users\twilliamson\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Renascor\GIS\63155 PSI and Soil Investigation, Waterloo Corner\02_MapProjects\63155_Renascor_WaterlooCorner_PSI_v11.aprx/61355_002_SiteLayout
Reference: Nearmap (22/05/2022)

Legend

- Soil Borehole (21)
- Cadastre
- Site Boundary

Site Areas

- Flood Area
- Heritage Area
- Asbestos Containing Material

JBS&G

Job No: 63155	
Client: Renascor	
Version: FINAL	Date: 27-Jul-2022
Author: twilliamson	Checked By: MS
Scale 1:4,000	

0 50 100
metres

Coord. Sys. GDA2020 MGA Zone 54

Robinson Road, Waterloo Corner, South Australia

SITE LAYOUT

FIGURE 3

File Name: C:\Users\twilliamson\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Renascor\GIS\63155 PSI and Soil Investigation, Waterloo Corner\02_MapProjects\63155_Renascor_WaterlooCorner_PSI_v11.aprx/61355_002_SiteLayoutBoreholes
Reference: Nearmap (22/05/2022)

Legend

- Site Boundary
- Cadastre
- Groundwater Well Location

JBS&G

Job No: 63155	
Client: Renascor	
Version: FINAL	Date: 30-Nov-2022
Author: jstrauss	Checked By: MS
Scale 1:4,000	

0 50 100
metres

Coord. Sys. GDA2020 MGA Zone 54

Robinson Road, Waterloo Corner, South Australia

GROUNDWATER WELL LOCATION

FIGURE 4

File Name: C:\Users\jstrauss\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Renascor\GIS\63155 PSI and Soil Investigation, Waterloo Corner\02_MapProjects\63155_Renascor_WaterlooCorner_PSI_v11.aprx/61355_004_Groundwater Well Locations
Reference: Nearmap (22/05/2022)

Summary Results Tables (including QA/QC) - SOIL

SOIL CHEMISTRY TABLE
Project Number: 63155
Project Name: Waterloo Corner Soils July 2022

				Metals & Metalloids																			TRHs (NEPC 2013)						
				Arsenic	Barium	Beryllium	Cadmium	Chromium (hexavalent)	Chromium (III+VI)	Chromium (Trivalent)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Tin	Zinc	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR				2	10	2	0.4	1	5	5	5	5	20	5	5	0.1	5	5	2	2	10	5	20	50	100	100	100	20	50
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Direct Exposure																													
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Indirect Exposure																													
PFAS NEMP 2020 Table 2 Health Industrial/Commercial																													
NEPC (2013) ESLs: Commercial, Fine																									2500	6600		215	170
NEPC (2013) EILs: Commercial (generic conservative)				160					310	600		310		1800				490				1200							
NEPC (2013) HILs: Commercial				3000		500	900	3600	3600		4000	240000		1500	60000	730		6000	10000			400000							
NEPC (2013) HSLs for Vapour Intrusion: Commercial, Clay																													
0-1m																												310	NL
NEPC (2013) Management Limits: Commercial, Fine																							800	1000	5000	10000			
Location Code	**Field ID**	**Sample Date**	**Lab Report Number**																										
ACM01	ACM01	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	BH01_0.0-0.1	29/06/2022	903019	<2	-	-	<0.4	-	24	-	-	11	-	9.4	-	<0.1	-	<5	-	-	-	22	<20	<50	<100	<100	<100	<20	<50
BH02	BH02_0.0-0.1	29/06/2022	903019	2.5	-	-	<0.4	-	25	-	-	13	-	11	-	<0.1	<5	<5	<2	<2	<10	28	-	-	-	-	-	-	-
BH03	BH03_0.0-0.1	29/06/2022	903019	<2	-	-	<0.4	-	24	-	-	9.4	-	10	-	<0.1	<5	<5	<2	<2	<10	25	-	-	-	-	-	-	-
BH04	BH04_0.0-0.1	29/06/2022	903019	2.3	-	-	<0.4	-	36	-	-	19	-	14	-	<0.1	<5	8	<2	<2	<10	32	-	-	-	-	-	-	-
BH05	BH05_0.0-0.1	29/06/2022	903019	<2	-	-	<0.4	-	11	-	-	<5	7600	11	-	<0.1	-	<5	-	-	-	17	<20	<50	<100	<100	<100	<20	<50
BH06	BH06_0.0-0.1	29/06/2022	903019	<2	-	-	<0.4	-	22	-	-	9.7	-	11	-	<0.1	-	<5	-	-	-	30	<20	<50	<100	<100	<100	<20	<50
BH07	BH07_0.0-0.1	29/06/2022	903019	<2	-	-	<0.4	-	16	-	-	9.7	-	9.2	-	<0.1	<5	<5	<2	<2	<10	17	-	-	-	-	-	-	-
BH08	BH08_0.0-0.1	29/06/2022	903019	<2	-	-	<0.4	-	17	-	-	9	-	9.5	-	<0.1	<5	<5	<2	<2	<10	19	-	-	-	-	-	-	-
BH09	BH09_0.0-0.1	29/06/2022	903019	2.6	-	-	<0.4	-	25	-	-	12	-	11	-	<0.1	<5	7.7	<2	<2	<10	22	-	-	-	-	-	-	-
BH10	BH10_0.0-0.1	30/06/2022	903019	3.3	-	-	<0.4	-	42	-	-	22	-	14	-	<0.1	-	9.7	-	-	-	31	<20	<50	<100	<100	<100	<20	<50
BH11	BH11_0.0-0.1	30/06/2022	903019	<2	-	-	<0.4	-	11	-	-	5.7	-	11	-	<0.1	<5	<5	<2	<2	<10	18	-	-	-	-	-	-	-
BH12	BH12_0.0-0.1	30/06/2022	903019	<2	-	-	<0.4	-	20	-	-	9.2	-	13	-	<0.1	<5	5.7	<2	<2	<10	30	-	-	-	-	-	-	-
BH13	BH13_0.0-0.1	30/06/2022	903019	3.4	-	-	<0.4	-	44	-	-	20	-	19	-	<0.1	-	9.4	-	-	-	45	<20	<50	<100	<100	<100	<20	<50
BH14	BH14_0.0-0.15	30/06/2022	903019	2.3	22	<2	<0.4	<1	24	24	<5	13	13,000	16	120	<0.1	-	<5	-	<2	-	39	<20	<50	<100	<100	<100	<20	<50
BH15	BH15_0.0-0.15	30/06/2022	903019	3.2	-	-	<0.4	-	42	-	-	19	-	20	-	<0.1	<5	6.8	<2	<2	<10	39	-	-	-	-	-	-	-
BH15	DUP02	30/06/2022	903019	<2	-	-	<0.4	-	34	-	-	14	-	21	-	<0.1	<5	5.2	<2	<2	<10	59	-	-	-	-	-	-	-
BH15	Split02	30/06/2022	32327	<4	-	-	<0.4	-	41	-	-	15	-	22	-	<0.1	-	6	-	-	-	44	-	-	-	-	-	-	-
BH16	BH16_0.0-0.1	30/06/2022	903019	<2	-	-	<0.4	-	25	-	-	10	-	14	-	<0.1	<5	<5	<2	<2	<10	30	-	-	-	-	-	-	-
BH17	BH17_0.0-0.1	30/06/2022	903019	<2	-	-	<0.4	-	15	-	-	7.5	-	18	-	<0.1	-	<5	-	-	-	31	<20	<50	<100	<100	<100	<20	<50
BH18	BH18_0.0-0.1	30/06/2022	903019	2.1	-	-	<0.4	-	21	-	-	9.6	-	21	-	<0.1	<5	<5	<2	<2	<10	28	-	-	-	-	-	-	-
BH19	BH19_0.0-0.1	29/06/2022	903019	3.9	-	-	<0.4	-	30	-	-	18	-	10	-	<0.1	<5	9.4	<2	<2	<10	31	-	-	-	-	-	-	-
BH19	BH19_0.1-0.2	29/06/2022	903019	2.6	48	<2	<0.4	<1	17	17	<5	35	14,000	24	180	<0.1	-	<5	-	<2	-	85	<20	<50	<100	<100	<100	<20	<50
BH19	DUP01	29/06/2022	903019	3.2	-	-	<0.4	-	20	-	-	34	-	23	-	<0.1	-	8	-	-	-	100	<20	<50	<100	<100	<100	<20	<50
BH19	Split01	29/06/2022	32327	<4	-	-	<0.4	-	23	-	-	26	-	14	-	<0.1	-	13	-	-	-	49	<25	<50	<100	<100	<50	<25	<50
BH20	BH20_0.0-0.1	29/06/2022	903019	<2	-	-	<0.4	-	15	-	-	5.3	-	14	-	<0.1	<5	<5	<2	<2	<10	22	-	-	-	-	-	-	-

Data Comments
#1: Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
#2: Chrysotile asbestos detected.Organic fibres detected.
#3: 80 x 50 x 5

SOIL CHEMISTRY TABLE
Project Number: 63155
Project Name: Waterloo Corner Soils July 2022

				BTEXN							PAH																					
				Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ calc (Zero)	Benzo(b+j)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR				0.1	0.1	0.1	0.1	0.2	0.3	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Direct Exposure																																
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Indirect Exposure																																
PFAS NEMP 2020 Table 2 Health Industrial/Commercial																																
NEPC (2013) ESLs: Commercial, Fine				95	135	185			95						1.4																	
NEPC (2013) EILs: Commercial (generic conservative)																												370				
NEPC (2013) HILs: Commercial																40	40	40														4000
NEPC (2013) HSLs for Vapour Intrusion: Commercial, Clay																																
0-1m				4	NL	NL			NL																			NL				
NEPC (2013) Management Limits: Commercial, Fine																																
Location Code	**Field ID**	**Sample Date**	**Lab Report Number**																													
ACM01	ACM01	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	BH01_0.0-0.1	29/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH02	BH02_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03	BH03_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH04	BH04_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	BH05_0.0-0.1	29/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH06	BH06_0.0-0.1	29/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH07	BH07_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	BH08_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	BH09_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH10	BH10_0.0-0.1	30/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH11	BH11_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH12	BH12_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH13	BH13_0.0-0.1	30/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH14	BH14_0.0-0.15	30/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH15	BH15_0.0-0.15	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	DUP02	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	Split02	30/06/2022	32327	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH16	BH16_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH17	BH17_0.0-0.1	30/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH18	BH18_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH19	BH19_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	BH19_0.1-0.2	29/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH19	DUP01	29/06/2022	903019	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH19	Split01	29/06/2022	32327	<0.2	<0.5	<1	<1	<2	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	-	<0.2	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
BH20	BH20_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Data Comments
#1: Quantification of linear and branched isomers has been conducted as a single tota
#2: Chrysotile asbestos detected.Organic fibres detected.
#3: 80 x 50 x 5

SOIL CHEMISTRY TABLE
Project Number: 63155
Project Name: Waterloo Corner Soils July 2022

				Organochlorine Pesticides																								
				Pentachlorophenol	4,4-DDE	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	Chlordane	Chlordane (cis)	Chlordane (trans)	DDT	DDD	DDT+DDE+DDD	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Methoxychlor	Toxaphene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR				1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Direct Exposure																												
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Indirect Exposure																												
PFAS NEMP 2020 Table 2 Health Industrial/Commercial																												
NEPC (2013) ESLs: Commercial, Fine																												
NEPC (2013) EILs: Commercial (generic conservative)																640												
NEPC (2013) HILs: Commercial				660								45	530					3600				100			50		2500	160
NEPC (2013) HSLs for Vapour Intrusion: Commercial, Clay																												
0-1m																												
NEPC (2013) Management Limits: Commercial, Fine																												
Location Code	**Field ID**	**Sample Date**	**Lab Report Number**																									
ACM01	ACM01	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	BH01_0.0-0.1	29/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH02	BH02_0.0-0.1	29/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH03	BH03_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	BH04_0.0-0.1	29/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH05	BH05_0.0-0.1	29/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH06	BH06_0.0-0.1	29/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH07	BH07_0.0-0.1	29/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH08	BH08_0.0-0.1	29/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH09	BH09_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	BH10_0.0-0.1	30/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH11	BH11_0.0-0.1	30/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH12	BH12_0.0-0.1	30/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH13	BH13_0.0-0.1	30/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH14	BH14_0.0-0.15	30/06/2022	903019	<1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH15	BH15_0.0-0.15	30/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH15	DUP02	30/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH15	Split02	30/06/2022	32327	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	-
BH16	BH16_0.0-0.1	30/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH17	BH17_0.0-0.1	30/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH18	BH18_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	BH19_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	BH19_0.1-0.2	29/06/2022	903019	<1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH19	DUP01	29/06/2022	903019	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
BH19	Split01	29/06/2022	32327	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	-
BH20	BH20_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data Comments
#1: Quantification of linear and branched isomers has been conducted as a single tota
#2: Chrysotile asbestos detected.Organic fibres detected.
#3: 80 x 50 x 5

SOIL CHEMISTRY TABLE
Project Number: 63155
Project Name: Waterloo Corner Soils July 2022

				Organophosphorus Pesticides																																		
				Azinophos methyl	Bolstar (Sulprofos)	Bromophos-ethyl	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton	EPN	Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pirimiphos-methyl	Pyrazophos	Ronnel	Terbufos	Tetrachlorvinphos	Tokuthion	Trichloronate	Parathion
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR				0.2	0.2	0.1	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Direct Exposure																																						
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Indirect Exposure																																						
PFAS NEMP 2020 Table 2 Health Industrial/Commercial																																						
NEPC (2013) ESLs: Commercial, Fine																																						
NEPC (2013) EILs: Commercial (generic conservative)																																						
NEPC (2013) HILs: Commercial								2000																														
NEPC (2013) HSLs for Vapour Intrusion: Commercial, Clay																																						
0-1m																																						
NEPC (2013) Management Limits: Commercial, Fine																																						
Location Code	**Field ID**	**Sample Date**	**Lab Report Number**																																			
ACM01	ACM01	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	BH01_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	BH02_0.0-0.1	29/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH03	BH03_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	BH04_0.0-0.1	29/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH05	BH05_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	BH06_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07	BH07_0.0-0.1	29/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH08	BH08_0.0-0.1	29/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH09	BH09_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	BH10_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH11	BH11_0.0-0.1	30/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH12	BH12_0.0-0.1	30/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH13	BH13_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH14	BH14_0.0-0.15	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH15	BH15_0.0-0.15	30/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH15	DUP02	30/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH15	Split02	30/06/2022	32327	<0.1	-	<0.1	-	<0.1	<0.1	-	-	-	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1	-	-	<0.1	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	<0.1
BH16	BH16_0.0-0.1	30/06/2022	903019	<0.2	<0.2	-	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH17	BH17_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH18	BH18_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	BH19_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	BH19_0.1-0.2	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	DUP01	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	Split01	29/06/2022	32327	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH20	BH20_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data Comments
#1: Quantification of linear and branched isomers has been conducted as a single tota
#2: Chrysotile asbestos detected.Organic fibres detected.
#3: 80 x 50 x 5

SOIL CHEMISTRY TABLE
Project Number: 63155
Project Name: Waterloo Corner Soils July 2022

				Chlorinated Alkenes	Polychlorinated Biphenyls								Phenols																			PFAS							Chlorinated Benzenes
				Tetrachloroethene	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,4-dinitrophenol	2,6-dichlorophenol	2-chlorophenol	2-Methylphenol	2-nitrophenol	3&4-Methylphenol (m&p-cresol)	4,6-Dinitro-2-methylphenol	4,6-Dinitro-o-cyclohexyl phenol	4-Chloro-3-Methylphenol	4-nitrophenol	Cresol Total	Phenol	Tetrachlorophenols	Phenols (Total Halogenated)	Phenols (Total Non Halogenated)	Perfluorooctanoic acid (PFOA)	Perfluorohexanesulfonic acid (PFHxS)	Perfluorooctanesulfonic acid (PFOS)	1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Sum of US EPA PFAS (PFOS + PFOA)*	Hexachlorobenzene
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR				0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	1	0.5	0.5	5	0.5	0.5	0.2	1	0.4	5	20	1	5	0.5	0.5	10	1	20	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.05
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Direct Exposure																																10				1			
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Indirect Exposure																																		0.14					
PFAS NEMP 2020 Table 2 Health Industrial/Commercial																																50	20	20		20			
NEPC (2013) ESLs: Commercial, Fine																																							
NEPC (2013) EILs: Commercial (generic conservative)																																							
NEPC (2013) HILs: Commercial												7															25000	240000											80
NEPC (2013) HSLs for Vapour Intrusion: Commercial, Clay																																							
0-1m																																							
NEPC (2013) Management Limits: Commercial, Fine																																							
Location Code	**Field ID**	**Sample Date**	**Lab Report Number**																																				
ACM01	ACM01	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	BH01_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH02	BH02_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH03	BH03_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	BH04_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	0.0052	<0.01	0.0052	0.0052	0.0052	<0.05
BH05	BH05_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH06	BH06_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH07	BH07_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05
BH08	BH08_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH09	BH09_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	-
BH10	BH10_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH11	BH11_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH12	BH12_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH13	BH13_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH14	BH14_0.0-0.15	30/06/2022	903019	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<0.5	<0.5	<5	<0.5	<0.5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5	<10	<1	<20	-	-	-	-	-	-	-	<0.05
BH15	BH15_0.0-0.15	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH15	DUP02	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH15	Split02	30/06/2022	32327	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH16	BH16_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.05
BH17	BH17_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH18	BH18_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	-
BH19	BH19_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19	BH19_0.1-0.2	29/06/2022	903019	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<0.5	<0.5	<5	<0.5	<0.5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5	<10	<1	<20	-	-	-	-	-	-	-	<0.05
BH19	DUP01	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05
BH19	Split01	29/06/2022	32327	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1
BH20	BH20_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data Comments
#1: Quantification of linear and branched isomers has been conducted as a single tota
#2: Chrysotile asbestos detected.Organic fibres detected.
#3: 80 x 50 x 5

SOIL CHEMISTRY TABLE
Project Number: 63155
Project Name: Waterloo Corner Soils July 2022

				Herbicides & Fungicides	Microbiological	Non-Metallic Inorganics			Major Anions	Ionic Balance			EPA VIC - IWRG621		Inorganics	Particle Size	Asbestos - Eurofins												Moisture Content	Other		
				Dinoseb	Total Coliforms	Cyanide Total	Nitrogen (Total)	Kjeldahl Nitrogen Total	Phosphorus	CEC	Conductivity (1:5 aqueous extract)	pH (Lab)	Organochlorine Pesticides EPAVic	Other Organochlorine Pesticides EPAVic	Nitrite + Nitrate as N	% Clay*	Approximate Sample Mass	Asbestos Sample Dimensions	Mass ACM	Mass Asbestos in ACM	Asbestos from ACM in Soil	Mass FA	Mass Asbestos in FA	Mass AF	Mass asbestos in AF	Asbestos from FA & AF in Soil	Mass Asbestos in FA & AF	Asbestos Reported Result	Moisture Content	Moisture Content (dried @ 103°C)	TOC	Iron (%)
				mg/kg	MPN/g	mg/kg	mg/kg	mg/kg	mg/kg	MEQ/100G	US/CM	pH Units	mg/kg	mg/kg	mg/kg	%	g	Comment	g	g	% (w/w)	g	g	g	g	% (w/w)	g	Comment	%	%	%	%
LOR				20	1	5	10	10	5	0.05	10	0.1	0.1	0.1	5	1													0.1	1	0.1	0.01
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Direct Exposure																																
PFAS NEMP (HEPA 2018) - Interim Soil - Ecological Indirect Exposure																																
PFAS NEMP 2020 Table 2 Health Industrial/Commercial																																
NEPC (2013) ESLs: Commercial, Fine																																
NEPC (2013) EILs: Commercial (generic conservative)																																
NEPC (2013) HILs: Commercial																																
NEPC (2013) HSLs for Vapour Intrusion: Commercial, Clay 0-1m																																
NEPC (2013) Management Limits: Commercial, Fine																																
Location Code	**Field ID**	**Sample Date**	**Lab Report Number**																													
ACM01	ACM01	30/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	71	1[#3]	0	0	0	0	0	0	0	0	1[#2]	-	-	-	-	-
BH01	BH01_0.0-0.1	29/06/2022	903019	-	-	-	530	530	210	-	-	-	<0.1	<0.1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-
BH02	BH02_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.8	-	-
BH03	BH03_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-
BH04	BH04_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-
BH05	BH05_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	22	240	7.7	<0.1	<0.1	-	7.4	-	-	-	-	-	-	-	-	-	-	-	-	-	16	0.6	0.76
BH06	BH06_0.0-0.1	29/06/2022	903019	-	-	-	360	360	270	-	-	-	<0.1	<0.1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-
BH07	BH07_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-
BH08	BH08_0.0-0.1	29/06/2022	903019	-	-	-	1200	1200	200	-	-	-	<0.1	<0.1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-
BH09	BH09_0.0-0.1	29/06/2022	903019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-
BH10	BH10_0.0-0.1	30/06/2022	903019	-	17000	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-
BH11	BH11_0.0-0.1	30/06/2022	903019	-	-	-	630	630	160	-	-	-	<0.1	<0.1	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-
BH12	BH12_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-
BH13	BH13_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-
BH14	BH14_0.0-0.15	30/06/2022	903019	<20	-	<5	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-
BH15	BH15_0.0-0.15	30/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-
BH15	DUP02	30/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-
BH15	Split02	30/06/2022	32327	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-
BH16	BH16_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-
BH17	BH17_0.0-0.1	30/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	-	-
BH18	BH18_0.0-0.1	30/06/2022	903019	-	3100	-	390	390	270	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-
BH19	BH19_0.0-0.1	29/06/2022	903019	-	300	-	580	580	230	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23	-	-
BH19	BH19_0.1-0.2	29/06/2022	903019	<20	-	<5	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	-	-
BH19	DUP01	29/06/2022	903019	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-
BH19	Split01	29/06/2022	32327	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	-	-	-
BH20	BH20_0.0-0.1	29/06/2022	903019	-	-	-	860	860	110	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-

Data Comments
#1: Quantification of linear and branched isomers has been conducted as a single tota
#2: Chrysotile asbestos detected.Organic fibres detected.
#3: 80 x 50 x 5

FIELD QAQC TABLE
Project Number: 63155
Project Name: Waterloo Corner Soils July 2022

Lab Report Number	903019	903019
Field ID	RB01	TB01
Sample Date	30/06/2022	29/06/2022
Sample Type	Rinsate	Trip Blank

Chemical Group	**Chemical Name**	**Units**	**LOR**		
BTEXN	Benzene	mg/L	0.001		<0.001
	Toluene	mg/L	0.001		<0.001
	Ethylbenzene	mg/L	0.001		<0.001
	Xylene (o)	mg/L	0.001		<0.001
	Xylene (m & p)	mg/L	0.002		<0.002
	Xylene Total	mg/L	0.003		<0.003
Metals & Metalloids	Arsenic	mg/L	0.001	<0.001	
	Cadmium	mg/L	0.0002	<0.0002	
	Chromium (III+VI)	mg/L	0.001	<0.001	
	Copper	mg/L	0.001	<0.001	
	Lead	mg/L	0.001	<0.001	
	Mercury	mg/L	0.0001	<0.0001	
	Nickel	mg/L	0.001	<0.001	
	Zinc	mg/L	0.005	<0.005	

SOIL QAQC TABLE
Project Number: 63155
Project Name: Waterloo Corner Soils July 2022

			Lab Report Number	903019	903019		903019	32327		903019	903019		903019	32327	
			Sample Type	Primary	Intra-Lab		Primary	Inter-Lab		Primary	Intra-Lab		Primary	Inter-Lab	
			Field ID	BH19_0.1-0.2	DUP01	**RPD**	BH19_0.1-0.2	Split01	**RPD**	BH15_0.0-0.15	DUP02	**RPD**	BH15_0.0-0.15	Split02	**RPD**
			Sample Date	29/06/2022	29/06/2022		29/06/2022	29/06/2022		30/06/2022	30/06/2022		30/06/2022	30/06/2022	
Chemical Group	**Chemical Name**	**Units**	**LOR**												
Metals & Metalloids	Arsenic	mg/kg	2 : 4 (Interlab)	2.6	3.2	21	2.6	<4	0	**3.2**	**<2**	**46**	3.2	<4	0
	Cadmium	mg/kg	0.4	<0.4	<0.4	0	<0.4	<0.4	0	<0.4	<0.4	0	<0.4	<0.4	0
	Chromium (III+VI)	mg/kg	5 : 1 (Interlab)	17	20	16	**17**	**23**	**30**	42	34	21	42	41	2
	Copper	mg/kg	5 : 1 (Interlab)	35	34	3	**35**	**26**	**30**	**19**	**14**	**30**	19	15	24
	Lead	mg/kg	5 : 1 (Interlab)	24	23	4	**24**	**14**	**53**	20	21	5	20	22	10
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
	Molybdenum	mg/kg	5							<5	<5	0	<5		
	Nickel	mg/kg	5 : 1 (Interlab)	**<5**	**8**	**46**	**<5**	**13**	**89**	6.8	5.2	27	6.8	6	13
	Selenium	mg/kg	2							<2	<2	0	<2		
	Silver	mg/kg	2							<2	<2	0	<2		
	Tin	mg/kg	10							<10	<10	0	<10		
	Zinc	mg/kg	5 : 1 (Interlab)	85	100	16	**85**	**49**	**54**	**39**	**59**	**41**	39	44	12
TRHs (NEPC 2013)	C6-C10	mg/kg	20 : 25 (Interlab)	<20	<20	0	<20	<25	0						
	C10-C16	mg/kg	50	<50	<50	0	<50	<50	0						
	C16-C34	mg/kg	100	<100	<100	0	<100	<100	0						
	C34-C40	mg/kg	100	<100	<100	0	<100	<100	0						
	C10-C40 (Sum of total)	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<50	0						
	F1 (C6-C10 minus BTEX)	mg/kg	20 : 25 (Interlab)	<20	<20	0	<20	<25	0						
	F2 (C10-C16 less Naphthalene)	mg/kg	50	<50	<50	0	<50	<50	0						
BTEXN	Benzene	mg/kg	0.1 : 0.2 (Interlab)	<0.1	<0.1	0	<0.1	<0.2	0						
	Toluene	mg/kg	0.1 : 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0						
	Ethylbenzene	mg/kg	0.1 : 1 (Interlab)	<0.1	<0.1	0	<0.1	<1	0						
	Xylene (o)	mg/kg	0.1 : 1 (Interlab)	<0.1	<0.1	0	<0.1	<1	0						
	Xylene (m & p)	mg/kg	0.2 : 2 (Interlab)	<0.2	<0.2	0	<0.2	<2	0						
	Xylene Total	mg/kg	0.3 : 1 (Interlab)	<0.3	<0.3	0	<0.3	<1	0						
PAH	Acenaphthene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Acenaphthylene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Anthracene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Benz(a)anthracene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Benzo(a)pyrene	mg/kg	0.5 : 0.05 (Interlab)	<0.5	<0.5	0	<0.5	<0.05	0						
	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	0	**1.2**	**<0.5**	**82**						
	Benzo(a)pyrene TEQ calc (Half)	mg/kg	0.5	0.6	0.6	0	0.6	<0.5	18						
	Benzo(a)pyrene TEQ calc (Zero)	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0						
	Benzo(b+j)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5								
	Benzo(g,h,i)perylene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5								
	Chrysene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Dibenz(a,h)anthracene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Fluoranthene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Fluorene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Naphthalene	mg/kg	0.5 : 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Naphthalene	mg/kg	0.5 : 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Phenanthrene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	Pyrene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0						
	PAHs (Sum of total)	mg/kg	0.5 : 0.05 (Interlab)	<0.5	<0.5	0	<0.5	<0.05	0						
Organochlorine Pesticides	4,4-DDE	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	a-BHC	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	b-BHC	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	d-BHC	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	g-BHC (Lindane)	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Aldrin	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Dieldrin	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Aldrin + Dieldrin	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Chlordane	mg/kg	0.1	<0.1	<0.1	0	<0.1			<0.1	<0.1	0	<0.1		
	DDT	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	DDD	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	DDT+DDE+DDD	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Endosulfan I	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Endosulfan II	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Endosulfan sulphate	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Endrin	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Endrin aldehyde	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Endrin ketone	mg/kg	0.05	<0.05	<0.05	0	<0.05			<0.05	<0.05	0	<0.05		
	Heptachlor	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Heptachlor Epoxide	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Methoxychlor	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
	Toxaphene	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5		
Organophosphorus Pesticides	Azinophos methyl	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Bolstar (Sulprofos)	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Chlorfenvinphos	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Chlorpyrifos	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Chlorpyrifos-methyl	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Coumaphos	mg/kg	2							<2	<2	0	<2		
	Demeton-O	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Demeton-S	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Diazinon	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Dichlorvos	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Dimethoate	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Disulfoton	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	EPN	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Ethion	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Ethoprop	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Fenitrothion	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Fensulfothion	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Fenthion	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Malathion	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Merphos	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Methyl parathion	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Mevinphos (Phosdrin)	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Monocrotophos	mg/kg	2							<2	<2	0	<2		
	Naled (Dibrom)	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Omethoate	mg/kg	2							<2	<2	0	<2		
	Phorate	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Pirimiphos-methyl	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Pyrazophos	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Ronnel	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
	Terbufos	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Tetrachlorvinphos	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Tokuthion	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Trichloronate	mg/kg	0.2							<0.2	<0.2	0	<0.2		
	Parathion	mg/kg	0.2 : 0.1 (Interlab)							<0.2	<0.2	0	<0.2	<0.1	0
Chlorinated Benzenes	Hexachlorobenzene	mg/kg	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0
EPA VIC - IWRG621	Organochlorine Pesticides EPAVic	mg/kg	0.1	<0.1	<0.1	0	<0.1			<0.1	<0.1	0	<0.1		
	Other Organochlorine Pesticides EPAVic	mg/kg	0.1	<0.1	<0.1	0	<0.1			<0.1	<0.1	0	<0.1		
Other	Moisture Content (dried @ 103°C)	%	1	21	20	5	21			16	14	13	16		

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**High RPDs are in bold (Acceptable RPDs for each LOR multiplier range are: 30 (1-10 x LOR); 30 (10-30 x LOR); 30 (> 30 x LOR))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Summary Results Tables (including QA/QC) - GROUNDWATER

WATER SUMMARY TABLE
Project Number: 63155
Project Name: Renascor Groundwater Sampling

				Metals & Metalloids								TPHs (NEPC 1999)					TRHs (NEPC 2013)							BTEXN							
				Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX	Naphthalene_VOC
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				1	0.2	1	1	1	0.1	1	5	20	50	100	100	100	20	50	100	100	100	20	50	1	1	1	1	2	3	1	10
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand (2-4m)																						6000	NL	5000	NL	NL			NL		NL
2(a). Recreation / Aesthetics - NHMRC (2011 updated 2018) ADWG: Health x10				100	20		20000	100	10	200			900	900	900	900		900	900	900	900		900	10	8000	3000			6000		
4(a). Primary Industries - ANZECC (2000) Livestock				500	10	1000	400	100	2	1000	20000																				
Field ID	**Sample ID**	**Sample Date**	**Lab Report Number**																												
GW01	GW01	18-Nov-22	942724	1	<0.2	<1	3	<1	<0.1	2	7	<20	<50	<100	<100	<100	<20	<50	<100	<100	<100	<20	<50	<1	<1	<1	<1	<2	<3	-	<10
GW02	GW02	18-Nov-22	942724	1	<0.2	<1	6	<1	<0.1	2	5	<20	60	<100	<100	<100	<20	<50	<100	<100	<100	<20	<50	<1	<1	<1	<1	<2	<3	-	<10
	DUP01	18-Nov-22	942724	1	<0.2	<1	7	<1	<0.1	2	6	<20	<50	<100	<100	<100	<20	<50	<100	<100	<100	<20	<50	<1	<1	<1	<1	<2	<3	-	<10
	SPLIT01	18-Nov-22	34654	1	<0.1	2	7	<1	<0.05	3	9	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<1	<1	<1	<1	<2	<1	<1	<1
GW03	GW03	18-Nov-22	942724	1	<0.2	<1	6	<1	<0.1	2	8	<20	50	<100	<100	<100	<20	<50	<100	<100	<100	<20	<50	<1	<1	<1	<1	<2	<3	-	<10

WATER SUMMARY TABLE
Project Number: 63155
Project Name: Renascor Groundwater Sampling

				PAH																			Chlorinated Alkanes																			
				Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ	Benzo(b+j)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Carbon tetrachloride	Chloroethane	Chloromethane	Dichlorodifluoromethane	Dichloromethane	Trichlorofluoromethane
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				1	1	1	1	1	5	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	5	5
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand (2-4m)																			NL																							
2(a). Recreation / Aesthetics - NHMRC (2011 updated 2018) ADWG: Health x10								0.1																						30					30				40	
4(a). Primary Industries - ANZECC (2000) Livestock																																										
Field ID	**Sample ID**	**Sample Date**	**Lab Report Number**																																							
GW01	GW01	18-Nov-22	942724	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<5	<5	<5	<5	<5
GW02	GW02	18-Nov-22	942724	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<5	<5	<5	<5	<5
	DUP01	18-Nov-22	942724	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<5	<5	<5	<5	<5
	SPLIT01	18-Nov-22	34654	<1	<1	<1	<1	<1	<5	-	<2	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<10	-	<10
GW03	GW03	18-Nov-22	942724	<1	<1	<1	<1	<1	-	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<5	<5	<5	<5	<5

WATER SUMMARY TABLE
Project Number: 63155
Project Name: Renascor Groundwater Sampling

				Chlorinated Alkenes													Solvents	PFAS																	
				1,1-dichloroethene	1,1-dichloropropene	2-chlorotoluene	3-chloropropene	4-chlorotoluene	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichloroethene	Vinyl Chloride	Acetone	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	N-ethylperfluorooctanesulfonamidoethanol (NEtFOSE)	N-methylperfluorooctane sulfonamidoacetic acid (NMeFOSAA)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				1	1	1	1	1	1	1	1	1	1	1	5	5	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand (2-4m)																																			
2(a). Recreation / Aesthetics - NHMRC (2011 updated 2018) ADWG: Health x10				300							500			|200	3	140000					5.6													
4(a). Primary Industries - ANZECC (2000) Livestock																																			
Field ID	Sample ID	Sample Date	Lab Report Number																																
GW01	GW01	18-Nov-22	942724	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
GW02	GW02	18-Nov-22	942724	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	DUP01	18-Nov-22	942724	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	SPLIT01	18-Nov-22	34654	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<10	-	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.1	<0.05	<0.1	<0.05	<0.5	<0.02
GW03	GW03	18-Nov-22	942724	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

WATER SUMMARY TABLE
Project Number: 63155
Project Name: Renascor Groundwater Sampling

				PFAS																		MAH											
				N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecanesulfonic acid (PFDS)	1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of WA DWER PFAS (n=10)*	Sum of PFAS	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Total MAH	Bromobenzene	Isopropylbenzene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	UG/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR				0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.05	0.1	1	1	1	1	1	1	1	1	3	1	1
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand (2-4m)																																	
2(a). Recreation / Aesthetics - NHMRC (2011 updated 2018) ADWG: Health x10								0.7		0.7							0.7											300					
4(a). Primary Industries - ANZECC (2000) Livestock																																	
Field ID	**Sample ID**	**Sample Date**	**Lab Report Number**																														
GW01	GW01	18-Nov-22	942724	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1	<1	<1	-	-	-	-	<1	-	<3	<1	<1
GW02	GW02	18-Nov-22	942724	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1	<1	<1	-	-	-	-	<1	-	<3	<1	<1
	DUP01	18-Nov-22	942724	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1	<1	<1	-	-	-	-	<1	-	<3	<1	<1
	SPLIT01	18-Nov-22	34654	<0.02	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.02	<0.01	<0.01	<0.02	<0.02	<0.01	-	<0.01	-	<0.01	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1
GW03	GW03	18-Nov-22	942724	<0.05	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.01	0.01	<0.01	<0.05	<0.1	<1	<1	-	-	-	-	<1	-	<3	<1	<1

WATER SUMMARY TABLE
Project Number: 63155
Project Name: Renascor Groundwater Sampling

				Miscellaneous Hydrocarbons							Chlorinated Benzenes						Trihalomethanes				Organic Sulfur Compounds	Non-Metallic Inorganics		EPA VIC - IWRG621		Inorganics		Chlorinated Hydrocarbons	Other
				1,2-dibromoethane	Bromomethane	Cyclohexane	Dibromomethane	Iodomethane	4-Methyl-2-pentanone	Methyl Ethyl Ketone	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	Carbon disulfide	Nitrogen (Total)	Kjeldahl Nitrogen Total	Chlorinated hydrocarbons EPAVic	Other chlorinated hydrocarbons EPAVic	Nitrite + Nitrate as N	Phosphate (as P)	Hexachlorobutadiene	TDS
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
LOR				1	5	1	1	1	5	5	1	1	1	1	1	1	1	5	1	1	1	200	200	5	5	50	10	1	10
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand (2-4m)																														
2(a). Recreation / Aesthetics - NHMRC (2011 updated 2018) ADWG: Health x10				10	10								15000		400	3000												7		
4(a). Primary Industries - ANZECC (2000) Livestock																														
Field ID	**Sample ID**	**Sample Date**	**Lab Report Number**																											
GW01	GW01	18-Nov-22	942724	<1	<5	-	<1	<1	<5	<5	-	-	<1	<1	<1	<1	<1	<5	<1	<1	<1	11,000	1000	<5	<5	10,000	20	-	17,000
GW02	GW02	18-Nov-22	942724	<1	<5	-	<1	<1	<5	<5	-	-	<1	<1	<1	<1	<1	<5	<1	<1	<1	20,500	1500	<5	<5	19,000	10	-	16,000
	DUP01	18-Nov-22	942724	<1	<5	-	<1	<1	<5	<5	-	-	<1	<1	<1	<1	<1	<5	<1	<1	<1	-	-	<5	<5	-	-	-	16,000
	SPLIT01	18-Nov-22	34654	<1	<10	<1	<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	<1	19,000
GW03	GW03	18-Nov-22	942724	<1	<5	-	<1	<1	<5	<5	-	-	<1	<1	<1	<1	<1	<5	<1	<1	<1	18,500	500	<5	<5	18,000	10	-	22,000

WATER QAQC TABLE
Project Number: 63155
Project Name: Renascor Groundwater Sampling 2022

			Lab Report Number	942724	Intra-Lab		942724	Inter-Lab	
			Field ID	GW02	DUP01	**RPD**	GW02	SPLIT01	**RPD**
			Sample Date	18/11/2022	18/11/2022		18/11/2022	18/11/2022	
Chemical Group	**Chemical Name**	**Units**	**LOR**						
Metals & Metalloids	Arsenic	µg/L	1	1	1	0	1		
	Cadmium	µg/L	0.2	<0.2	<0.2	0	<0.2		
	Chromium (III+VI)	µg/L	1	<1	<1	0	<1		
	Copper	µg/L	1	6	7	15	6		
	Lead	µg/L	1	<1	<1	0	<1		
	Mercury	µg/L	0.1	<0.1	<0.1	0	<0.1		
	Nickel	µg/L	1	2	2	0	2		
	Zinc	µg/L	5	5	6	18	5		
TPHs (NEPC 1999)	C6-C9 Fraction	µg/L	20 : 10 (Interlab)	<20	<20	0	<20	<10	0
	C10-C14 Fraction	µg/L	50	60	<50	18	60	<50	18
	C15-C28 Fraction	µg/L	100	<100	<100	0	<100	<100	0
	C29-C36 Fraction	µg/L	100	<100	<100	0	<100	<100	0
	C10-C36 Fraction (Sum of Total)	µg/L	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
TRHs (NEPC 2013)	C6-C10	µg/L	20 : 10 (Interlab)	<20	<20	0	<20	<10	0
	C10-C16	µg/L	50	<50	<50	0	<50	<50	0
	C16-C34	µg/L	100	<100	<100	0	<100	<100	0
	C34-C40	µg/L	100	<100	<100	0	<100	<100	0
	C10-C40 (Sum of total)	µg/L	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
	F1 (C6-C10 minus BTEX)	µg/L	20 : 10 (Interlab)	<20	<20	0	<20	<10	0
	F2 (C10-C16 less Naphthalene)	µg/L	50	<50	<50	0	<50	<50	0
BTEXN	Benzene	µg/L	1	<1	<1	0	<1	<1	0
	Toluene	µg/L	1	<1	<1	0	<1	<1	0
	Ethylbenzene	µg/L	1	<1	<1	0	<1	<1	0
	Xylene (o)	µg/L	1	<1	<1	0	<1	<1	0
	Xylene (m & p)	µg/L	2	<2	<2	0	<2	<2	0
	Xylene Total	µg/L	3 : 1 (Interlab)	<3	<3	0	<3	<1	0
	Naphthalene_VOC	µg/L	10 : 1 (Interlab)	<10	<10	0	<10	<1	0
PAH	Acenaphthene	µg/L	1	<1	<1	0	<1	<1	0
	Acenaphthylene	µg/L	1	<1	<1	0	<1	<1	0
	Anthracene	µg/L	1	<1	<1	0	<1	<1	0
	Benz(a)anthracene	µg/L	1	<1	<1	0	<1	<1	0
	Benzo(a)pyrene	µg/L	1	<1	<1	0	<1	<1	0
	Benzo(b+j)fluoranthene	µg/L	1	<1	<1	0	<1		
	Benzo(g,h,i)perylene	µg/L	1	<1	<1	0	<1	<1	0
	Benzo(k)fluoranthene	µg/L	1	<1	<1	0	<1		
	Chrysene	µg/L	1	<1	<1	0	<1	<1	0
	Dibenz(a,h)anthracene	µg/L	1	<1	<1	0	<1	<1	0
	Fluoranthene	µg/L	1	<1	<1	0	<1	<1	0
	Fluorene	µg/L	1	<1	<1	0	<1	<1	0
	Indeno(1,2,3-c,d)pyrene	µg/L	1	<1	<1	0	<1	<1	0
	Naphthalene	µg/L	1	<1	<1	0	<1	<1	0
	Phenanthrene	µg/L	1	<1	<1	0	<1	<1	0
	Pyrene	µg/L	1	<1	<1	0	<1	<1	0
	PAHs (Sum of total)	µg/L	1	<1	<1	0	<1	<1	0
Chlorinated Alkanes	1,1,1,2-tetrachloroethane	µg/L	1	<1	<1	0	<1	<1	0
	1,1,1-trichloroethane	µg/L	1	<1	<1	0	<1	<1	0
	1,1,2,2-tetrachloroethane	µg/L	1	<1	<1	0	<1	<1	0
	1,1,2-trichloroethane	µg/L	1	<1	<1	0	<1	<1	0
	1,1-dichloroethane	µg/L	1	<1	<1	0	<1	<1	0
	1,2,3-trichloropropane	µg/L	1	<1	<1	0	<1	<1	0
	1,2-dichloroethane	µg/L	1	<1	<1	0	<1	<1	0
	1,2-dichloropropane	µg/L	1	<1	<1	0	<1	<1	0
	1,3-dichloropropane	µg/L	1	<1	<1	0	<1	<1	0
	Bromochloromethane	µg/L	1	<1	<1	0	<1	<1	0
	Carbon tetrachloride	µg/L	1	<1	<1	0	<1	<1	0
	Chloroethane	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<10	0
	Chloromethane	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<10	0
	Dichlorodifluoromethane	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<10	0
	Dichloromethane	µg/L	5	<5	<5	0	<5		
	Trichlorofluoromethane	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<10	0
Chlorinated Alkenes	1,1-dichloroethene	µg/L	1	<1	<1	0	<1	<1	0
	3-chloropropene	µg/L	1	<1	<1	0	<1		
	4-chlorotoluene	µg/L	1	<1	<1	0	<1	<1	0
	cis-1,2-dichloroethene	µg/L	1	<1	<1	0	<1	<1	0
	cis-1,3-dichloropropene	µg/L	1	<1	<1	0	<1	<1	0
	Tetrachloroethene	µg/L	1	<1	<1	0	<1	<1	0
	trans-1,2-dichloroethene	µg/L	1	<1	<1	0	<1	<1	0
	trans-1,3-dichloropropene	µg/L	1	<1	<1	0	<1	<1	0
	Trichloroethene	µg/L	1	<1	<1	0	<1	<1	0
	Vinyl Chloride	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<10	0

WATER QAQC TABLE
Project Number: 63155
Project Name: Renascor Groundwater Sampling 2022

			Lab Report Number	942724	Intra-Lab		942724	Inter-Lab	
			Field ID	GW02	DUP01	**RPD**	GW02	SPLIT01	**RPD**
			Sample Date	18/11/2022	18/11/2022		18/11/2022	18/11/2022	
Solvents	Acetone	µg/L	5	<5	<5	0	<5		
PFAS	Perfluorobutanoic acid (PFBA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0
	Perfluoropentanoic acid (PFPeA)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0
	Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluorodecanoic acid (PFDA)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0
	Perfluorododecanoic acid (PFDoDA)	µg/L	0.01 : 0.05 (Interlab)	<0.01	<0.01	0	<0.01	<0.05	0
	Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01 : 0.1 (Interlab)	<0.01	<0.01	0	<0.01	<0.1	0
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01 : 0.5 (Interlab)	<0.01	<0.01	0	<0.01	<0.5	0
	Perfluorooctane sulfonamide (FOSA)	µg/L	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0
	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	µg/L	0.05 : 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0
	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
	N-ethylperfluorooctanesulfonamidoethanol (NEtFOSE)	µg/L	0.05 : 0.5 (Interlab)	<0.05	<0.05	0	<0.05	<0.5	0
	N-methylperfluorooctane sulfonamidoacetic acid (NMeFOSAA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0
	N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	µg/L	0.05 : 0.02 (Interlab)	<0.05	<0.05	0	<0.05	<0.02	0
	Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01	<0.01	<0.01	0	<0.01		
	Perfluorobutanesulfonic acid (PFBS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluoropentanesulfonic acid (PFPeS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluorohexanesulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluorooctanesulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Perfluorononanesulfonic acid (PFNS)	µg/L	0.01	<0.01	<0.01	0	<0.01		
	Perfluorodecanesulfonic acid (PFDS)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0
	1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.01	0
	1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0
	1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	µg/L	0.01 : 0.02 (Interlab)	<0.01	<0.01	0	<0.01	<0.02	0
	Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	µg/L	0.01	<0.01	<0.01	0	<0.01		
	Sum of US EPA PFAS (PFOS + PFOA)*	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0
	Sum of WA DWER PFAS (n=10)*	µg/L	0.05	<0.05	<0.05	0	<0.05		
	Sum of PFAS	µg/L	0.1 : 0.01 (Interlab)	<0.1	<0.1	0	<0.1	<0.01	0
MAH	1,2,4-trimethylbenzene	µg/L	1	<1	<1	0	<1	<1	0
	1,3,5-trimethylbenzene	µg/L	1	<1	<1	0	<1	<1	0
	Styrene	µg/L	1	<1	<1	0	<1	<1	0
	Total MAH	µg/L	3	<3	<3	0	<3		
	Bromobenzene	µg/L	1	<1	<1	0	<1	<1	0
	Isopropylbenzene	µg/L	1	<1	<1	0	<1	<1	0
Miscellaneous Hydrocarbons	1,2-dibromoethane	µg/L	1	<1	<1	0	<1	<1	0
	Bromomethane	µg/L	5 : 10 (Interlab)	<5	<5	0	<5	<10	0
	Dibromomethane	µg/L	1	<1	<1	0	<1	<1	0
	Iodomethane	µg/L	1	<1	<1	0	<1		
	4-Methyl-2-pentanone	µg/L	5	<5	<5	0	<5		
	Methyl Ethyl Ketone	µg/L	5	<5	<5	0	<5		
Chlorinated Benzenes	1,2-Dichlorobenzene	µg/L	1	<1	<1	0	<1	<1	0
	1,3-dichlorobenzene	µg/L	1	<1	<1	0	<1	<1	0
	1,4-dichlorobenzene	µg/L	1	<1	<1	0	<1	<1	0
	Chlorobenzene	µg/L	1	<1	<1	0	<1	<1	0
Trihalomethanes	Dibromochloromethane	µg/L	1	<1	<1	0	<1	<1	0
	Chloroform	µg/L	5 : 1 (Interlab)	<5	<5	0	<5	<1	0
	Tribromomethane	µg/L	1	<1	<1	0	<1	<1	0
	Bromodichloromethane	µg/L	1	<1	<1	0	<1	<1	0
Organic Sulfur Compounds	Carbon disulfide	µg/L	1	<1	<1	0	<1		
EPA VIC - IWRG621	Chlorinated hydrocarbons EPAVic	µg/L	5	<5	<5	0	<5		
	Other chlorinated hydrocarbons EPAVic	µg/L	5	<5	<5	0	<5		
Other	TDS	µg/L	10000 : 5000 (Interlab)	1.6E7	1.6E7	0	1.6E7	1.9E7	17

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**High RPDs are in bold (Acceptable RPDs for each LOR multiplier range are: 30 (1-10 x LOR); 30 (10-30 x LOR); 30 (> 30 x LOR))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

GROUNDWATER BLANKS TABLE NOV 2022
Project Number: 63155
Project Name: Waterloo Corner

Lab Report Number	942724	942724
Field ID	RB01	TB01
Sampled_Date/Time	18/11/2022	18/11/2022
Sample Type	Rinsate	Trip_B

Chem_Group	**ChemName**	**Units**	**EQL**		
BTEXN	Benzene	µg/l	0.001		<1
	Toluene	µg/l	0.001		<1
	Ethylbenzene	µg/l	0.001		<1
	Xylene (o)	µg/l	1		<1
	Xylene (m & p)	µg/l	0.002		<2
	Xylene Total	µg/l	0.003		<3
	Naphthalene_VOC	µg/l	0.01		
Metals & Metalloids	Arsenic	µg/l	0.001	<1	
	Cadmium	µg/l	0.0002	<0.2	
	Chromium (III+VI)	µg/l	0.001	<1	
	Copper	µg/l	0.001	<1	
	Lead	µg/l	0.001	<1	
	Mercury	µg/l	0.0001	<0.1	
	Nickel	µg/l	0.001	<1	
	Zinc	µg/l	0.005	<5	

Appendix A – Current Certificate of Title

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

REGISTRAR-GENERAL SOUTH AUSTRALIA

Certificate of Title - Volume 5723 Folio 299

Parent Title(s) CT 5211/524

Creating Dealing(s) TG 8770112

Title Issued 07/01/2000 **Edition** 2 **Edition Issued** 14/03/2019

Estate Type

FEE SIMPLE

Registered Proprietor

SOUTH AUSTRALIAN WATER CORPORATION
OF ADELAIDE SA 5000

Description of Land

ALLOTMENTS 3 AND 4 FILED PLAN 115108
IN THE AREA NAMED WATERLOO CORNER
HUNDRED OF PORT ADELAIDE

Easements

SUBJECT TO EASEMENT(S) OVER THE LAND MARKED A TO ETSA UTILITIES PTY. LTD. (TG 8770112)

Schedule of Dealings

NIL

Notations

Dealings Affecting Title NIL

Priority Notices NIL

Notations on Plan NIL

Registrar-General's Notes

AREA NAME UPDATED VIDE GOVERNMENT GAZETTE DATED 02/06/2011

Administrative Interests NIL

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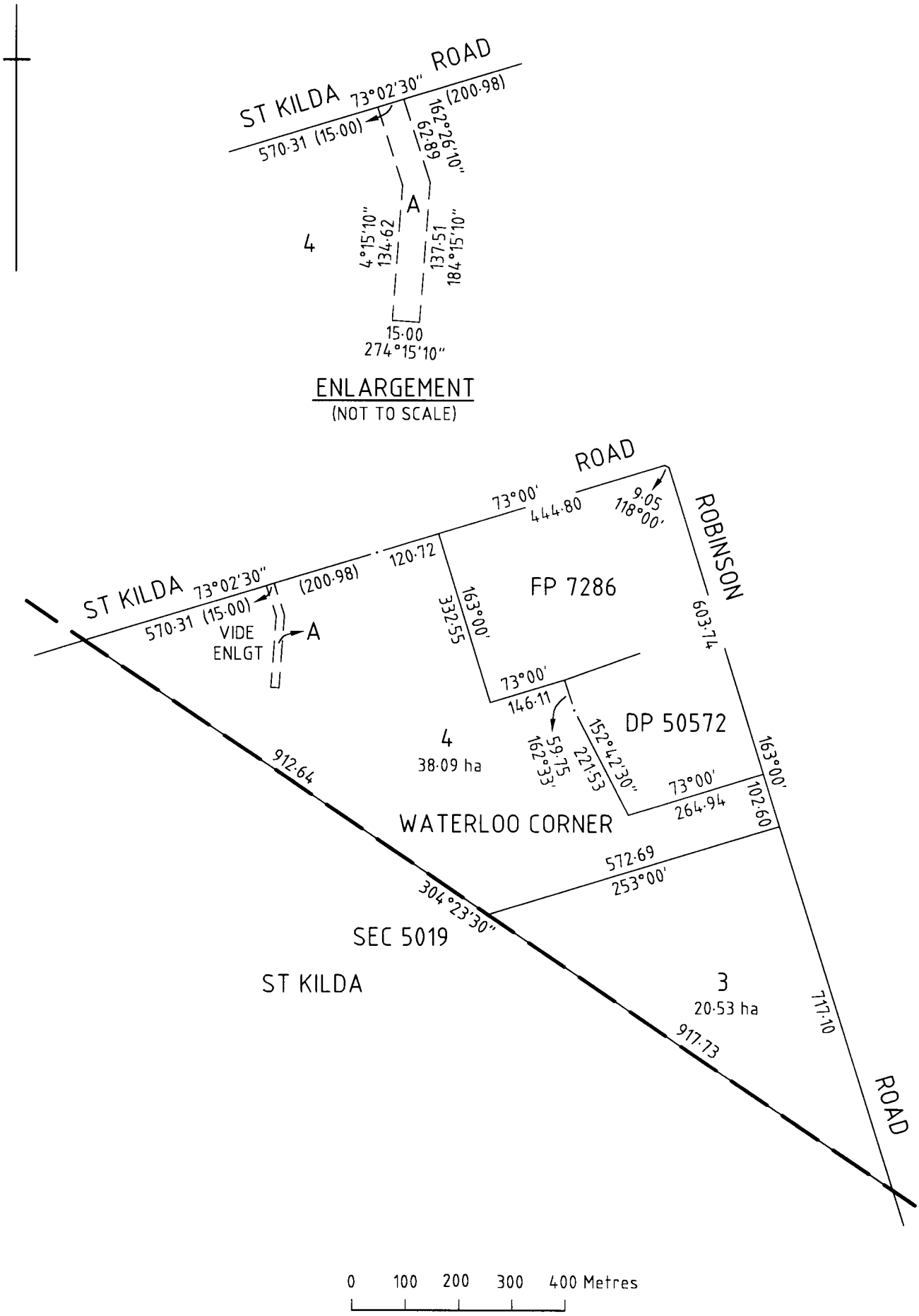

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Product	Historical Search
Date/Time	12/05/2022 02:57PM
Customer Reference	62455 KF
Order ID	20220512007405

Certificate of Title

Title Reference:	CT 5723/299
Status:	CURRENT
Parent Title(s):	CT 5211/524
Dealing(s) Creating Title:	TG 8770112
Title Issued:	07/01/2000
Edition:	2

Dealings

No lodged Dealings found.

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Appendix B – Preliminary Development Plan

SITE PLAN

GENERAL NOTES

1-THIS DEVELOPMENT WILL INCLUDE A GREEN BUFFER ZONE 10m WIDE ON THE NORTH, NORTH-WEST & SOUTH-EAST BOUNDARIES.
NATIVE TREES AND VEGETATION WILL CREATE A SCREEN FOR PROCESS PLANT INFRASTRUCTURE.

APPROXIMATE AREA

AREA 1 - DRAIN 1.3 Ha
AREA 2 - PROCESS PLANT 8.8 Ha
AREA 3 - GREEN BUFFER ZONE 1.2 Ha
AREA 4 - PURIFICATION 3.0 Ha
AREA 5 - STORES / WATER TREATMENT- 1.1 Ha
AREA 6 - ADMIN. 0.9
AREA 7 - HV YARD 0.5 Ha

TOTAL AREA (1 TO 7) - 16.8 Ha

PROPOSED SITE DEVELOPMENT AREA -19.9 Ha

INFORMATION ONLY
PRELIMINARY / NOT FOR CONSTRUCTION

40 0 40 80 120 160 200m
SCALE 1:2000

REFERENCE DRAWINGS	DWG No	REV	DATE	REVISIONS	DRN	CHK	DSGN	TECH APP	PROJ APP
		A	11.05.22	PRELIMINARY - INFORMATIION ONLY	HB				

WHEN IN DOUBT-ASK DO NOT SCALE

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GR ENGINEERING SERVICES LTD
ENGINEERING CONSULTANTS AND CONTRACTORS
179 Great Eastern Highway, Belmont Western Australia, 6104
ACN 121 542 738
Phone: (08) 6272 6000
Fax: (08) 6272 6001

DRAWN	HB	11.05.22
CHECKED		
DESIGNED		
TECH APP		
PROJ APP		
CLIENT APP		

RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT
GENERAL ARRANGEMENT SITE PLAN - STAGE 1 PLAN

A1	SCALE 1:2000	JOB No 12813	DRG No SKT-002	REV A

M:\1-PROJECT STUDIES\12813 - Siviour\DRG\SKT-003dwg.dwg - 11/05/2022 - 3:59pm - howard.baldock

Appendix C - Site Inspection Photographs

PHOTOGRAPH 1 – VIEW OF THE SITE - REVEGETATION

PHOTOGRAPH 2 – VIEW OF BURIED SEAGAS STRUCTURE

PHOTOGRAPH 3 – VIEW OF ILLEGAL DUMPING

PHOTOGRAPH 4 – VIEW OF ILLEGAL DUMPING

JBS&G

Job No: 63155	
Client: Renascor Resources	
Version: Rev A	Date: 20/07/22
Drawn By: AT	Checked By: MS
Not to Scale	
Coord. Sys n/a	

Robinson Road, Waterloo Corner

SITE PHOTOGRAPHS

APPENDIX B

PHOTOGRAPH 5 – VIEW FACING ROBINSON ROAD

PHOTOGRAPH 6 – VIEW OF FLOODED SOILS

PHOTOGRAPH 7 – VIEW FROM NORTHWEST INTERNAL GATE LOOKING EAST

PHOTOGRAPH 8 – VIEW FROM THE NORTHWEST LOOKING SOUTHEAST

JBS&G

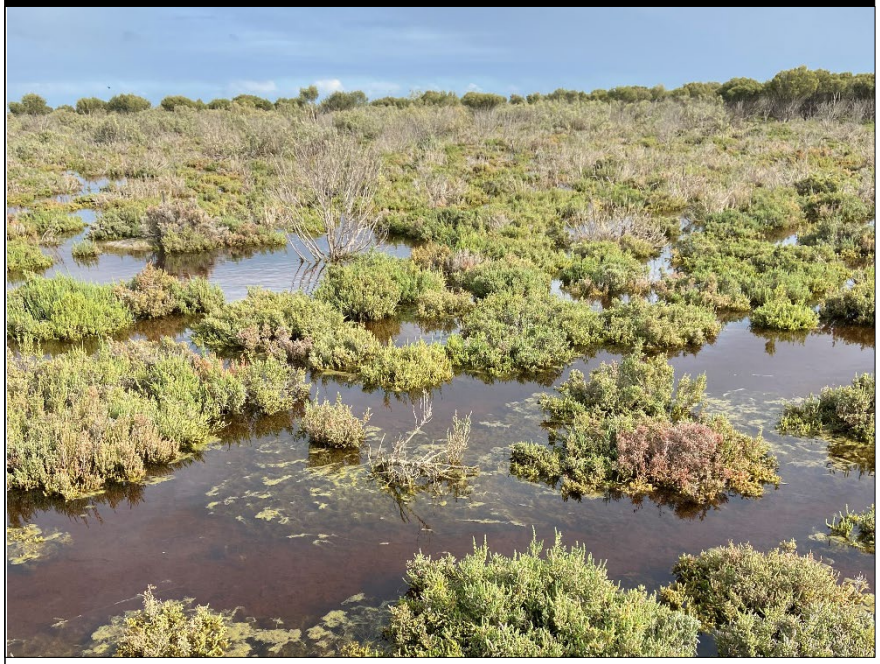
Job No: 63155	
Client: Renascor Resources	
Version: Rev A	Date: 20/07/22
Drawn By: AT	Checked By: MS
Not to Scale	
Coord. Sys n/a	

Robinson Road, Waterloo Corner

SITE PHOTOGRAPHS

APPENDIX B

PHOTOGRAPH 9 – VIEW OF FLOODING ON SITE



PHOTOGRAPH 10 – VIEW OF FLOODING ON SITE

PHOTOGRAPH 11 – VIEW OF FLOODING ON SITE

PHOTOGRAPH 12 – VIEW OF ASBESTOS CONTAINING MATERIAL AT SURFACE

JBS&G

Job No: 63155	
Client: Renascor Resources	
Version: Rev A	Date: 20/07/22
Drawn By: AT	Checked By: MS
Not to Scale	
Coord. Sys n/a	

Robinson Road, Waterloo Corner

SITE PHOTOGRAPHS

APPENDIX B

Appendix D – Historical Certificates of Title

Ownership History

Table 1: Section 5016 ownership history

Property Description	Certificate of Title	Parent Title	Date	Details
Section 5016 Hundred of Port Adelaide County of Adelaide	Volume 163 Folio 248		11 April 1872	New titled issued to **David Duck** (Farmer)
			14 December 1881	Transferred to **James Gilbertson** (Farmer)
Section 5016 Hundred of Port Adelaide County of Adelaide	Volume 1328 Folios 17	Volume 163 Folio 248	9 April 1924	New title issued to **James Gilbertson** (Farmer)
			22 May 1924	Transferred to **Sinclair Scott & Co. Limited**

Table 2: Section 5021 ownership history

Property Description	Certificate of Title	Parent Title	Date	Details
Section 5021 Hundred of Port Adelaide County of Adelaide	Volume 72 Folio 176		3 October 1865	New titled issued to **David Duck** (Farmer)
			14 December 1881	Transferred to **James Gilbertson** (Farmer)
Section 5021 Hundred of Port Adelaide County of Adelaide	Volume 1328 Folios 16	Volume 72 Folio 176	22 May 1924	New title issued to **James Gilbertson** (Farmer)
			9 April 1924	Transferred to **Sinclair Scott & Co. Limited**

Table 3: Section 5016-5021 (inclusive) ownership history

Property Description	Certificate of Title	Parent Title	Date	Details
Sections 5016, 5017, 5018, 5019, 5020 and 5021 Hundred of Port Adelaide County of Adelaide	Volume 1510 Folio 168	Volume 1328 Folios 16 and 17 & Volume 1092 Folio 151 & Volume 1407 Folio 196	30 May 1928	New title issued to **Sinclair Scott & Co. Limited**
			21 April 1928	Transferred to **Frank Anthony Stevens** (Dentist) and **Lewis Pearce McArthur** (Company Manager)
			17 March 1930	Transferred to **Frank Anthony Stevens** (Dentist) and **Lewis Pearce McArthur** (Company Manager)
			2 April 1931	Transferred to **Theodora Ena McArthur** (Married Woman)
Sections 5016, 5017, 5018, 5019, 5020 and 5021 Hundred of Port Adelaide County of Adelaide	Volume 2310 Folio 128	Volume 1510 Folio 168	19 February 1954	New title issued to **John Omagh Robinson** (Farmer) and **Mavis Robinson** (Wife)
			14 December 1953	Portion of Section 5021 transferred to **Hubert England** and **Kathleen Marion May England**
Sections 5016, 5017, 5018, 5019 and 5020 and Portion of Section 5021 Hundred of Port Adelaide County of Adelaide	Volume 2369 Folio 114	Volume 2310 Folio 128	28 January 1955	New title issued to **John Omagh Robinson** (Farmer) and **Mavis Robinson** (Wife)
Sections 5016 and 5020 and Portion of Section 5021 Hundred of Port Adelaide County of Adelaide	Volume 2443 Folio 151	Volume 2369 Folio 114	21 March 1956	New title issued to **John Omagh Robinson** (Farmer) and **Mavis Robinson** (Wife)
			28 September 1960	Transferred to **Minister of Works**
			11 November 1960	Undivided Third Parts in Portion of Section 5021 transferred to **Giuseppe Reveruggi**, **Carmine Reveruggi**, and **Mario Reveruggi** and **Rosa Reveruggi**
			1 December 1960	Portion of Section 5021 transferred to **George Irotta** and **Bianca Irene Irotta**
Portions of Section 5021 Hundred of Port Adelaide County of Adelaide	Volume 3219 Folio 195	Volume 2443 Folio 151	20 February 1964	New title issued to **John Omagh Robinson** (Farmer) and **Mavis Robinson** (Wife)
			18 May 1966	Transferred to **Minister of Works**

Sections 5016 and 5020 and Portion of Section 5021 Hundred of Port Adelaide County of Adelaide	Volume 2828 Folio 31	Volume 2443 Folio 151	2 December 1960	New title issued to **Minister of Works**
			18 May 1966	Portion of Section 5021 transferred to **John Omagh Robinson** (Farmer) and **Mavis Robinson** (Wife)
Sections 5016 and 5020 and Portion of Section 5021 Hundred of Port Adelaide County of Adelaide	Volume 3414 Folio 131	Volume 3219 Folio 195 & Volume 2828 Folio 31	15 June 1966	New title issued to **Minister of Works**
Electronic Title (not available for review)	Volume 5211 Folio 524	Volume 3414 Folio 131	31 August 1994	
Allotments 3 and 4 Filed Plan 115108 Waterloo Corner Hundred of Port Adelaide	Volume 5723 Folio 299	Volume 5211 Folio 524	7 January 2000	New title issued to **South Australian Water Corporation**

South Australia

(CERTIFICATE OF TITLE)

Register Book,

Vol. 3414 *Folio* 131

Pursuant to Memorandum of Transfer No.2725856 Registered on Vol.3219 Folio 195 and Balance Certificate of Title from Vol.2828 Folio 31

MINISTER OF WORKS

is the proprietor of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in THAT PIECE of land situated in the HUNDRED OF PORT ADELAIDE COUNTY OF ADELAIDE being the SECTIONS 5016 containing fifty acres and three roods or thereabouts and 5020 containing fifty acres and one rood or thereabouts and PORTION OF SECTION 5021 containing forty three acres three roods and twenty perches or thereabouts and more particularly delineated and bounded as appears in the plan in the margin hereof and therein colored green

Which said Sections are delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

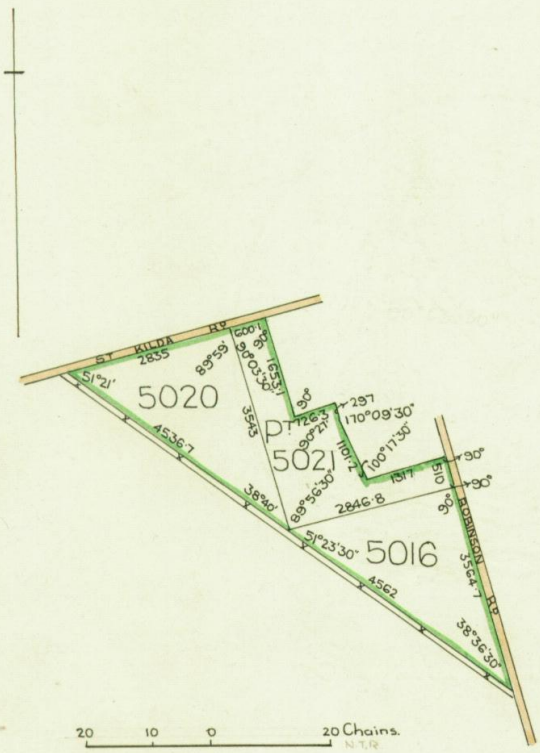
In witness whereof I have hereunto signed my name and affixed my seal this 15 day of June 1966

Signed the 15 day of June 1966, in the presence of Proctor

G.E. Roswell

DEPUTY Registrar-General

REGISTRAR-GENERAL SOUTH AUSTRALIA



CANCELLED
CONVERTED TO A COMPUTERISED TITLE
REGISTRAR-GENERAL SOUTH AUSTRALIA

South Australia

(CERTIFICATE OF TITLE)

Register Book,

Vol. 3219 *Folio* 195

Balance Certificate of Title from Vol.2443 Folio 151

JOHN OMAGH ROBINSON of Salisbury Farmer and MAVIS ROBINSON his wife

are the proprietor s of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in

THOSE pieces of land situate in the HUNDRED of PORT ADELAIDE COUNTY of ADELAIDE

being PORTIONS OF SECTION 5021 containing together forty two acres and sixteen perches or thereabouts and more particularly delineated and bounded as appears in the plan in the margin hereof and therein colored green

Which said Section is delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

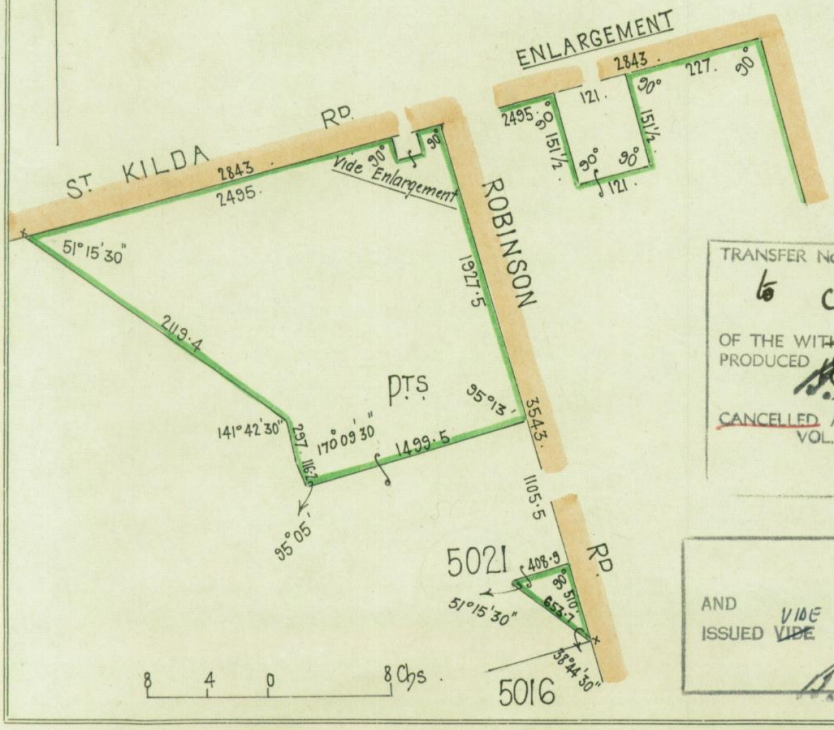
In witness whereof I have hereunto signed my name and affixed my seal this 20th day of February 1964

Signed the 20th day of February 1964, in the presence of J. Myers.

R. S. Collins

Registrar-General

REGISTRAR-GENERAL SOUTH AUSTRALIA



TRANSFER No. 2725856 to Minister of works of portion of the within land produced 15 JUN 1966 at 11.20 a.m.

B. Nelson Hayden DEP. REG. GEN.

CANCELLED AS REGARDS ABOVE LAND AND NEW C.T. ISSUED VOL. 3414 FOL. 131

15 JUN 1966

B. Nelson Hayden DEP. REG. GEN.

CANCELLED

AND ISSUED VIDE Balance 2725855 CERTIFICATE OF TITLE VOL. 3414 FOL. 130

B. Nelson Hayden DEP. REG. GENL.

South Australia.

(CERTIFICATE OF TITLE.)

Register Book,

Vol. 2443 *Folio* 151

Balance Certificate of Title from Vol. 2369 Folio 114

JOHN OMAGH ROBINSON of Salisbury Farmer and MAVIS ROBINSON his wife

are the proprietors of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in THAT PIECE of land situated in the HUNDRED OF PORT ADELAIDE COUNTY OF ADELAIDE being the SECTIONS 5016 containing fifty acres two roods and thirty two perches or thereabouts and 5020 containing fifty acres and thirty two perches or thereabouts and PORTION OF SECTION 5021 containing one hundred acres two roods and eighteen perches or thereabouts and more particularly delineated and bounded as appears in the plan in the margin hereof and therein colored green

50 - 2 - 32
50 - 32
100 2 18
201 - 2 - 2

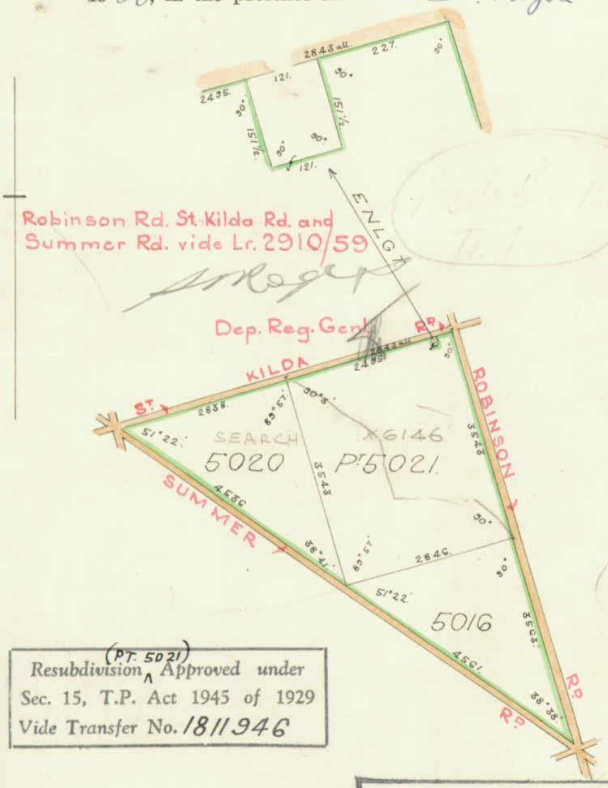
Which said Sections are delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this twenty first day of March 1956

Signed the 21st day of March 19 56, in the presence of R. B. Payne

Registrar-General.

REGISTRAR-GENERAL SOUTH AUSTRALIA



Resubdivision (PT. 5021) Approved under Sec. 15, T.P. Act 1945 of 1929 Vide Transfer No. 1811946

Resubdivision Approved under Sec. 11 T.P. Act 1929-1957 Vide Lr. 4003 of 1960

Mortgage No. 1613863 from John Omagh Robinson and Mavis Robinson to Commonwealth Bank of Australia Produced for registration the 22 day of March 1950 at 11.40 a.m.

Reg.Genl.

Mortgage No. 1648813 from John Omagh Robinson and Mavis Robinson to Commonwealth Bank of Australia Produced for registration the 3 day of November 1950 at 2.40 p.m.

Reg.Genl.

The within Mortgage No. 1648813 is vested in Commonwealth Trading Bank of Australia Vide No. 1934954 Produced for registration the 7 day of March 1956 at 11.30 a.m.

Reg.Genl.

Powers of Attorney Nod. 1437463. 1845116 and 1806998

Reg.Genl.

(C/N. 2205467) D. 1613863.

THE WITHIN MORTGAGE No. 1613863 IS VESTED IN COMMONWEALTH TRADING BANK OF AUSTRALIA VIDE No. 2205467 PRODUCED FOR REGISTRATION THE 25 DAY OF May 1960 AT 11.25 am

DEP. REG. GENL.

P/A. No 2178164 D.R.A.

DISCHARGE OF MORTGAGE No. 1613863 BY ENDORSEMENT THEREON. PRODUCED 25/5/1960 AT 11.25 am

DEP. REG. GEN.

D 1648813 T 1934954 7

P/A. 2177746 J.P. Bennett

J.A.G

DISCHARGE OF MORTGAGE No. 1648813. BY ENDORSEMENT THEREON. PRODUCED 28.9.1960 AT 11.15am.
J.P. Bennett DEP. REG. GEN.

TRANSFER No. 2234262.
to Minister of Works.
OF THE WITHIN Sections 5016, 5020 and pt of part Section 5021.
PRODUCED 28.9.1960 AT 11.15am
J.P. Bennett DEP. REG. GEN.
CANCELLED AS REGARDS ABOVE LAND AND NEW C.T. ISSUED
VOL. 2828 FOL. 31
J.A. Rogers DEP. REG. GEN.

~~F 2250084~~

TRANSFER No. 2245352 to Giuseppe Reverazzi of one undivided third part Carmine Reverazzi of one undivided third part and to Mario Reverazzi and Rosa Reverazzi of one undivided third part in portion
OF THE WITHIN Part Sec. 5021
PRODUCED 11/11/1960 AT 11.30am
B.L. Nairn DEP. REG. GEN.
CANCELLED AS REGARDS ABOVE LAND AND NEW C.T. ISSUED
VOL. 2860 FOL. 73
S.E. Cresswell DEP. REG. GEN.

TRANSFER No. 2250084 to
George Trotta and
Bianca Irene Trotta of portion
OF THE WITHIN Part Sec. 5021
PRODUCED 1/12/1960 AT 1.15pm
B.L. Nairn DEP. REG. GEN.
CANCELLED AS REGARDS ABOVE LAND AND NEW C.T. ISSUED
VOL. 2860 FOL. 74
S.E. Cresswell DEP. REG. GEN.

L.N.C.T. VIDE DKT. 2675/1964.

CANCELLED
AND Balance CERTIFICATE OF TITLE
ISSUED VIDE Lt 2675/1964 VOL. 3219 FOL. 195
B.L. Nairn DEP. REG. GENL.

South Australia.

(CERTIFICATE OF TITLE.)

Register Book,

Vol. 2369 *Folio* 114

Balance Certificate of Title from Vol.2310 Folio 128

JOHN OMAGH ROBINSON of Salisbury Farmer and MAVIS ROBINSON his wife

are the proprietor s of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in THOSE PIECES of land situated in the HUNDRED OF PORT ADELAIDE COUNTY OF ADELAIDE being the SECTIONS 5016 containing fifty acres two roods and thirty two perches or thereabouts 5017 containing forty eight acres one rood and eleven perches or thereabouts 5018 containing one hundred and two acres three roods and twenty perches or thereabouts 5019 containing forty five acres three roods and three perches or thereabouts and 5020 containing fifty acres and thirty two perches or thereabouts and PORTION OF SECTION 5021 containing one hundred acres two roods and eighteen perches or thereabouts and more particularly delineated and bounded as appears in the plan in the margin hereof and therein colored green

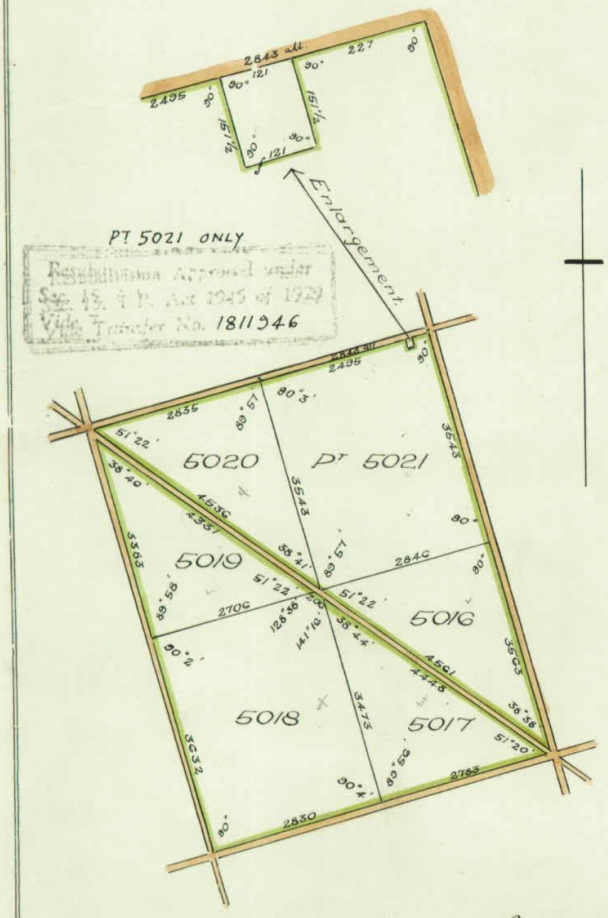
Which said Section s are delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this twenty-eighth day of January 1955

Signed the 28th day of January 1955, in the presence of A. Williams

Registrar-General.

REGISTRAR-GENERAL SOUTH AUSTRALIA



Mortgage No.1613863 from John Omagh Robinson and Mavis Robinson to Commonwealth Bank of Australia Produced for registration the 22 day of March 1950 at 11.40 a.m.

Reg.Genl.

Mortgage No.1648813 from John Omagh Robinson and Mavis Robinson to Commonwealth Bank of Australia Produced for registration the 3 day of November 1950 at 2.40 p.m.

Reg.Genl.

Power of Attorney No.1437463

Reg.Genl.

~~P.D/M. 1934953. C/M. 1934954. P.D/M. 1934955 T. 1934956~~

SECTIONS 5017, 5018 AND 5019 ARE THE WITHIN ~~LAND IS~~ DISCHARGED FROM THE WITHIN MORTGAGE NO. 1613863 AS APPEARS BY MEMORANDUM NO. 1934953. PRODUCED FOR REGISTRATION THE 7 DAY OF March 1956 AT 11-30am

DEP. REG. GENL.

P/A No. 1845116.

Over.

THE WITHIN MORTGAGE No. 1648813 IS VESTED IN
COMMONWEALTH TRADING BANK OF AUSTRALIA
VIDE No. 1934954
PRODUCED FOR REGISTRATION THE 7 DAY
OF March 1956 AT 11-30am.
DEP. REG. GENL.

SECTIONS 5017, 5018 AND 5019 ARE
THE WITHIN ~~LAND IS~~ DISCHARGED FROM THE
WITHIN MORTGAGE No. 1648813 AS APPEARS
BY MEMORANDUM No. 1934955. PRODUCED FOR
REGISTRATION THE 7 DAY OF March
1956 AT 11-30am
DEP. REG. GENL.

P/A No. 1806992. per DEG.

TRANSFER No. 1934956. FROM
John Omagh Robinson and
Mavis Robinson to
Kevin George Judd
OF THE WITHIN secs. 5017, 5018 and 5019.
PRODUCED FOR REGISTRATION THE 7 DAY OF
March 1956 AT 11-30am.
DEP. REG. GENL.

CANCELLED AS REGARDS LAND IN TRANSFER
No. 1934956. AND NEW CERTIFICATE
OF TITLE ISSUED VOL. 2443 FOLIO 150
DEP. REG. GENL.

CANCELLED

AND Balance
CERTIFICATE OF TITLE ISSUED
VIDE
VOL. 2443 FOL. 151
DEP. REG. GENL.

South Australia. (CERTIFICATE OF TITLE.)

Register Book,

Vol. 2310 *Folio* 128

New Certificate of Title for the whole of the Land in Vol.1510 Folio 168

JOHN OMAGH ROBINSON of Salisbury Farmer and MAVIS ROBINSON his wife

are the proprietors of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in THOSE SECTIONS of land situated in the HUNDRED OF PORT ADELAIDE COUNTY of ADELAIDE NOD.5016 containing fifty acres two roods and thirty two perches or thereabouts 5017 containing forty eight acres one rood and eleven perches or thereabouts 5018 containing one hundred and two acres three roods and twenty perches or thereabouts 5019 containing forty five acres three roods and three perches or thereabouts 5020 containing fifty acres and thirty two perches or thereabouts and 5021 containing one hundred acres three roods and seven perches or thereabouts

and bounded as appears in the plan in the margin hereof

Which said Sections are delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

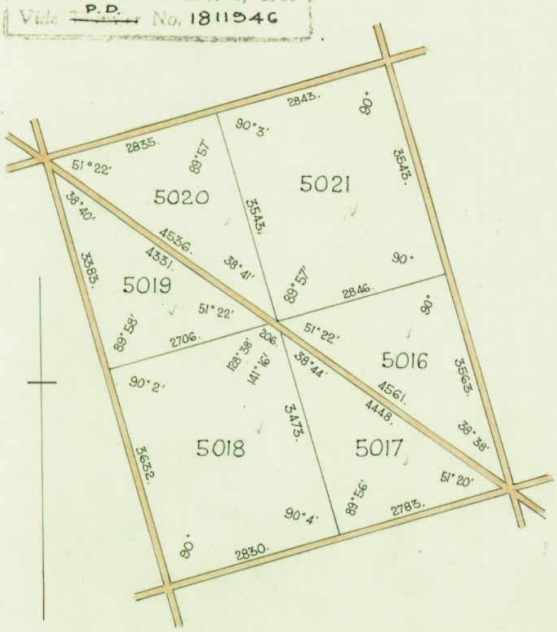
In witness whereof I have hereunto signed my name and affixed my seal this nineteenth day of February 1954

Signed the 19th day of February 19 54. in the presence of A. Potts

Registrar-General.

REGISTRAR-GENERAL SOUTH AUSTRALIA

Resubdivision Approved under Sec. 15. T.P. Act 1945 of 1929 Vide P.D. No. 1811946



Mortgage No.1613863 from John Omagh Robinson and Mavis Robinson to Commonwealth Bank of Australia of portion of the within land Produced for registration the 22 day of March 1950 at 11.40 a.m.

Reg.Genl.

Mortgage No.1648813 from John Omagh Robinson and Mavis Robinson to Commonwealth Bank of Australia of portion of the within land Produced for registration the 3 day of November 1950 at 2.40 p.m.

Reg.Genl.

Power of Attorney No.1437463

Reg.Genl.

1811947

TRANSFER No. 1811947 FROM John Omagh Robinson and Mavis Robinson to Hubert England and Kathleen Marion May England of Portion OF THE WITHIN Sec 5021.

PRODUCED FOR REGISTRATION THE 14 DAY OF December 19 53 AT 11.30 am

DEP. REG. GENL.

CANCELLED AS REGARDS LAND IN TRANSFER No. 1811947. AND NEW CERTIFICATE OF TITLE ISSUED VOL. 2311 FOLIO 171

DEP. REG. GENL.

Bvet.

CANCELLED

AND Balance
CERTIFICATE OF TITLE ISSUED
VIDE Letter 82/1955.
VOL. 2369 FOL. 114.
DEP. REG. GENL.

CANCELLED

AND New
CERTIFICATE OF TITLE ISSUED
VIDE T 181947.
VOL. 2310 FOL. 128
DEP. REG. GENL.

South Australia. (CERTIFICATE OF TITLE.)

Register Book,

Vol. 1510 Folio 168

New Certificate of Title for the whole of the land in Vol 1328 Folios 16 and 17 and portion of the land in Vol 1092 Folio 151 and Vol 1407 Folio 196

Sinclair Scott & Co Limited whose registered office is situated at Currie Street Adelaide is the proprietor of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in those SECTION 1 of land situated in the Hundred of Port Adelaide COUNTY of Adelaide Nos 5016 containing fifty acres two roods and thirty two perches or thereabouts 5017 containing forty eight acres one rood and eleven perches or thereabouts 5018 containing one hundred and two acres three roods and twenty perches or thereabouts 5019 containing forty five acres three roods and three perches or thereabouts 5020 containing fifty acres and thirty two perches or thereabouts and 5021 containing one hundred acres three roods and seven perches or thereabouts

and bounded as appears in the plan in the margin hereof

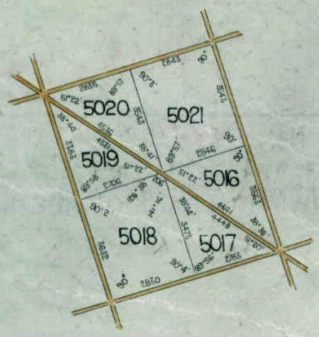
which said Section 1 are delineated in the public map of the said Hundred deposited in the Lands and Survey Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this Thirtieth day of May 1928

Signed the 30th day of May 1928, in the presence of M. G. Shinze

A. W. Sachse
Registrar-General.

Resubdivision Approved under Sec. 15. T.P. Act 1945 of 1929 Vide T.P. Book 41 Page 152.



40 20 0 40 Chs

MORTGAGE No. 1035304 FROM Sinclair Scott & Co. Limited TO The National Mutual Life Association of Australasia Limited PRODUCED FOR REGISTRATION THE 27 DAY OF April 1928 AT 12·30 p.m.
DEP. REG GENL.

TRANSFER No. 1035310 FROM Sinclair Scott & Co. Limited TO Frank Anthony Stevens of Adelaide Dentist and Lewis Pearce McArthur of Port Victoria Company Manager OF AN ESTATE IN FEE SIMPLE IN THE WITHIN LAND. PRODUCED FOR REGISTRATION THE 27 DAY OF April 1928 AT 12·30 p.m.
DEP REG. GENL

MORTGAGE No. 1037590 FROM Frank Anthony Stevens and Lewis Pearce McArthur TO John Sinclair PRODUCED FOR REGISTRATION THE 19 DAY OF May 1928 AT 11·15 a.m. (Including other land)
DEP. REG GENL.

TRANSFER No. 1092682 FROM
Frank Anthony Stevens and Lewis Pearce McArthur
TO the said Frank Anthoney Stevens and Lewis Pearce McArthur
OF AN ESTATE IN FEE SIMPLE IN THE WITHIN LAND as tenants in common
PRODUCED FOR REGISTRATION THE 17 DAY OF March 1930 AT 2.15 pm
[signature] DEP. REG. GENL.

MORTGAGE No. 1092683 FROM
Frank Anthoney Stevens and Lewis Pearce McArthur
TO Carl Heinrich Grasohm
PRODUCED FOR REGISTRATION THE 17 DAY OF March 1930 AT 2.15 pm (including other land)
[signature] DEP. REG GENL.

PD1037590 T ~~[illegible]~~
Omnibus ~~[illegible]~~
DH117997

TRANSFER No. 1117193 FROM
Frank ~~Anthoney~~ Anthony Stevens
TO Theodora Ona McArthur of Adelaide Married Woman
OF AN ESTATE IN FEE SIMPLE IN one undivided moiety in THE WITHIN LAND
PRODUCED FOR REGISTRATION THE 2 DAY OF April 1931 AT 3 pm
[signature] DEP. REG. GENL.

TRANSMISSION APPLICATION No. 1117765
THE within Mortgage NO. 1037590 WAS TRANSMITTED TO Stanley Bruce Sinclair of Glenormond Hastolatot and Arthur Donald Jewell of Mount Pleasant Bank Manager AS THE EXECUTORS NAMED IN THE WILL DATED THE 12 DAY OF January 1929 OF THE within NAMED John Sinclair WHO DIED ON THE 30 DAY OF August 1929 AS APPEARS BY PROBATE DATED THE 9 DAY OF December 1929 PRODUCED FOR REGISTRATION THE 16 DAY OF April 1931 AT 2.40 pm
[signature] DEP. REG. GENL.

DISCHARGE OF THE within MORTGAGE
No. 1037590
BY ENDORSEMENT THEREON
PRODUCED FOR REGISTRATION THE 16 DAY OF April 1931 AT 2.40 pm
[signature] DEP. REG. GENL.

MORTGAGE No. 1117766 FROM
Lewis Pearce McArthur and Theodora Ona McArthur
TO May Rebecca Grace Allchurch
PRODUCED FOR REGISTRATION THE 16 DAY OF April 1931 AT 2.40 pm (including other land)
[signature] DEP. REG GENL.

DISCHARGE OF THE within MORTGAGE
No. 1092683
BY MEMORANDUM No. 1117997
PRODUCED FOR REGISTRATION THE 21 DAY OF April 1931 AT 2 pm (62 not produced)
[signature] DEP. REG. GENL.

~~X 1590386~~

Caveat No. 1590386 lodged by John Ross Dunstan and dated the 3 day of October 1949 over the within land. Produced for registration the 3 day of October 1949 at 11.40 am (including other land)
[signature] Dep Reg. Genl

~~T 161386 to M 161386~~
P/A No. 1348976 for ~~[illegible]~~

TRANSFER No. 161386 2 FROM
The National Mutual Life Association of Australasia Limited as Mortgagee
to John Omagh Robinson of 3 Hughes Street Parkside Farmer and Maud Robinson his wife
OF AN ESTATE IN FEE SIMPLE IN THE WITHIN LAND
PRODUCED FOR REGISTRATION THE 22 DAY OF March 1950 AT 11.40 am
[signature] DEP. REG. GENL.

MORTGAGE No. 161386 3 FROM
John Omagh Robinson
Jana Maud Robinson
TO COMMONWEALTH BANK OF AUSTRALIA.
PRODUCED FOR REGISTRATION THE 22 DAY OF March 1950 AT 11.40 am
[signature] DEP. REG. GENL.

The within Caveat No. 1590386 was withdrawn on the 26 day of May 1950 as appears by Memorandum No. 1626774 Produced for registration the 16 day of June 1950 at 11.40 am
[signature] Dep Reg Genl

~~M 164512~~

MORTGAGE No. 1648813 FROM
John Omagh Robinson and Maud Robinson
TO COMMONWEALTH BANK OF AUSTRALIA
PRODUCED FOR REGISTRATION THE 3 DAY OF November 1950 AT 2.40 pm
[signature] DEP. REG. GENL.

~~HD 10000 T 6144 D~~

P/A No. 1437463. See DEF.

PORTION OF SECTION 5021 THE WITHIN ~~LAND~~ IS DISCHARGED FROM THE WITHIN MORTGAGES No. 0 1648813 / 1613863 AS APPEARS BY MEMORANDUM No. 1811946 PRODUCED FOR REGISTRATION THE 14 DAY OF December 1953 AT 11.30 am
[signature] DEP. REG. GENL.

See face CT.

South Australia. (CERTIFICATE OF TITLE.)

Register Book,

Vol. 1328 Folio 16

New Certificate of Title for the whole of the land in Vol. 72. Folio 176

James Gilbertson of Waterloo Farm near Virginia Farmer is the proprietor of an estate in fee simple subject nevertheless to such incumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in That SECTION of land situated in the Hundred of Port Adelaide COUNTY of Adelaide Hod. 5021 containing one hundred ~~and one~~ acres three roods and seven perches or thereabouts

and bounded as appears in the plan in the margin hereof which said Section is delineated in the public map of the said Hundred deposited in the Lands and Survey Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this twentysecond day of May 1924

Signed the 22nd day of May 1924, in the presence of W. Shaw

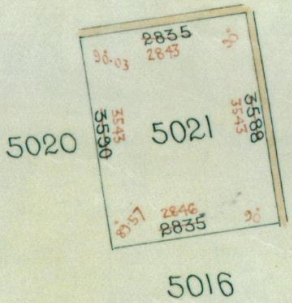
W. Blackwell
Registrar-General.

FOR CORRECTIONS IN RED VIDE LETTER 357 OF 1925
W. Blackwell REG. GEN.

Transfer No. 885799 from James Gilbertson to Sinclair Scott & Co. Limited whose registered office is situated at Currie Street Adelaide fee simple in the within land Produced for registration the 9 day of April 1924 at 3 pm
W. A. Kerwood Dep. Reg. Gen.

Mortgage No. 885800 from Sinclair Scott & Co. Limited to James Gilbertson Produced for registration the 9 day of April 1924 at 3 pm (including other land)
W. A. Kerwood Dep. Reg. Gen.

Mortgage No. 885801 from Sinclair Scott & Co. Limited to James Gilbertson Produced for registration the 9 day of April 1924 at 3 pm (including other land)
W. A. Kerwood Dep. Reg. Gen.



20 10 0 20 CHS

DISCHARGE OF THE above MORTGAGE NO. 885801 BY RECEIPT ENDORSED THEREON PRODUCED FOR REGISTRATION THE 8 DAY OF April 1926 AT 11.15 A.M.
DEP. REG. GENL.

Mortgage No. 958658 from Sinclair Scott & Co Limited to Allan Sinclair Percy Venning Scott and Stanley Bruce Sinclair as Tenants in Common Produced for registration the 8 day of April 1926 at 11.15 am (Including other land.)

Dep Reg Gen

Caveat No. 1019854 dated the 5 day of November 1927 over the within land Produced for registration the 5 day of November 1927 at 11.25 am (Including other land)

Dep Reg Gen

The within Caveat No. 1019854 was withdrawn on the 26 day of April 1928 as appears by Memorandum No. 1035302. Produced for registration the 27 day of April 1928 at 12.30 pm

Dep Reg Genl

DISCHARGE OF THE within MORTGAGE
No. 885800
~~BY ENDORSEMENT THEREON~~
PRODUCED FOR REGISTRATION THE 27 DAY OF April 1928 AT 12.30 pm
DEP. REG. GENL.

DISCHARGE OF THE within MORTGAGE
No. 958658
BY MEMORANDUM No. 1035303
PRODUCED FOR REGISTRATION THE 27 DAY OF April 1928 AT 12.30 pm
DEP. REG. GENL.

CANCELLED

AND New
CERTIFICATE OF TITLE ISSUED
VIDE Letter No. 677 of 1928
VOL. 1510 FOL. 168

DEP. REG. GENL.

(C)

6318

South Australia.

CERTIFICATE OF TITLE

Register Book.

Vol. LXXII Folio. 176

David Duck of near Salisbury Farmer is now seised of an estate in fee simple subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in — that Section of land situated in the Hundred of Port Adelaide County of Adelaide numbered 5021 containing one hundred and one acres or thereabouts and bounded as appears in the plan in the margin hereof — which said section is delineated in the Public Map of the said Hundred deposited in the Office of the Surveyor General and was originally granted the fourteenth day of January 1853 under the hand and seal of Sir — Henry Edward Fox Young Lieutenant Governor of the said — Province to Edward Wright

In witness whereof, I have hereunto signed my name and affixed my seal this third day of October one thousand eight hundred and sixty five

W B Rawson

Registrar-General

Signed, the 3rd day of Oct. 1865, in presence of

Wm Geo Joyner

CANCELLED

AND NEW CERTIFICATE OF TITLE

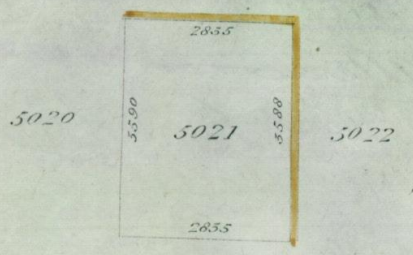
ISSUED vide Letter No 695 of 1924

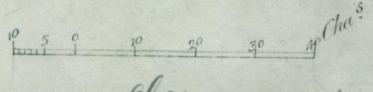
VOL. 1328 FOL. 16

W H Tacey

DEP. REG. GENL

5026





DISCHARGE OF THE above MORTGAGE

NO. 1 689455 and 689864

BY RECEIPT ENDORSED THEREON PRODUCED

FOR REGISTRATION THE 9 DAY OF

April 1924 AT 3 PM

DEP. REG. GENL

Mortgage No. 17395 from David Duck to William Diment. Produced 9 day March 1867 at Ten o'clock pm.

C Manclarke Registrar General.

Discharge of the above Mortgage No. 17395 by receipt indorsed thereon for the total of the money thereby secured dated the 13th day February. Entered the 28th day February 1875 at 3 pm.

C Manclarke Dep Registrar Genl

Transfer No 135640 from David Duck to James Gilberton of Waterloo Farm near Virginia Farmer of the above land. Produced the 14 day December 1881 at 11 am

C Manclarke Dep Reg Genl

Mortgage No 135641 from James Gilberton to David Duck. Produced the 14 day December 1881 at 11 am (Including also other property)

C Manclarke Dep Reg Genl

Mortgage No 135642 from James Gilberton to Alexander George Downer and John William Downer. Produced the 14 day December 1881 at 11 am (Including also other property)

C Manclarke Dep Reg Genl

EM 135624

The time for payment of the within Mortgage No 135641 is Extended as regards the sum of £400 (as appears by an Indorsement thereon dated the 13th day of December 1886 Produced for registration the 16th day of December 1886 at 2.25 pm

W Cam Catto Dep Reg Genl

~~The time for the payment of the within Mortgage No 135641~~

Ditto within Mortgage No 135641 has been transmitted to George Lambert of Compact Gentleman and Alice Kensall (formerly Duck of Salisbury the executors named in the will dated the ~~day~~ 1 day March 1887 of the within named David Duck who died on the 28 day March 1890 as appears by Probate dated the 17 day May 1890 Produced for registration the 9 day February 1893 at noon (No 267541.

E J Heath Dep Regd

The time for the payment of the within Mortgage No 135641 (regards the sum of £400) was extended to the 9 day February 1896 as appears by memorandum dated the 8 day February 1893 Produced for registration the 9 day February 1893 at noon

E J Heath Dep Regd

Order of Supreme Court No 39 of 1903 dated the 13 day July 1903 vesting the within Mortgage No 135641 in George ~~Houghton~~ Daniel of Hermitage near Noughton Farmer upon trust of the will of the within named David Duck Produced for registration the 4 day August 1903 at 11.50 am

E J Heath Dep Reg Genl

DISCHARGE OF THE WITHIN MORTGAGE No 135641 BY MEMORANDUM No 401226 PRODUCED FOR REGISTRATION THE 29 DAY OF October 1903 AT 2.30 pm

E J Heath DEP. REG. GENL

DISCHARGE OF THE WITHIN MORTGAGE No 135642 BY RECEIPT ENDORSED THEREON PRODUCED FOR REGISTRATION THE 29 DAY OF October 1903 AT 2.30 pm

E J Heath DEP. REG. GENL

See face of CT

Mortgage No 401227 from James Gilberstone to Walter Reynell Alexander George Downer and Peter Waite Produced for registration the 29 day October 1903 at 2.30 pm including other lands

E J Heath Dep Reg Genl

Mortgage No 401228 including other lands from James Gilberstone to Alexander George Downer and Sir John William Downer K.C.M.G. Produced for registration the 29 day October 1903 at 2.30 pm

E J Heath Dep Reg Genl

The within named John William Downer died on the 2 day of August 1915 as appears by office copy of certificate of Death No 67815 Produced for registration the 2 day of July 1917 at 2.30 pm

Rob Atkinson Dep Regd

The within Mortgage No 401228 was transmitted to Frank Hagger Downer of Adelaide Solicitor and Elders Trustee and Executor Company Limited whose registered office is at Currie Street Adelaide (the lawful attorney of James Frederick Dawson of London for the use and benefit of the said James Frederick Dawson and until he shall duly apply for any other Probate)

AS THE SURVIVING EXECUTOR NAMED IN THE WILL DATED THE 26 DAY OF July 1901 OF THE within NAMED Alexander George Downer WHO DIED ON THE 17 DAY OF August 1916 AS APPEARS BY PROBATE DATED THE 12 DAY OF December 1916 PRODUCED FOR REGISTRATION THE 26 DAY OF July 1917 AT 2.30 pm NO 67815

Rob Atkinson Dep Regd

Pof 4 No 47679 No 2 WRG

DISCHARGE OF THE within MORTGAGE NO 401227 and 401228 BY RECEIPT ENDORSED THEREON PRODUCED FOR REGISTRATION THE 12 DAY OF March 1918 AT 12.15 pm

R H Salter DEP. REG. GENL

Mortgage No 689455 (including other land) from James Gilberstone to The Savings Bank of South Australia Produced for registration the 12 day of March 1918 at 12.15 pm

R H Salter Dep Regd

Mortgage No 689864 including other land from James Gilberstone & Frank Hagger Downer Elders Trustee and Executor Company Limited Una Stella Downer and James Frederick Downer Produced for registration the 18 day of March 1918 at 2.45 pm

E J Blackmore Dep Regd

South Australia.

(CERTIFICATE OF TITLE.)

Register Book,

Vol. 1328 Folio 17

New Certificate of Title for the whole of the land in Vol. 163. Folio 248

James Gilbertson of Waterloo Farm near Virginia Farmer

is the proprietor of an estate in fee simple

subject nevertheless to such incumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in

That SECTION of land situated in the Hundred of Port Adelaide COUNTY of Adelaide

Reg Gen No. 5016 containing ~~forty nine~~ fifty two acres, or thereabouts

and bounded as appears in the plan in the margin hereof

which said Section is delineated in the public map of the said Hundred deposited in the Lands and Survey Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this twentysecond day of May 1924

Signed the 22nd day of May 1924, in the presence of W. O. Shaw.

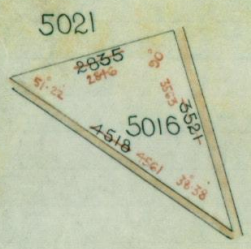
W. Blenkhorn
Registrar-General.

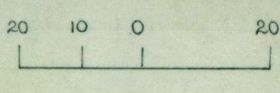
For Corrections in red vide Letter 357 of 1925
W. Mathews Reg Gen

Transfer No. 885799 from James Gilbertson to Sinclair Scott & Co Limited whose registered office is situated at Currie Street Adelaide of in estate in fee simple in the within land Produced for registration the 9 day of April 1924 at 3 pm
W. H. Westwood Dep Reg Gen

Mortgage No. 885800 from Sinclair Scott & Co Limited to James Gilbertson Produced for registration the 9 day of April 1924 at 3 pm (Including other land)
W. H. Westwood Dep Reg Gen

Mortgage No. 885801 from Sinclair Scott & Co Limited to James Gilbertson Produced for registration the 9 day of April 1924 at 3 pm (Including other land)
W. H. Westwood Dep Reg Gen





DISCHARGE OF THE above MORTGAGE
NO. 885801
BY RECEIPT ENDORSED THEREON PRODUCED
FOR REGISTRATION THE 8 DAY OF
April 1926 AT 11.12 A.M.
DEP. REG. GEN.

Mortgage No 958658 from Sinclair Scott & Co Limited to Allan Sinclair Percy Venning Scott and Stanley Bruce Sinclair as Tenants in Common Produced for registration the 8 day of April 1926 at 11.15 am (including other land)

Dep Rg Gen

Caveat No 1019854 dated the 5 day of November 1927 over the within land Produced for registration the 2 day of November 1927 at 11.25 am (including other land)

Dep Rg Gen

The within Caveat No. 1019854 was withdrawn on the 26 day of April 1928 as appears by Memorandum No. 1035302. Produced for registration the 27 day of April 1928 at 12.30 pm.

Dep Reg Genl

DISCHARGE OF THE within MORTGAGE
No. 885800
BY ENDORSEMENT THEREON
PRODUCED FOR REGISTRATION THE 27 DAY OF April 1928 AT 12.30 pm
DEP. REG. GENL.

DISCHARGE OF THE within MORTGAGE
No. 458658
BY MEMORANDUM No. 1035303
PRODUCED FOR REGISTRATION THE 27 DAY OF April 1928 AT 12.30 pm
DEP. REG. GENL.

CANCELLED

AND New
CERTIFICATE OF TITLE ISSUED
VIDE Letter No 677 of 1928
VOL 1510 FOL 168
DEP. REG. GENL.

1881

(C.)

South Australia.

[CERTIFICATE OF TITLE.

Register Book,

Vol. CLXIII Folio. 148

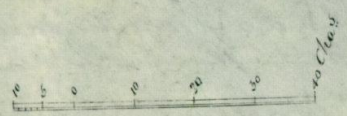
David Duck of Salisbury Farmer is now seised of an estate in fee simple, subject, nevertheless, to such incumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon in That Section of land situated in the Hundred of Port Adelaide County of Adelaide No 5016 containing forty nine acres or thereabouts and bounded as appears in the plan in the margin hereof

which said Section is delineated in the public map of the said Hundred, deposited in the office of the Surveyor-General, and was originally granted the 4th day of December 1852 under the hand and seal of Sir Henry Edward Fox Young Lieutenant Governor of the said province to George Mapplett

In witness whereof, I have hereunto signed my name and affixed my seal this Eleventh day of April one thousand eight hundred and Seventy Five

J W Andrews
Registrar-General.

Signed, the 11th day of April 18 75, in presence of } W G Dyce



CANCELLED
AND New CERTIFICATE OF TITLE
ISSUED vide Letter No 695 of 1927
VOL 1328 FOL 17
A H Sager
DEP. REC. GEN.

Transfer No 135640 from David Duck to James Gilbertson of Waterloo Farm near Virginia Farmer of the above land. Produced the 14 day December 1881 at 11 am
W Manchester Dep Reg Gen

Mortgage No 135641 from James Gilbertson to David Duck. Produced the 14 day December 1881 at 11 am (Including also other property)
W Manchester Dep Reg Gen

Mortgage No 135642 from James Gilbertson to Alexander George Downer and John William Downer. Produced the 14 day December 1881 at 11 am (Including also other property)
W Manchester Dep Reg Gen

The time for payment of the above Mortgage No 135641 is Extended as regards the sum of £400 till the 9th day of December 1886 as appears by Endorsement thereon dated the 13th day of December 1886 Produced for registration the 16th day of December 1886 at 2.25 p.m.
W Manchester Deptly Gen

Over

The within Mortgage No 135641 has been transmitted to George Lambert of Prospect Gentleman and Alice Verrall (formerly Duck) of Salisbury the executors named in the will dated the 1 day March 1887 of the within named David Duck who died on the 28 day March 1890 as appears by Probate dated the 17 day May 1890 Produced for registration the 9 day February 1893 at 9 o'clock (No 267541)

E J Heath Dep Reffrar

The time for the payment of the within Mortgage No 135641 has been extended to the 9 day February 1896 as appears by endorsement thereon dated the 8 day February 1893 Produced for registration the 9 day February 1896 at noon

E J Heath Dep Reffrar

Order of Supreme Court No 307436 dated the 13 day July 1903 vesting the within Mortgage No 135641 in George Lambert of Hermitage near Houghton Farmer upon trust of the will of the within named David Duck Produced for registration the 14 day August 1903 at 11.50 am

E J Heath Dep Reg Genl

DISCHARGE OF THE WITHIN MORTGAGE
No. 135641 BY MEMORANDUM
No. 401226 PRODUCED FOR REGISTRATION THE 29 DAY OF October
1903 AT 2.30 pm
E J Heath DEP. REG. GENL

DISCHARGE OF THE WITHIN MORTGAGE
No. 135641 2 BY RECEIPT ENDORSED THEREON PRODUCED FOR REGISTRATION THE 29 DAY OF October 1903
AT 2.30 pm.
E J Heath DEP. REG. GENL.

Mortgage No 401227 including other lands from James Gilberton to Walter Russell Alexander George Downer and Peter Waite Produced for registration the 29 day October 1903 at 2.30 pm

E J Heath Dep Reg Genl

Mortgage No 401228 including other lands from James Gilberton to Alexander George Downer and Sir John William Downer K.C.M.G. Produced for registration the 29 day October 1903 at 2.30 pm

E J Heath Dep Reg Genl

The within named John William Dawson died on the 2 day of August 1915 as appears by Office Copy of Certificate of Death No 6781 Produced for registration the 26 day of July 1917 at 2.30 pm

Robt Allcock Dep Reg

The within Mortgage No 401228 was transmitted to Frank Hagger Downer of Adelaide Solicitor and Elder Trustee and Executor Company Limited whose registered office is at Leigh St Adelaide the Attorney of James Frederick Downer of London for the use and benefit of the said James Frederick Downer and until he shall duly apply for and obtain Probate)

Summary

AS THE EXECUTORS NAMED IN THE WILL DATED THE 26 DAY OF July 1909 OF THE within NAMED Alexander George Downer WHO DIED ON THE 17 DAY OF August 1916 AS APPEARS BY PROBATE DATED THE DAY OF December 1916 PRODUCED FOR REGISTRATION THE 26 DAY OF July 1917 AT 2.30 pm
NO. 401228
Robt Allcock DEP. REG. GENL

Lott 1649679 N.H. Clerk

DISCHARGE OF THE within MORTGAGES
NO. 401227 and 401228
REGISTRATION THE 12 DAY OF March 1918 AT 12.15 pm
W H Salter DEP. REG. GENL

Mortgage No 689455 from James Gilberton to The Savings Bank of South Australia Produced for registration the 12 day of March 1918 at 12.15 pm (Including other lands)

W H Salter Dep Reg Genl

Mortgage No 689864 from James Gilbertson to Frank Hagger Downer Elder's Trustee and Executor Company Limited Mrs Stella Downer and James Frederick Downer Produced for registration the 18 day of March 1918 at 2.45 pm (Including other land)

J S Blackburn Dep Reg Genl

DISCHARGE OF THE above MORTGAGES
NO. 689455 and 689864
BY RECEIPT ENDORSED THEREON PRODUCED FOR REGISTRATION THE 9 DAY OF April 1918 AT 3 pm
Robt Allcock DEP. REG. GENL

(See Face of C.T.)

South Australia.

(CERTIFICATE OF TITLE.)

Register Book,

Vol. 1092 Folio 151

New Certificate of Title from Vol. 1096 Folio 38

James Gilbertson of Virginia Farmer is

the proprietor of an estate in fee simple

subject nevertheless to such incumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in

those SECTIONS of land situated in the Hundred of Port Adelaide COUNTY of Adelaide

Sec 185, and 186, ~~and~~ each containing one hundred and two acres or thereabouts and 5010 ~~each~~ containing one hundred and ~~the~~ eight acres and one rood or thereabouts and

Rec. Gen. 21/3/26 5017 containing forty, ~~seven~~ eight acres and one rood and twenty perches or thereabouts

and bounded as appears in the plan in the margin hereof

which said Sections are delineated in the public map of the said Hundred deposited in the office of the Surveyor-General.

In witness whereof I have hereunto signed my name and affixed my seal this Third day of May 1918

Signed the 3rd day of May 1918, in the presence of Muriel Baykett

G. Wolfendanthony

Registrar-General.

For Corrections in red vide Letter 357 of 1925

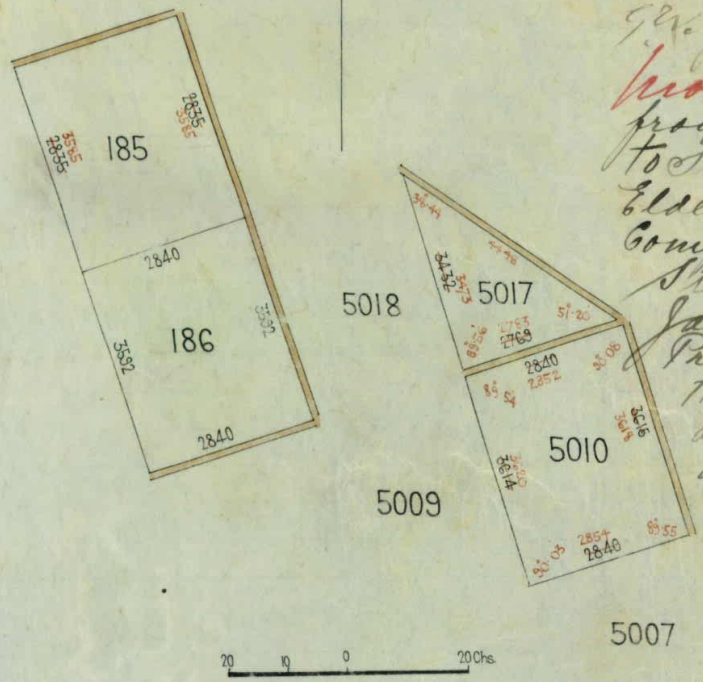
J. M. Henkner Rec. Gen. 21/3/26

Mortgage No. 689455 from James Gilbertson to The Savings Bank of South Australia Produced for registration the 12 day of March 1918 at 12.15 p.m. (Including other land)

G. Wolfendanthony Reg. Genl.

Mortgage No. 689864 from James Gilbertson to Frank Hagger Downer Elder's Trustee and Executor Company Limited Una Stella Downer and James Frederick Downer Produced for registration the 18 day of March 1918 at 2.45 p.m. (Including other land)

J. M. Henkner Dep. Reg. Genl.



Discharge of the above Mortgage No. 689455 and 689864 by receipt endorsed thereon produced for record this 9 day of April 1924 at 3 p.m.

Henry Rowland
Dep. Reg. Genl.

Transfer No 885799 from James Gilberton to Sinclair Scott & Co. Limited whose registered office is situated at Currie Street Adelaide of an estate in fee simple in the within land. Produced for registration the 9 day of April 1926 at 3 pm

R W Sherwood Dep Reg Genl.

Mortgage No. 885800 (Including other land) from Sinclair Scott & Co Limited to James Gilberton. Produced for registration the 9 day of April 1926 at 3 pm

R W Sherwood Dep Reg Genl

Mortgage No. 885801 (Including other land) from Sinclair Scott & Co Limited to James Gilberton. Produced for registration the 9 day of April 1926 at 3 pm

R W Sherwood Dep Reg Genl

DISCHARGE OF THE above MORTGAGE
NO. 885801
BY RECEIPT ENDORSED THEREON PRODUCED
FOR REGISTRATION THE 8 DAY OF
April 1926 AT 11.15 a m

H Bowe DEP. REG. GENL.

Mortgage No. 958658 from Sinclair Scott & Co Limited to Allan Sinclair Percy Venning Scott and Stanley Bruce Sinclair as Tenants in Common Produced for registration the 8 day of April 1926 at 11.15 am (Including other land)

H Bowe Dep Reg Gen

Caveat No. 1019854 dated the 5 day of November 1927 over the within land Produced for registration the 5 day of November 1927 at 11.55 am (Including other land)

R W Sherwood Dep Reg Genl

The within Caveat No. 1019854 was withdrawn on the ~~27~~ 26 day of April 1928 as appears by Memorandum No. 1035302. Produced for registration the 27 day of April 1928 at 12.30 pm.

H Cornish Dep Reg Genl

DISCHARGE OF THE within MORTGAGE
No. 885800
BY ENDORSEMENT THEREON
PRODUCED FOR REGISTRATION THE 27 DAY OF
April 1928 AT 12.30 pm

H Cornish
DEP. REG. GENL.

DISCHARGE OF THE within MORTGAGE
No. 958658
BY MEMORANDUM No. 1035303
PRODUCED FOR REGISTRATION THE 27 DAY OF
April 1928 AT 12.30 pm

H Cornish
DEP. REG. GENL.

CANCELLED
as regards the within Sections 185 and 186
AND New
CERTIFICATE OF TITLE ISSUED
VIDE Letter No. 675 of 1928
VOL. 1510 FOL. 167

J Burns DEP. REG. GENL.

CANCELLED
as regards the within Section 5017
AND New
CERTIFICATE OF TITLE ISSUED
VIDE Letter No. 677 of 1928
VOL. 1510 FOL. 168

J Burns DEP. REG. GENL.

CANCELLED
AND Balance Sec. 5010
CERTIFICATE OF TITLE ISSUED
VIDE Letter No. 676 of 1928
VOL. 1510 FOL. 170

J Burns DEP. REG. GENL.

Mortgage No 689455 from James Gilbertson to the Savings Bank of South Australia produced for registration the 12 day of March 1918 at 12.15 pm including other land
N H Walters Deputy

(C) South Australia. (CERTIFICATE OF TITLE.)

Register Book,

Vol. CCCCXLVI Folio 38

Pursuant to Memorandum of Transfer No: 172786.

James Gilbertson of Waterloo Farmer is now Seized of an estate in fee simple

subject nevertheless to such incumbrances, liens, and interests, as are notified by memorial underwritten or endorsed hereon, in those Sections of land situated in the Hundred of ~~Munno Para~~ Port Adelaide County of Adelaide No.s 185. 186. 501A each containing one hundred and two acres or thereabouts and 501B containing forty seven acres or thereabouts and bounded as appears in the plan in the margin hereof

pr Act 1929 23/7/89

which said Sections are delineated in the public map of the said Hundred, deposited in the office of the Surveyor-General.

W Manfaulte
Registrar-General.

In witness whereof, I have hereunto signed my name and affixed my seal this twenty eighth day of March one thousand eight hundred and eighty-four in presence of

R Earl

CANCELLED
AND New CERTIFICATE OF TITLE
ISSUED vide A.T. Letter 343 of 1918
VOL. 1092 FOL. 151
DEP. REG. GENL

Mortgage No 172482 (including also other property) from William Gilbertson James Gilbertson and Joseph Gilbertson to Charles Stewart Produced the 10 day March 1884 at 1 p.m
W Manfaulte Dep Reg Genl

Mortgage No 172483 (including also other property) from William Gilbertson James Gilbertson and Joseph Gilbertson to Alexander George Downer and John William Downer Produced the 10 day March 1884 at 1 p.m.
W Manfaulte Dep Reg Genl

The within Mortgage No 172482 has been transmitted to Mary Ann Stewart of Payneham widow the executrix named in the will dated the 10 day March 1880 of the within named Charles Stewart who died on the 15 day January 1885 as appears by Probate dated the 21 day March 1885 produced for registration the 25 day March 1889 at noon (No 228259) W Manfaulte Dep Reg Genl

The time for the payment of the within Mortgage No 172482 has been extended to the 21 day February 1892 with interest at the rate of £5 per centum per annum as appears by endorsement thereon Produced for registration the 26 day March 1889 at 2.55 pm
W Manfaulte Dep Reg Genl

Lease No 250017. from James Gilberson to Thomas Cunnow of the above Section 5010. Term five years from the 2nd day of March 1891. Produced for registration the 31st day of July 1891 at 11.35 a.m.
E. J. Heath Dep Reg Genl

The within Mortgage No 172482 is discharged from the sum of £3000 as appears by Memorandum No 256694. Produced for registration the 29 day February 1892 at 11.15 am
E. J. Heath Dep. Reg. Genl

Mortgage No 305799. (~~Including also other property~~) from James Gilberson to Alfred Stephen Chapman Walter Reynell and Alexander George Downer produced for registration the 11 day July 1896 at 11. 10 am.
E. J. Heath Dep Reg. Genl

Mortgage No 305802. (~~Including also other property~~) from James Gilberson to Alexander George Downer and Sir John William Downer produced for registration the 11 day July 1896 at 11. 10 am.
E. J. Heath Dep Reg Genl

Lease No 381207 from James Gilberson to John George Bardett the younger of the within Sec. 5010 Term three years from the 3 day March 1902 Produced for registration the 2 day June 1902 at noon
E. J. Heath Dep Reg Genl

The time for payment of the above Mortgage No 305799 is extended until the 3 day of May 1907 with Interest at the rate of £4/10/ per centum per annum as appears by Memorandum No. 417702 Produced for registration the 22 day of December 1904 2.55 pm
Vernon H Edwards Dep Reg Genl

No 584068 Memorandum of Appointment whereby the above Mortgage No 305799 is now vested in Walter Reynell of Reynella Gentleman Alexander George Downer of Adelaide Solicitor and Elders Trustee & Executor Co limited of Currie Street Adelaide pursuant to the Trustee Act 1893 Produced for registration the 27 day of March 1913 at 11 am
Vernon H Edwards Dep Reg Genl

See page 7 C.T.

Discharge of the within Mortgages No 172482 and 172483 by receipts endorsed thereon produced for registration the 11 day July 1896 at 11.10 am
E. J. Heath Dep. Reg Genl

No 624358 Memorandum of Appointment whereby the within Mortgage No 305799 is now vested in Walter Reynell of Reynella Gentleman Elders Trustee and Executor Company Limited of Currie Street Adelaide and James Frederick Downer of Adelaide Solicitor Pursuant to the Trustee ~~and~~ Act 1893 Produced for registration the 19 day of August 1915 at 2.40 pm
W. H. Salter Dep Reg Genl

The within named John William Downer died on the 12 day of August 1915 as appears by Official Copy of Certificate of Death No 17916 Produced for registration the 26 day of July 1916 at 2.30 pm
Hob. Alexander Dep Reg

The within Mortgage No 305802 was transmitted to Frank Tagger Downer of Adelaide Solicitor and Elders Trustee and Executor Company Limited whose registered office is at Currie Street Adelaide (the lawful attorney of James Frederick Downer of Sandy for the use and benefit of the said James Frederick Downer and until he shall duly apply for and obtain probate) surviving as the executor named in the will dated the 26th day of July 1907 of the within named Alexander George Downer who died on the 17 day of August 1916 as appears by probate dated the 12 day of December 1916 produced for registration the 23 day of July 1917 at 2.30 pm No 28186
Hob. Alexander DEP. REG. GEN.

Off No 649679 NB Hob G

DISCHARGE OF THE within MORTGAGE NO 305802 BY MEMORANDUM NO 689452 PRODUCED FOR REGISTRATION THE 12 DAY OF March 1918 AT 12.15 pm
N. H. Foster
DEP. REG. GENERAL

DISCHARGE OF THE within MORTGAGE NO 305799 BY MEMORANDUM NO 689453 PRODUCED FOR REGISTRATION THE 12 DAY OF March 1918 AT 12.15 pm
N. H. Foster
DEP. REG. GENERAL

South Australia. (CERTIFICATE OF TITLE.)

Register Book,

Vol. 1407 Folio 196

Pursuant to Application No. 27242.

Sinclair Scott & Co. Limited whose registered office is situated at Currie Street Adelaide is the proprietor of an estate in fee simple subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in those SECTIONS of land situated in the Hundred of Port Adelaide COUNTY of Adelaide No. 5008 containing sixty two acres three roods and twenty five perches or thereabouts 5018 containing one hundred and two acres three roods and twenty perches or thereabouts 5019 containing forty five acres three roods and three perches or thereabouts 5020 containing fifty acres and thirty two perches or thereabouts 5022 containing one hundred and two acres and ten perches or thereabouts and 5023 containing one hundred and two acres and twelve perches or thereabouts

and bounded as appears in the plan in the margin hereof which said Sections are delineated in the public map of the said Hundred deposited in the Lands and Survey Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this fifteenth day of February 1926

Signed the 15th day of February 1926, in the presence of H. B. Shaw.

Registrar-General.

Mortgage No. 958657 from Sinclair Scott & Co. Limited to James Gilberson Produced for registration the 8 day of April 1926 at 11.15 am

Dep Reg Gen

Mortgage No. 958658 from Sinclair Scott & Co. Limited to Allan Sinclair Percy Venning Scott and Stanley Bruce Sinclair as Tenants in Common. Produced for registration the 8 day of April 1926 at 11.15 am (Including other land)

Dep Reg Gen

Caveat No. 1019854 dated the 5 day of November 1927 over the within land Produced for registration the 5 day of November 1927 at 11.25 am (Including other land)

Dep Reg Gene

The within Caveat No. 1019854 was withdrawn on the 26 day of April 1928 as appears by Memorandum No. 1035302. Produced for registration the 27 day of April 1928 at 12.30 pm.

Dep Reg Gen

(over)

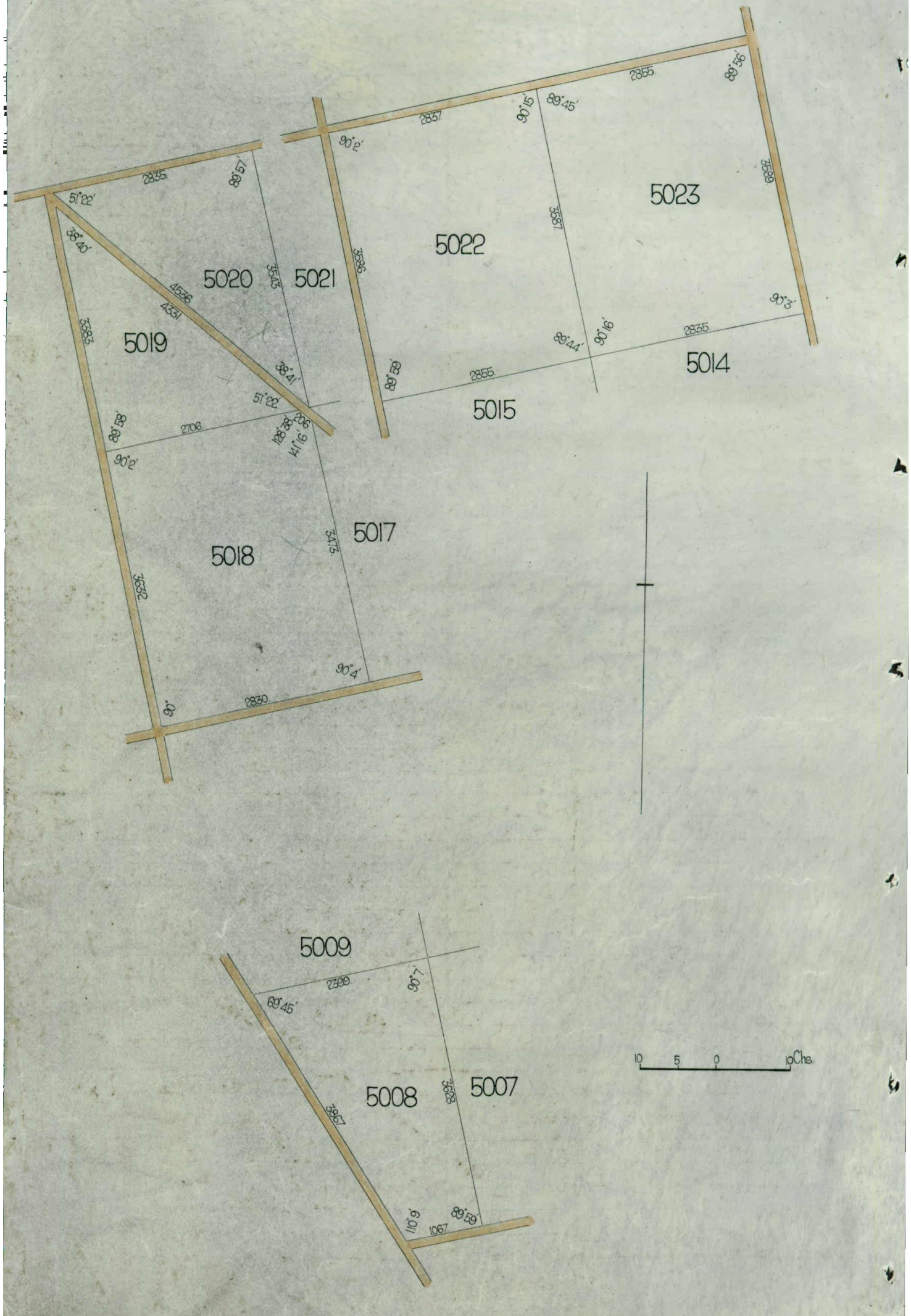
DISCHARGE OF THE within MORTGAGE
No. 958657
BY ENDORSEMENT THEREON
PRODUCED FOR REGISTRATION THE 27 DAY OF
April 1928 AT 12.30 pm
H A Carmichael
DEP. REG. GENL.

DISCHARGE OF THE within MORTGAGE
No. 958658
BY MEMORANDUM No. 1035303
PRODUCED FOR REGISTRATION THE 27 DAY OF
April 1928 AT 12.30 pm.
H A Carmichael
DEP. REG. GENL.

CANCELLED
as regards the within Sections 5018. 5019. 5020
AND New
CERTIFICATE OF TITLE ISSUED
VIDE Letter No 677 of 1928
VOL. 1510 FOL. 168
J Burnes DEP. REG. GENL.

CANCELLED
as regards the within Sections 5022. 5023
AND New
CERTIFICATE OF TITLE ISSUED
VIDE Letter No 678 of 1928
VOL. 1510 FOL. 169
J Burnes DEP. REG. GENL.

CANCELLED
AND Balance
CERTIFICATE OF TITLE ISSUED
VIDE Letter No 676 of 1928
VOL. 1510 FOL. 170
J Burnes DEP. REG. GENL.


5020
5021
5019
5018
5017
5022
5023
5014
5015
5009
5008
5007
2835
89°57'
51°22'
38°40'
4536
4331
3543
3583
38°41'
51°22'
89°58'
2706
128°38'
206
141°16'
90°2'
3473
3632
90°4'
2830
90°
2857
90°15'
89°45'
2855
89°56'
3587
3586
3589
90°3'
89°44'
90°16'
2835
89°59'
2855
2399
90°7'
69°45'
3867
3628
110°9'
89°59'
1067
10 5 0 10 Chs.

South Australia

(CERTIFICATE OF TITLE)

Register Book,

Vol. 2828 *Folio* 31

Pursuant to Memorandum of Transfer No.2234262 Registered on Vol.2443 Folio 151

MINISTER OF WORKS

is the proprietor of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in THAT PIECE of land situated in the HUNDRED OF PORT ADELAIDE COUNTY OF ADELAIDE being the SECTIONS 5016 containing fifty acres and three roods or thereabouts and 5020 containing fifty acres and one rood or thereabouts and PORTION OF SECTION 5021 containing forty three acres three roods and twenty perches or thereabouts and more particularly delineated and bounded as appears in the plan in the margin hereof and therein colored green

Which said Section s are delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this second day of December 1960

Signed the 2nd day of December 1960, in the presence of W. Knolder

Registrar-General.

REGISTRAR-GENERAL SOUTH AUSTRALIA

T2/25855

Closed Road. Vide Tracing No. 5274.

Dep. Reg. Genl.

TRANSFER No. 2725855 to John Omagh Robinson and Mavis Robinson of portion Part section 5021

OF THE WITHIN PRODUCED 18.5.1966 AT 11.20 a.m.

DEP. REG. GEN.

CANCELLED AS REGARDS ABOVE LAND AND NEW C.T. ISSUED VOL. 3414 FOL. 130

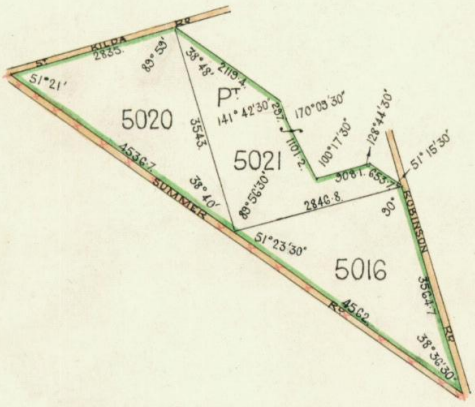
15 JUN 1966

DEP. REG. GEN.

CANCELLED

AND ISSUED VIDE 11105 Balance 2725856 CERTIFICATE OF TITLE VOL. 3414 FOL. 131

DEP. REG. GENL.



South Australia.

(CERTIFICATE OF TITLE.)

Register Book,

Vol. 2443 *Folio* 151

Balance Certificate of Title from Vol. 2369 Folio 114

JOHN OMAGH ROBINSON of Salisbury Farmer and MAVIS ROBINSON his wife

are the proprietors of an estate in fee simple

subject nevertheless to such encumbrances liens and interests as are notified by memorial underwritten or endorsed hereon in THAT PIECE of land situated in the HUNDRED OF PORT ADELAIDE COUNTY OF ADELAIDE being the SECTIONS 5016 containing fifty acres two roods and thirty two perches or thereabouts and 5020 containing fifty acres and thirty two perches or thereabouts and PORTION OF SECTION 5021 containing one hundred acres two roods and eighteen perches or thereabouts and more particularly delineated and bounded as appears in the plan in the margin hereof and therein colored green

50 - 2 - 32
50 - 32
100 2 18
201 - 2 - 2

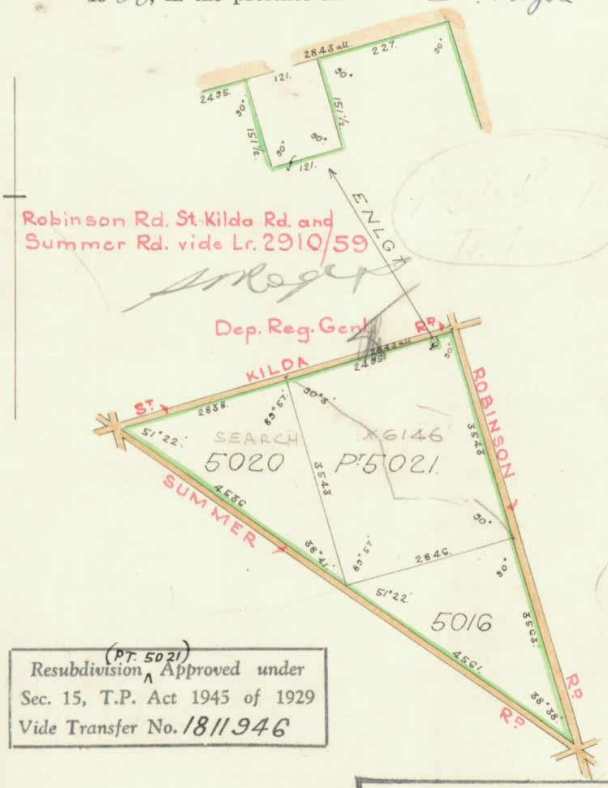
Which said Sections are delineated in the public map of the said Hundred deposited in the Land Office at Adelaide.

In witness whereof I have hereunto signed my name and affixed my seal this twenty first day of March 1956

Signed the 21st day of March 19 56, in the presence of R. B. Payne

Registrar-General.

REGISTRAR-GENERAL SOUTH AUSTRALIA



Resubdivision (PT. 5021) Approved under Sec. 15, T.P. Act 1945 of 1929 Vide Transfer No. 1811946

Resubdivision Approved under Sec. 11 T.P. Act 1929-1957 Vide Lr. 4003 of 1960

Mortgage No. 1613863 from John Omagh Robinson and Mavis Robinson to Commonwealth Bank of Australia Produced for registration the 22 day of March 1950 at 11.40 a.m.

Reg.Genl.

Mortgage No. 1648813 from John Omagh Robinson and Mavis Robinson to Commonwealth Bank of Australia Produced for registration the 3 day of November 1950 at 2.40 p.m.

Reg.Genl.

The within Mortgage No. 1648813 is vested in Commonwealth Trading Bank of Australia Vide No. 1934954 Produced for registration the 7 day of March 1956 at 11.30 a.m.

Reg.Genl.

Powers of Attorney Nod. 1437463. 1845116 and 1806998

Reg.Genl.

(C/N. 2205467) D. 1613863.

THE WITHIN MORTGAGE No. 1613863 IS VESTED IN COMMONWEALTH TRADING BANK OF AUSTRALIA VIDE No. 2205467 PRODUCED FOR REGISTRATION THE 25 DAY OF May 1960 AT 11.25 am

DEP. REG. GENL.

P/A. No 2178164 D.R.A.

DISCHARGE OF MORTGAGE No. 1613863 BY ENDORSEMENT THEREON. PRODUCED 25/5/1960 AT 11.25 am

DEP. REG. GEN.

D 1648813 T 1934954 7

P/A. 2177746 J.P. Bennett

J.A.G

DISCHARGE OF MORTGAGE No. 1648813. BY ENDORSEMENT THEREON. PRODUCED 28.9.1960 AT 11.15am.
J.P. Bennett DEP. REG. GEN.

TRANSFER No. 2234262.
to Minister of Works.
OF THE WITHIN Sections 5016, 5020 and pt of part Section 5021.
PRODUCED 28.9.1960 AT 11.15am
J.P. Bennett DEP. REG. GEN.
CANCELLED AS REGARDS ABOVE LAND AND NEW C.T. ISSUED
VOL. 2828 FOL. 31
J.A. Rogers DEP. REG. GEN.

~~F 2250084~~

TRANSFER No. 2245352 to Giuseppe Reverazzi of one undivided third part Carmine Reverazzi of one undivided third part and to Mario Reverazzi and Rosa Reverazzi of one undivided third part in portion
OF THE WITHIN Part Sec. 5021
PRODUCED 11/11/1960 AT 11.30am
B.L. Nairn DEP. REG. GEN.
CANCELLED AS REGARDS ABOVE LAND AND NEW C.T. ISSUED
VOL. 2860 FOL. 73
S.E. Cresswell DEP. REG. GEN.

TRANSFER No. 2250084 to
George Trotta and
Bianca Irene Trotta of portion
OF THE WITHIN Part Sec. 5021
PRODUCED 1/12/1960 AT 1.15pm
B.L. Nairn DEP. REG. GEN.
CANCELLED AS REGARDS ABOVE LAND AND NEW C.T. ISSUED
VOL. 2860 FOL. 74
S.E. Cresswell DEP. REG. GEN.

L.N.C.T. VIDE DKT. 2675/1964.

CANCELLED
AND Balance CERTIFICATE OF TITLE
ISSUED VIDE Lt 2675/1964 VOL. 3219 FOL. 195
B.L. Nairn DEP. REG. GENL.

Product	Child Parent Title Search
Date/Time	14/06/2022 10:56AM
Customer Reference	63155 MS
Order ID	20220614003055

Certificate of Title

Title Reference:	CT 5211/524
Status:	CANCELLED
Parent Title(s):	CT 3414/131
Dealing(s) Creating Title:	CONVERTED TITLE
Title Issued:	31/08/1994
Title Cancelled:	07/01/2000
Edition:	2

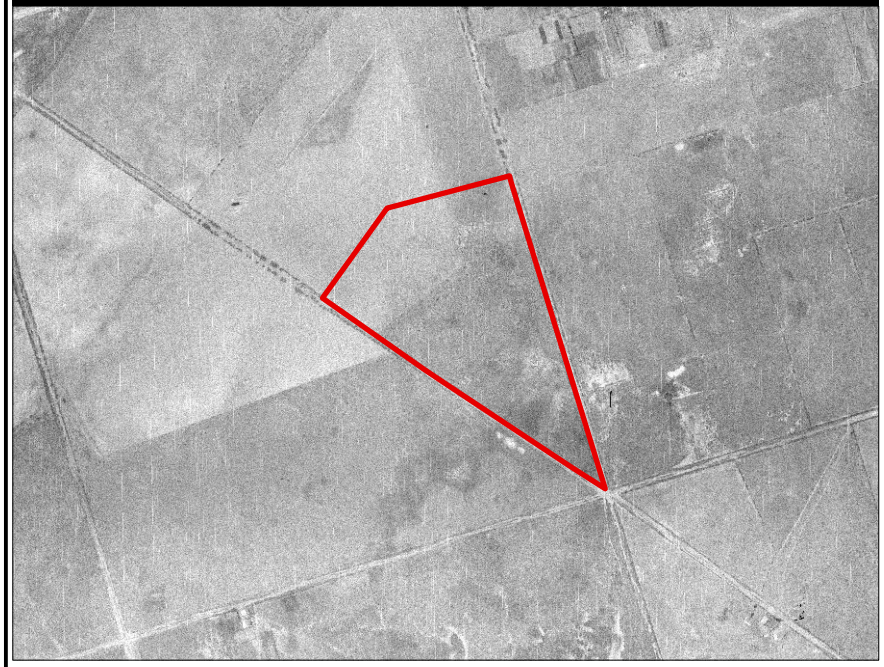
Child Titles

Title Reference	Status	Estate Type	Plan / Parcel	Proprietors/Lessees/ Custodians at time of issue
CT 5723/298	CURRENT	EASEMENT ONLY	F115108 ALLOTMENT 4	ETSA UTILITIES PTY. LTD.
CT 5723/299	CURRENT	FEE SIMPLE	F115108 ALLOTMENT 3 F115108 ALLOTMENT 4	SOUTH AUSTRALIAN WATER CORPORATION

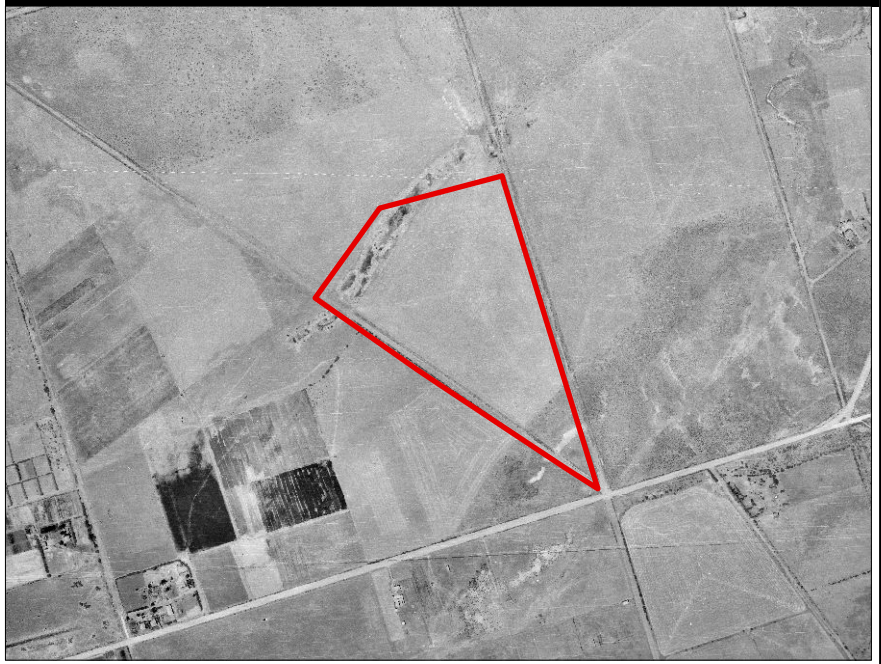
Copyright: www.landservices.com.au/copyright | Privacy: www.landservices.com.au/privacy | Terms of Use: www.landservices.com.au/sailis-terms-of-use

Appendix E – Historical Aerial Photographs

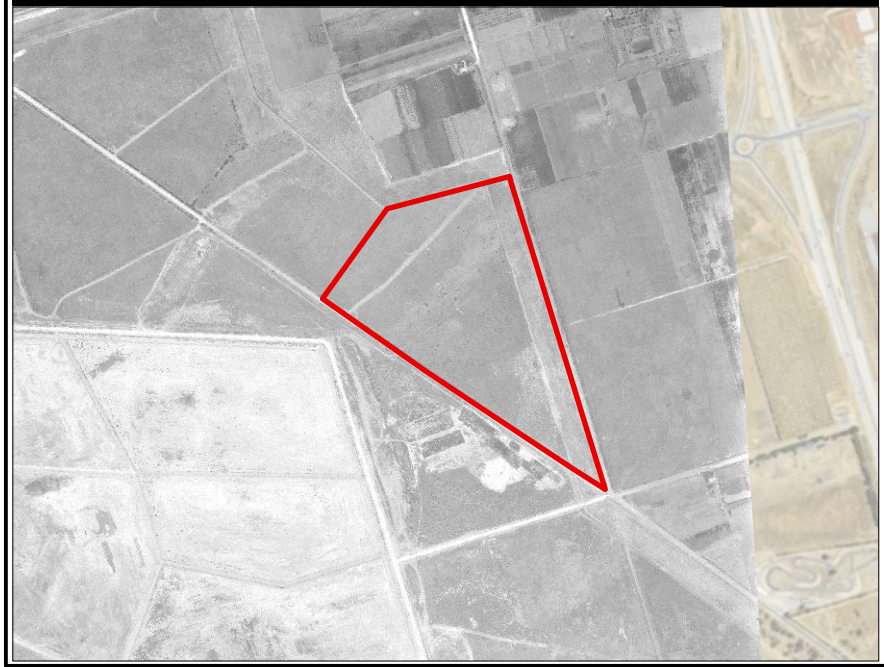
HISTORICAL AERIAL 1949



HISTORICAL AERIAL 1959



HISTORICAL AERIAL 1969



HISTORICAL AERIAL 1979

Legend

Site Boundary

JBS&G

Job No: 63155	
Client: Renascor	
Version: FINAL	Date: 06-Jul-2022
Author: twilliamson	Checked By: MS
Scale 1:17,500	

0 25 50

metres

Coord. Sys. GDA2020 MGA Zone 54

Robinson Road, Waterloo Corner, South Australia

HISTORICAL AERIALS (1949 - 1979)

APPENDIX E

File Name: C:\Users\twilliamson\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Renascor\GIS\63155 PSI and Soil Investigation, Waterloo Corner\02_MapProjects\63155_Renascor_WaterlooCorner_PSI_v6.aprx/61355_003a_HistoricalAerial
Reference: ESRI Topographic Basemap - Accessed Imagery: 06/07/2022

HISTORICAL AERIAL 1989

HISTORICAL AERIAL 1999

HISTORICAL AERIAL 2009

HISTORICAL AERIAL 2019

Legend

Site Boundary

JBS&G

Job No: 63155	
Client: Renascor	
Version: FINAL	Date: 27-Jul-2022
Author: twilliamson	Checked By: MS
Scale 1:17,500	

0 250 500

metres

Coord. Sys. GDA2020 MGA Zone 54

Robinson Road, Waterloo Corner, South Australia

HISTORICAL AERIALS (1989 - 2019)

APPENDIX E

File Name: C:\Users\twilliamson\JBS&G Australia\JBS&G - DCS - Internal - Documents\Projects\Renascor\GIS\63155 PSI and Soil Investigation, Waterloo Corner\02_MapProjects\63155_Renascor_WaterlooCorner_PSI_v11.aprx/61355_003b_HistoricalAerial
Reference: ESRI Topographic Basemap - Accessed Imagery: 27/07/2022

Appendix F - Government Records

Environment Protection Authority
GPO Box 2607 Adelaide SA 5001
211 Victoria Square Adelaide SA 5000
T (08) 8204 2004
Country areas 1800 623 445

Receipt No :
Admin No : 16879 (72805)

JBS&G
100 Hutt Street
ADELAIDE SA 5000

Contact: Section 7
Telephone: (08) 8204 2026
Email: epasection7@sa.gov.au

Contact: Public Register
Telephone: (08) 8204 9128
Email: epa.publicregister@sa.gov.au

06 June, 2022

EPA STATEMENT TO FORM 1 - CONTRACTS FOR SALE OF LAND OR BUSINESS

The EPA provides this statement to assist the vendor meet its obligations under section 7(1)(b) of the *Land and Business (Sale and Conveyancing) Act 1994*. A response to the questions prescribed in Schedule 1-Contracts for sale of land or business-forms (Divisions 1 and 2) of the *Land and Business (Sale and Conveyancing) Act 1994* is provided in relation to the land.

I refer to your enquiry concerning the parcel of land comprised in

Title Reference	CT Volume 5723 Folio 299
Address	Bolivar WWTP, Allotments 3 & 4 (FP 115108), Bolivar Interchange Connector Road, BOLIVAR SA 5110

Schedule – Division 1 – *Land and Business (Sale and Conveyancing) Regulations 2010*

PARTICULARS OF MORTGAGES, CHARGES AND PRESCRIBED ENCUMBRANCES AFFECTING THE LAND

8. Environment Protection Act 1993

Does the EPA hold any of the following details relating to the *Environment Protection Act 1993*:

8.1	Section 59 - Environment performance agreement that is registered in relation to the land.	NO
8.2	Section 93 - Environment protection order that is registered in relation to the land.	NO
8.3	Section 93A - Environment protection order relating to cessation of activity that is registered in relation to the land.	NO
8.4	Section 99 - Clean-up order that is registered in relation to the land.	NO
8.5	Section 100 - Clean-up authorisation that is registered in relation to the land.	NO
8.6	Section 103H - Site contamination assessment order that is registered in relation to the land.	NO
8.7	Section 103J - Site remediation order that is registered in relation to the land.	NO

8.8	Section 103N - Notice of declaration of special management area in relation to the land (due to possible existence of site contamination).	NO
8.9	Section 103P - Notation of site contamination audit report in relation to the land.	NO
8.10	Section 103S - Notice of prohibition or restriction on taking water affected by site contamination in relation to the land.	NO

Schedule – Division 2 – *Land and Business (Sale and Conveyancing) Regulations 2010*

PARTICULARS RELATING TO ENVIRONMENT PROTECTION

3-Licences and exemptions recorded by EPA in public register

Does the EPA hold any of the following details in the public register:

a)	details of a current licence issued under Part 6 of the *Environment Protection Act 1993* to conduct any prescribed activity of environmental significance under Schedule 1 of that Act at the land?	**YES**
b)	details of a licence no longer in force issued under Part 6 of the *Environment Protection Act 1993* to conduct any prescribed activity of environmental significance under Schedule 1 of that Act at the land?	NO
c)	details of a current exemption issued under Part 6 of the *Environment Protection Act 1993* from the application of a specified provision of that Act in relation to an activity carried on at the land?	NO
d)	details of an exemption no longer in force issued under Part 6 of the *Environment Protection Act 1993* from the application of a specified provision of that Act in relation to an activity carried on at the land?	NO
e)	details of a licence issued under the repealed *South Australian Waste Management Commission Act 1979* to operate a waste depot at the land?	NO
f)	details of a licence issued under the repealed *Waste Management Act 1987* to operate a waste depot at the land?	NO
g)	details of a licence issued under the repealed *South Australian Waste Management Commission Act 1979* to produce waste of a prescribed kind (within the meaning of that Act) at the land?	NO
h)	details of a licence issued under the repealed *Waste Management Act 1987* to produce prescribed waste (within the meaning of that Act) at the land?	NO

4-Pollution and site contamination on the land - details recorded by the EPA in public register

Does the EPA hold any of the following details in the public register in relation to the land or part of the land:

a)	details of serious or material environmental harm caused or threatened in the course of an activity (whether or not notified under section 83 of the *Environment Protection Act 1993*)?	NO

b)	details of site contamination notified to the EPA under section 83A of the *Environment Protection Act 1993*?	NO
c)	a copy of a report of an environmental assessment (whether prepared by the EPA or some other person or body and whether or not required under legislation) that forms part of the information required to be recorded in the public register?	NO
d)	a copy of a site contamination audit report?	NO
e)	details of an agreement for the exclusion or limitation of liability for site contamination to which section 103E of the *Environment Protection Act 1993* applies?	NO
f)	details of an agreement entered into with the EPA relating to an approved voluntary site contamination assessment proposal under section 103I of the *Environment Protection Act 1993?*	NO
g)	details of an agreement entered into with the EPA relating to an approved voluntary site remediation proposal under section 103K of the *Environment Protection Act 1993?*	NO
h)	details of a notification under section 103Z(1) of the *Environment Protection Act 1993* relating to the commencement of a site contamination audit?	NO
i)	details of a notification under section 103Z(2) of the *Environment Protection Act 1993* relating to the termination before completion of a site contamination audit?	NO
j)	details of records, held by the former *South Australian Waste Management Commission* under the repealed *Waste Management Act 1987*, of waste (within the meaning of that Act) having been deposited on the land between 1 January 1983 and 30 April 1995?	NO

5-Pollution and site contamination on the land - other details held by EPA

Does the EPA hold any of the following details in relation to the land or part of the land:

a)	a copy of a report known as a "Health Commission Report" prepared by or on behalf of the *South Australian Health Commission* (under the repealed *South Australian Health Commission Act 1976*)?	NO
b)	details (which may include a report of an environmental assessment) relevant to an agreement entered into with the EPA relating to an approved voluntary site contamination assessment proposal under section 103I of the *Environment Protection Act 1993?*	NO
c)	details (which may include a report of an environmental assessment) relevant to an agreement entered into with the EPA relating to an approved voluntary site remediation proposal under section 103K of the *Environment Protection Act 1993*?	NO
d)	a copy of a pre-1 July 2009 site audit report?	NO
e)	details relating to the termination before completion of a pre-1 July 2009 site audit?	NO

Records identified in this EPA Statement to Form 1: **EPA/1534**

The above records have been identified with a YES response in this EPA Statement to Form 1 and can be obtained by contacting the Public Register on (08) 8204 9128 or email epa.publicregister@sa.gov.au

All care and diligence has been taken to access the above information from available records. Historical records provided to the EPA concerning matters arising prior to 1 May 1995 are limited and may not be accurate or complete.

Licence No. 1534

ISSUED:
01 Dec 2020

EXPIRY:
30 Nov 2025

ACN:

SOUTH AUSTRALIAN WATER CORPORATION

Bolivar WWTP, Port Wakefield Road, BOLIVAR SA 5110

Environmental Authorisation under Part 6 of the *Environment Protection Act 1993*

South Australian Environment Protection Authority
GPO Box 2607
Adelaide SA 5001
Tel: 08 8204 2004

Environment Protection Authority

LICENCE NUMBER 1534

LICENSEE DETAILS

Licence Holder: SOUTH AUSTRALIAN WATER CORPORATION

Premises Address(es): Bolivar WWTP, Port Wakefield Road, BOLIVAR SA 5110

LICENSED ACTIVITIES

The Licensee is authorised to undertake, at the location(s) shown above, the following prescribed activities of environmental significance under Schedule 1 Part A of the Act, subject to the conditions in this Licence.

3(4)(b)	Wastewater treatment works (outside MLR WPA)
8(2)(a)	Fuel burning not coal or wood

TERMS OF LICENCE

Commencement Date: 01 Dec 2020

Expiry Date: 30 Nov 2025

Amended Date: 11 Feb 2021

Table of Contents

Licence Explanatory Notes – Do Not Form Part of the Licence 5
Definitions 6
Acronyms 7
Conditions of Licence 8
Attachments 16

Licence Explanatory Notes – Do Not Form Part of the Licence

Compliance with this licence

The EPA seeks to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the quality of the environment according to the principles of ecologically sustainable development. To achieve this objective, the EPA uses a number of regulatory decision making principles and actions outlined in the 'Compliance and enforcement regulatory options and tools' document available on the EPA website.

Notification – serious or material environmental harm caused or threatened

If serious or material environmental harm from pollution is caused or threatened in the course of an activity, the licence holder must, as soon as reasonably practicable after becoming aware of the harm or threatened harm, notify the EPA (preferably on EPA emergency phone number 1800 100 833) of the harm or threatened harm, its nature, the circumstances in which it occurred and the action taken to deal with it in accordance with section 83 of the *Environment Protection Act 1993* (the Act). In the event that the primary emergency phone number is out of order, the licence holder should phone (08) 8204 2004.

Variations, transfers and surrender of a licence

The EPA may impose or vary the conditions of a licence by notice in writing to the licence holder in accordance with sections 45 and 46 of the Act. Public notice may be required where the variation of licence conditions results in a relaxation of the requirements imposed for the protection or restoration of the environment and results in an adverse effect on any adjoining land or its amenity.

If a licence holder wishes to vary the conditions of a licence, transfer a licence to another entity, or surrender a licence, the licence holder must submit an application to the EPA in accordance with the applicable provisions of the Act (sections 45, 49 and 56, respectively). A licence remains in effect and in its original form until such time as any proposed variation, application for surrender, or transfer has been made and approved in writing by the EPA.

Suspension or cancellation of a licence

The EPA may suspend or cancel a licence by notice in writing to the licence holder in accordance with section 55 of the Act if satisfied the licence holder has either obtained the licence improperly, contravened a requirement under the Act or if the holder is a body corporate, a director of the body corporate has been guilty of misconduct of a prescribed kind (whether in this State or elsewhere).

Responsibilities under Environment Protection legislation

In addition to the conditions of any licence, a licence holder must comply with their obligations under all State and Federal legislation (as amended from time to time) including: the *Environment Protection Act 1993;* the *Environment Protection Regulations 2009;* all Environment Protection Policies made under the *Environment Protection Act 1993;* and any National Environment Protection Measures not operating as an Environment Protection Policy under the *Environment Protection Act 1993*

Public Register Information

The EPA maintains and makes available a Public Register of details related to its determinations and other information it considers appropriate (i.e. excluding trade processes or financial information) in accordance with section 109 of the Act. These details include, but are not limited to:

- licensing and beverage container applications and approvals
- enforcement actions
- site contamination
- serious or material environmental harm caused or threatened in the course of an activity
- environment improvement programmes and environment performance agreements
- environment assessment reports; results of testing, monitoring or evaluation required by a licence
- EPA advice or direction regarding development approvals referred to the EPA by a planning authority

Definitions

Unless the contrary intention appears, terms used in this licence that are defined in the Act (including any regulations or environment protection policies made pursuant to the Act) have the respective meanings assigned to those terms by the Act.

THE ACT: The *Environment Protection Act 1993*

PREMISES: The whole of the land comprised in Titles Register - Certificate of Title, Crown Lease and Crown Record.

CT5922/939
CR5757/813
CT5718/706
CT5928/454
CT5928/455
CT5667/516
CT5907/186
CT5667/518
CT5907/185
CT5832/390
CT5820/659
CT5820/658
CT5832/974
CT5746/665
CT5750/784
CT5550/653
CT5907/184
CT5723/299
CT5789/601
CT5803/934
CR5757/821
CR5757/814
CT5881/409
CT5593/239
CR5757/815
CT5561/623
CT5278/129
CT5907/179
CT6135/951
CT6142/472
CT6142/472
CT6142/473
CT6181/33
CT6181/34
CT6181/33
CT6181/35
CT6181/33
CT6209/435
CT6209/436
CT6209/437
CT6209/438

AUTHORISATION FEE PAYMENT DATE: means the anniversary of the grant or renewal of this authorisation.

ENVIRONMENTAL HARM: means the same as is defined in section 5 of the Environment Protection Act 1993.

KEY STAKEHOLDERS: Any person, business or group who has an interest in or is affected by an organisation's activities. It includes but is not limited to local landholders, businesses, residents, special interest groups, councils, the media, and parliamentary representatives.

WASTE: means -

1. As defined under the Environment Protection Act 1993,

1(a) any discarded, dumped, rejected, abandoned, unwanted or surplus matter, whether or not intended for sale or for purification or resource recovery by a separate operation from that which produced the matter; or

1(b) any matter declared by regulation to be waste for the purposes of this Act (following consultation by the Minister on the regulation with prescribed bodies in accordance with the regulations); or

1(c) any matter declared by an environment protection policy to be waste for the purposes of this Act,

whether or not of value.

2. However, waste does not include—

2(a) an approved recovered resource whilst it is being dealt with in accordance with the declaration of that resource—see section 4A; or

2(b) anything declared by regulation or an environment protection policy not to be waste for the purposes of this Act,

even though the resource or the thing so declared might otherwise, but for the declaration, fall within the definition of waste in subsection (1).

WASTEWATER: as defined in the Environment Protection (Water Quality) Policy 2015.

Acronyms

EPA: means Environment Protection Authority

ISO: means International Organisation for Standardization.

NATA: means National Association of Testing Authorities.

WIMP: means Wastewater Irrigation Management Plan

WWTP: means Wastewater Treatment Plant.

Conditions of Licence

The Licensee is authorised to conduct the prescribed activities as described in this Licence at the Premises nominated, subject to the following conditions:

---

1 CONTROL OF EMISSIONS

1.1 DISCHARGE LOCATIONS (S - 162)

The Licensee must:

1.1.1 only discharge treated wastewater to surface waters at the locations set out in Attachment 1 of this Licence.

1.2 ODOUR PREVENTION (S - 10)

The Licensee must take all reasonable and practicable measures to prevent odour from leaving the Premises.

1.3 PREMISES STORMWATER MANAGEMENT (S - 160)

The Licensee must:

1.3.1 take all reasonable and practicable measures to prevent contamination of stormwater resulting from prescribed activities undertaken at the Premises; and

1.3.2 implement appropriate contingency measures to contain the contaminated stormwater at the Premises unless and until the contaminated stormwater is treated to remove the contamination, or is disposed of at an appropriately licensed facility.

1.4 RECYCLED WATER IRRIGATION (S - 161)

The Licensee must, when irrigating recycled water to land at the Premises:

1.4.1 prevent pooling of recycled water; and

1.4.2 prevent runoff of recycled water from the Premises.

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2 OPERATIONAL MANAGEMENT

2.1 AIR POLLUTION CONTROL EQUIPMENT REGISTER (U - 262)

The licensee must:

2.1.1 maintain all air pollution control equipment to ensure that pollution is minimised: and

2.1.2 ensure the register includes:

a the name of the recording officer;

b the date of each inspection of the equipment;

c details of the equipment that was inspected;

d an assessment of whether the equipment was working effectively; and

e the action taken (if required) to rectify and faults or failures.

2.2 BUNDING (S - 5)

The licensee must ensure that all chemicals or chemical products are stored, loaded or unloaded in an appropriately bunded area.

NOTES

The EPA will assess the appropriateness of any bund against the EPA's 'Bunding and Spill Management Guidelines'.

2.3 COMMUNITY ENGAGEMENT PLAN (U - 1239)

The Licensee must:

2.3.1 develop and implement a Community Engagement Plan in consultation with key stakeholders by the compliance date listed below;

2.3.2 provide public access to the Community Engagement Plan (and any subsequent amended version) once developed; and

2.3.3 ensure that the Community Engagement plan includes a methodology for the public access to reporting requirements of licence conditions including, but not limited to:

a Trigger and Action Response Plan;

b Monitoring Plan;

c Wastewater Irrigation Management Plan; and

d Pre-Trial Plan.

Compliance Date: 30-Sep-2021

2.4 COMPLAINTS REGISTER (S - 1)

The Licensee must:

2.4.1 prepare and maintain a register of all complaints concerning environmental issues.

2.4.2 ensure the register includes:

a the date and time that the complaint was made;

b details of the complaint including the likely cause of events giving rise to the complaint;

c the contact details of the complainant (if permitted by the complainant); and

d details of any action taken in response to the complaint by the Licensee.

2.5 DEVELOP AND IMPLEMENT VERMIN MANAGEMENT PLAN (S - 297)

The Licensee must take all reasonable and practicable measures, including development of an appropriate Vermin Management Plan, to minimise the presence of vermin at the Premises.

2.6 ENVIRONMENT IMPROVEMENT PROGRAMME (T - 1027)

The Licensee must:

2.6.1 develop and submit to the EPA by 31 July 2017, an EIP to the satisfaction of the EPA;

2.6.2 ensure the EIP includes, but not be limited to;

a details of actions to be undertaken at the Bolivar Wastewater Treatment Plant to meet annual loads of total nitrogen and suspended solids discharged to waters as per the Adelaide Coastal Waters Quality Improvement Plan (the Plan) targets applicable to SA Water assets of:

i 300 tonnes per year of total nitrogen;

ii 760 tonnes of suspended solids

b clear timeframes for actions to be taken by the Licensee as set out in the EIP; and

c a reporting method to the EPA, including frequency, that demonstrates progress and completion of compliance actions;

2.6.3 implement the EIP (or any revised EIP approved in writing by the EPA) upon approval in writing by the EPA.

Compliance Date: 31-Jul-2017

2.7 GENERIC CONTINGENCY PLAN (S - 120)

The Licensee must prepare an appropriate contingency plan for the Premises to address any spillages, equipment or plant failure that has the potential to increase the risk of harm to the environment.

2.8 IMPLEMENT PRE-TRIAL PLAN (U - 1243)

The Licensee must only implement a Pre-Trial Plan (developed in accordance with condition U-1242) in accordance with its requirements when the Pre-Trial Plan (or any revised Pre-Trial Plan approved in writing by the EPA) has been approved in writing by the EPA.

2.9 POST-TRIAL REPORT (U - 1244)

The Licensee must:

2.9.1 within 90 days of completion of any trial undertaken in accordance with conditions U-1242 and U-1243, provide a Post-Trial report to the satisfaction of the EPA that includes, but is not limited to:

a whether the objective(s) and anticipated outcomes of the trial were met;

b the date(s) of the trial;

c a gap analysis comparing actual performance with the approved Pre-Trial plan;

d an assessment of the suitability and performance of the processes, facilities and the equipment during the Trial;

e an outline of the measure(s) implemented to mitigate any environmental impacts of the trial and the reason(s) for those measures; and

f the details of the outcome of any community engagement during the trial.

2.10 PRE-TRIAL PLAN (U - 1242)

The Licensee must:

2.10.1 develop a Pre-Trial Plan prior to undertaking a trial for a change of a kind contemplated by conditions A5 or A6 of this Licence;

2.10.2 ensure any Pre-Trial Plan includes but is not limited to:

a the objective(s) and anticipated outcomes of the trial;

b the details of the site plan for the trial at the Premises;

c a summary of the trial;

d the proposed duration of the trial, including the start and end date(s);

e an assessment of the processes, facilities and equipment to be included in the trial to demonstrate their suitability for the trial;

f details of the monitoring and modelling to be undertaken during the trial;

g an assessment of the potential environmental risks of the trial;

h an assessment of any potential additional waste treatment required, any by-products generated by the trial and applicable disposal pathways of waste and by-products;

i mitigation measures to minimise the risk of any environmental impacts, including triggers for when the trial would cease; and

j the details of the community engagement process to be undertaken to address public concerns about the trial.

2.11 RECYCLED WASTEWATER MANAGEMENT (S - 144)

The Licensee must ensure that any recycled wastewater used for the purpose of irrigation or reuse is of a quality that is fit for the intended use (i.e. fit for purpose).

NOTES

The EPA will assess 'fitness for purpose' against the 'Australian Guidelines for Water Recycling: Managing Health & Environmental Risks' (Phase 1), 2006.

2.12 TRIGGER AND ACTION RESPONSE PLAN (U - 1240)

The Licensee must:

2.12.1 develop and submit to the satisfaction of the EPA by the compliance date listed below, a Trigger and Action Response Plan (TAR Plan);

2.12.2 ensure that the TAR Plan includes, but is not limited to:

a the identification of thresholds at which potential or actual environmental harm may occur due to the activity being undertaken at the Premises in identifying the thresholds required by this condition regard should be had to the following:

i environmental pollutants (effluent, solid waste, odour, noise, dust);

ii incidents that may cause potential or actual environmental harm;

iii existing monitoring data;

iv meteorological conditions; and

v visual observations;

b detailed action and response strategies that will be implemented in the event that the thresholds identified are reached or exceeded;

c a methodology and framework for quarterly reporting to the EPA, which includes, but is not limited to:

i the date and time one or more threshold is reached or exceeded;

ii action and response strategies implemented to address the exceedance(s); and

iii a summary of events notified and reported to the public under condition U-1239;

d a methodology and framework for the provision of an annual report to the EPA which includes, but is not limited to:

i a review of all thresholds identified in subclause 2 of this condition;

ii a review of the effectiveness of all action and response strategies identified in subclause 2 of this condition;

iii a trend analysis of data collected;

iv a review and analysis of community complaints recorded in compliance with condition S-1 with the exceedance of thresholds reported under subclause 2 of this condition; and

v identified opportunities for improvement in environment management at the Premises;

vi recommendations for updates to be included in the TAR Plan based on any of the above; and

2.12.3 Implement the TAR Plan (or any revised TAR Plan) approved in writing by the EPA in accordance with the requirements of that plan.

Compliance Date: 30-Nov-2021

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3 MONITORING AND REPORTING

3.1 Monitoring Implementation and Report: WIMP (U - 265)

The licensee must:

3.1.1 implement the approved South Australian Water Corporation document entitled 'Bolivar Wastewater Treatment Plant, Plant Irrigation Management Plan', dated September 1998 (the WIMP') or any revised WIMP approved in writing by the EPA;

3.1.2 submit a WIMP Report to the EPA by 31 October each year for the reporting period 1 July to 30 June, a Report to the satisfaction of the EPA.

NOTES

The EPA will assess the Report against the EPA Guideline 'Regulatory monitoring and testing Monitoring Plan requirements'.

3.2 MONITORING PLAN (U - 264)

The Licensee must:

3.2.1 develop and submit to the EPA by 29 February 2016, an updated plant performance monitoring plan for the Bolivar WWTP, to the satisfaction of the EPA;

3.2.2 ensure that the revised monitoring plan includes, but not be limited to, the following:

a the incorporation of the approved 'Bolivar Wastewater Treatment Plant plant discharge monitoring program' dated January 2015

b the incorporation of the approved 'Bolivar High Salinity WWTP Sampling Program' dated January 2015

c an assessment of trends in concentration and load of key effluent quality parameters;

d how reviews and amendments to the monitoring plan will be undertaken and reported to the EPA;

e the criteria against which monitoring results will be assessed;

f the method and frequency of reporting to the EPA; and

3.2.3 implement the Monitoring Plan (or any revised Monitoring Plan approved in writing by the EPA) upon approval by the EPA.

NOTES

The EPA will assess the Monitoring Plan against the EPA Guideline 'Regulatory monitoring and testing monitoring plan requirements'.

Compliance Date: 29-Feb-2016

3.3 SAMPLING AND ANALYSIS REQUIREMENTS FOR MONITORING (S - 73)

The Licensee must ensure that:

3.3.1 sampling of water, wastewater and soil is undertaken by a suitably qualified person.

3.3.2 sampling is carried out in accordance with Australian Standard/New Zealand Standard AS/NZS 5667 (parts 1-12) and Australian Standard AS 4482.1-2005 (from 1 June 2013) where applicable.

3.3.3 analysis of samples is carried out by either;

a a laboratory registered by NATA for the analytical procedures being undertaken; or

b a laboratory with ISO 9000 series (Quality System) certification.

NOTES

Guidance on sampling in accordance with EPA requirements can be found in the EPA Guidelines document entitled 'Regulatory monitoring and testing water and wastewater sampling'.

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4 ADMINISTRATION

4.1 ANNUAL RETURN AND PAYMENT OF ANNUAL FEES (A - 4)

For the purposes of section 48(2)(a) of the Act, the date in each year for the lodgement of the Annual Return is no later than 90 days before the anniversary of the grant or renewal of the Licence; and

4.1.1 For the purposes of section 48(2)(b) of the Act, the date in each year for the payment of Annual Authorisation Fee is the anniversary of the grant of the Licence.

4.2 APPROVAL OF OPERATING PROCESSES (A - 6)

The Licensee must not undertake changes to operating processes conducted pursuant to the Licence at the Premises without written approval from the EPA, where such changes:

4.2.1 have the potential to increase emissions or alter the nature of pollutants or waste currently generated by, or from the licensed activity; or

4.2.2 have the potential to increase the risk of environmental harm; or

4.2.3 would relocate the point of discharge of pollution or waste at the Premises.

4.3 APPROVAL OF WORKS (A - 5)

The Licensee must not construct or alter a building or structure, or install or alter any plant or equipment, for use of an activity undertaken pursuant to the Licence at the Premises without written approval from the EPA, where such changes:

4.3.1 have the potential to increase the emissions or alter the nature of pollutants or waste currently generated by, or from the licensed activity; or

4.3.2 have the potential to increase the risk of environmental harm; or

4.3.3 would relocate the point of discharge of pollution or waste at the Premises.

4.4 CHANGE OF LICENSEE DETAILS (A - 3)

If the Licensee's name or postal address (or both) changes, the Licensee must inform the EPA within 28 days of the change occurring.

4.5 LICENCE RENEWAL (A - 2)

For the purposes of section 43(3) of the Act, an application for Renewal of the Licence must be made no later than 90 days before the expiry date of the Licence.

4.6 OBLIGATIONS TO EMPLOYEES, AGENTS AND CONTRACTORS (A - 1)

The Licensee must ensure that every employee, agent or contractor responsible for undertaking any activity regulated by the Licence, is informed as to the conditions of the Licence.

4.7 VARIATION OF CONDITIONS OF LICENCE (pursuant to section 45(3) of the Environment Protection Act, 1993) (U - 1241)

The EPA may:

4.7.1 impose conditions or vary conditions of this licence at any time by notice in writing to the Licensee in the following circumstances:

a in relation to:

i odour and noise emissions;

ii discharges of wastewater;

iii revision of the EIP where the progress or implementation of the EIP Is not meeting the necessary environmental outcomes;

iv the efluent discharge monitoring data and information; and

v Trigger and Action Response Plan reports.

Attachments

ATTACHMENT 1 discharge location-1534.pdf"

DISCHARGE LOCATIONS

LICENCE1534 - ATTACHMENT 1

SOUTH AUSTRALIAN WATER CORPORATION

– BOLIVAR WASTEWATER TREATMENT PLANT – EPA LICENCE 1534

Location Name	Description	Latitude	Longitude
Buckland Park Outfall	**Marine discharge**	-34.696877	138.481981

Government of South Australia
Department of Treasury and Finance

State Administration Centre
200 Victoria Square
Adelaide SA 5000
GPO Box 1045
Adelaide SA 5001
DX56205
Tel 08 8226 9500
Fax 08 8226 3819
http://www.treasury.sa.gov.au
ABN 19 040 349 865

File: T&F22/0717
A2470551

12 July 2022

Ms Alma Cimirotic
JBS&G
Suite 1, 100 Hutt Street
ADELAIDE SA 5000

Sent via email: acimirotic@jbsg.com.au

Dear Ms Cimirotic

Freedom of Information – Dangerous Substances licence

I refer to your application under the *Freedom of Information Act 1991* (FOI Act), received by the Department of Treasury and Finance (DTF) on 24 June 2022.

Your application specifically requested:

'JBS&G are requesting a dangerous goods search for CT 5723/299 (Allotment 3, Robinson Road, Waterloo Corner, SA) to assist with environmental investigations.'

Pursuant to section 23(1)(b) of the FOI Act I advise that, following extensive searches conducted throughout the agency, I have been unable to locate any results recorded for:

Allotment 3, Robinson Road, Waterloo Corner, SA

SafeWork SA regulates licensable quantities of dangerous substances as prescribed by the *Dangerous Substances (General) Regulations 2017*, specifically:

- Regulation 39 (Class 6 or 8 substances),
- Regulation 11 (Class 2 substances), and
- Regulation 22 (Class 3 substances).

All other dangerous substances are not regulated by SafeWork SA, as a result, the information provided only relates to the classes of substances as prescribed in *Dangerous Substances (General) Regulations 2017.*

Appeal Rights

If you are dissatisfied with the outcome of your FOI application, you have the right to make a complaint to the Ombudsman SA. Please contact the Ombudsman directly on (08) 8226 8699.

If you require any further information, please phone Inthira Stocker on (08) 8429 3497.

Yours sincerely

Maria Ross
ACCREDITED FREEDOM OF INFORMATION OFFICER

Appendix G – Groundwater Database Information (Water Connect)

DHNO	Unit No	Class	Aquifer	Depth	Permit	Purpose	Status	SWL	RSWL	TDS	EC	pH	Easting	Northing	MGA Zone	Plan	Parcel	Title
50736	6628-3767	WW	Qpah(Q3)	28.96		IND				2925	5229	7.4	279101.4	6152739.85	54	F114373	A12	CT 6108 355
50749	6628-3780	WW	Qpah(Q3)	36.58		DOMIRR, STK	OPR			700	1271	6.5	278505.33	6154833.79	54	F114776	A62	CT 5752 923
50750	6628-3781	WW	Qpah(Q1)	12.19		STK	UKN			4700	8302	7	278893.41	6154532.79	54	F114777	A63	CT 5752 911
50808	6628-3839	WW					UKN						279022.44	6152441.84	54	F114643	A82	CT 5744 792
50817	6628-3848	WW	Qpah(Q4)	45.72		STK	UKN			499	907		278300.77	6152754.56	54	D113211	A553	CT 6177 611
50827	6628-3858	WW	Qpah(Q3)	27.43			UKN			2394	4297		278904.47	6152695.83	54	D113220	A558	CT 6177 742
50832	6628-3863	WW					UKN						278666.45	6152912.87	54	D121805	A11	CT 6232 824
50833	6628-3864	WW	Qpah(Q3)	27.89		IRRSTK	OPR			2323	4170		278666.43	6152913.86	54	D121805	A11	CT 6232 824
50834	6628-3865	WW	Qpah(Q4)	42.67			UKN			2024	3641		278666.43	6152913.86	54	D121805	A11	CT 6232 824
50836	6628-3867	WW	Qpah(Q4)	45.72		DOMIRR, STK	UKN						278666.47	6152915.86	54	D121805	A11	CT 6232 824
50840	6628-3871	WW	Qpah(Q4)	47.55		IRR	UKN	7.62	1.38	1015	1838	6.5	278421.33	6153903.77	54	D24232	A1	CT 5346 293
50855	6628-3886	WW	Qpah(Q1)				UKN	0.76	6.24	2795	5000		277160.4	6153998.85	54	D62589	A1	CT 6161 442
50857	6628-3888	WW	Qpah(Q4)	48.77		DOMIRR	OPR	0	8	890	1615		277943.81	6154220.57	54	F114706	A45	CT 5710 80
50865	6628-3896	WW				IRRSTK	UKN	0	9	2152	3868		277723.45	6154348.89	54	F114700	A39	CT 5755 245
50867	6628-3898	WW					UKN	3.05	5.95	2152	3868		277723.45	6154348.89	54	F114700	A39	CT 5755 245
50868	6628-3899	WW	Qpah(Q4)	48.77		IRRSTK		1.83	7.17	955	1731	6.8	277981.36	6154281.86	54			
50877	6628-3908	WW	Qpah(Q4)	43.28		DOMIRR	OPR	24.38	-14.38	641	1165		278171.36	6154675.79	54	F114710	A49	CT 5339 15
50893	6628-3924	WW	Qpah(Q4)	45.72			UKN	0.91	9.09	685	1244		278230.39	6154480.88	54	F114713	A52	CT 6160 834
50896	6628-3927	WW	Qpah(Q3)	24.38		IRR	OPR			626	1138		278041.24	6155009.74	54	D113208	A515	CT 6181 97
50908	6628-3939	WW	Qpah	0.3			UKN						278041.33	6155009.85	54	D113208	A515	CT 6181 97
51061	6628-4092	WW					UKN						275581.37	6153969.8	54	F103650	A15	CT 6129 150
51062	6628-4093	WW	Qpah(Q3)	27.43		STK	UKN	6.1	-1.1				275888.42	6154060.75	54	F40178	A4	CT 6129 150
51094	6628-4125	WW					UKN						275801.41	6152543.8	54	H105800	S320	CR 5766 822
59615	6628-12646	WW	Qpah(Q1)	21.3	13984	INV	UKN			9464	16213	7.2	276327.43	6154746.82	54			
59616	6628-12647	WW	Qpah(Q1)	10	13985	INV	UKN			12100	20431	7.4	276055.39	6154654.86	54	D80872	A309	CT 6043 356
59617	6628-12648	WW	Qpah(Q1)	12	13986	INV	UKN			15857	26215	7.2	275977.41	6154876.83	54	D4994	A1	CT 5657 584
59618	6628-12649	WW	Qpah(Q1)	10	13987	INV	UKN			9094	15607	7.4	276947.33	6155300.84	54	F101575	A7	CT 5115 218
59619	6628-12650	WW	Qpah(Q1)	10	13988	INV	UKN						276564.44	6155164.8	54	F213323	A96	CT 5594 574
60028	6628-13059	WW	Qpah(Q4)	45	10754	IRR	OPR			1317	2380	7.2	278054.38	6154297.83	54	F114708	A47	CT 5544 626
61463	6628-14494	WW	Qpah(Q1)	8	95279	OBS	OPR			11824	20000	7.1	276327.43	6154746.82	54			
61464	6628-14495	WW	Qpah(Q1)	8	95280	OBS	OPR			14351	23934	7.3	276066.43	6154502.73	54			
61925	6628-14956	WW	Qpah(Q1)	12	23276	INVOBS	OPR	4.55	2.06	7794	13500	7.1	276128.41	6154877.84	54	D4994	A2	CT 5660 33
61927	6628-14958	WW	Qpah(Q1)	11	23278	INVOBS	OPR	5.17	1.8	11192	19000	7	276256.43	6154915.8	54	D4994	A2	CT 5660 33
62816	6628-15847	WW	Qpah(Q3)	38	95877	OBS	OPR	8.57	-2.38	14862	24700		276981.38	6154406.07	54	D5852	A15	CT 5301 134
132753	6628-16281	WW	Qpah(Q1)	14.5	29546	OBS	UKN	2.55	4.85	16359	27000	7.2	276857.39	6153699.82	54	F115108	A4	CT 5723 299
181998	6628-20296	WW	Qpah	20	52798	INV		5.7	0.52				275996.75	6154846.56	54	D4994	A2	CT 5660 33
197982	6628-21453	WW	Qpah(Perched)	6		INVMON		3.47	2.47				276032.12	6154616.88	54			
197983	6628-21454	WW	Qpah(Perched)	6		INVMON	OPQ						276981.47	6154402.19	54	D5852	A15	CT 5301 134
197988	6628-21459	WW	Qpah(Perched)	6		INVMON							279143.27	6154293.06	54			
198900	6628-21595	WW	Qpah(Q1)	15		INV		1.19	5.18				276978.66	6154412.56	54	D5852	A15	CT 5301 134
198901	6628-21596	WW	Qpah(Q1)	15		INV		1.24	5.15				276981.04	6154405.07	54	D5852	A15	CT 5301 134
199570	6628-21652	WW	Qpah(Q2)	24				1.22	5.16				276980.05	6154408.15	54	D5852	A15	CT 5301 134
228834	6628-22817	WW	Qpah	21.5	122233								276287.84	6155078.95	54	D80872	A308	CT 6043 355
228835	6628-22818	WW	Qpah	9	122234								276467.65	6155263.46	54	D80872	A308	CT 6043 355
228836	6628-22819	WW	Qpah	9	122235								276036	6154743.84	54	D4994	A2	CT 5660 33
228837	6628-22820	WW	Qpah	12	122237								276028.12	6154811.36	54	D4994	A2	CT 5660 33
253573	6628-25058	WW	Qpah	19.45	151884	INV							277930.8	6153734.56	54	D24232	A18	CT 5111 400
274916	6628-26818	WW	Qpah	8.5	219705	INV							279212.43	6153625.89	54	D122429	A11	CT 6241 45
274919	6628-26821	WW	Qpah	8	219708	INV							279246.06	6153408.05	54	F114394	A33	CT 6241 46

284536	6628-27668	WW	Qhck	2.7				0.98					275602.39	6152683.46	54	H105800	S320	CR 5766 822
284537	6628-27669	WW	Qhck	1.2									275601.89	6152685.45	54	H105800	S320	CR 5766 822
284540	6628-27672	WW	Qhck	2.7				0.58					275779.25	6152667.24	54	H105800	S320	CR 5766 822
284542	6628-27674	WW	Qhck	1.1				0.57					275777.32	6152667.41	54	H105800	S320	CR 5766 822
294219	6628-28832	WW		6	281965	INV							276072.37	6155011.55	54	D4994	A1	CT 5657 584
294220	6628-28833	WW		18.5	281964	INV							276142.92	6154831.35	54	D4994	A2	CT 5660 33
294221	6628-28834	WW		6	281962	INV							276013.75	6154701.79	54			
294222	6628-28835	WW		6.5	281963	INV							276097.17	6154515.8	54	D80872	A309	CT 6043 356
294223	6628-28836	WW		6.5	281966	INV							276352.08	6154814.79	54	D80872	A308	CT 6043 355
310740	6628-29610	WW		9	324670	MON							278225.77	6152061.49	54	F114627	A66	CT 5550 653
312743	6628-29706	WW		8	326626	INV							278310.76	6152659.45	54			
312751	6628-29712	WW		6	326531	ENV							279085.72	6153873.46	54	D16044	A10	CT 5923 366
312752	6628-29713	WW		9	326533	ENV							279019.75	6153896.52	54	D16044	A10	CT 5923 366
312753	6628-29714	WW		8	326532	ENV							279042.76	6153926.48	54	D16044	A10	CT 5923 366
312938	6628-29736	WW		8.5	326626	INV							278791.73	6153997.48	54			
313705	6628-29814	WW		8	304475	INV							279067.72	6152902.53	54			
313706	6628-29815	WW		5.5	304477	INV							278462.94	6154775.16	54			
315406	6628-30047	WW		18	338977	INV							278759.26	6153915.14	54			
315996	6628-30156	WW		5	338612	INV							275903.16	6154606.12	54	F40178	A4	CT 6129 150
315997	6628-30157	WW		5	338611	INV							275969.27	6154355.22	54	F40178	A4	CT 6129 150
315998	6628-30158	WW		4	338610	INV							275715.07	6154478.63	54	F40178	A4	CT 6129 150
315999	6628-30159	WW		4.5	338614	INV							275848.27	6154354.43	54	F40178	A4	CT 6129 150
316000	6628-30160	WW		4	338609	INV							275648.57	6154286.42	54	F40178	A4	CT 6129 150
316001	6628-30161	WW		4	338608	INV							275702.56	6154083.62	54	F40178	A4	CT 6129 150
352396	6628-30986	WW											277946.76	6154886.52	54	F114491	A30	CT 6056 11
353883	6628-31091	WW		2.7		MON		1	1.46	130000	152941	7.2	275779.77	6152667.53	54	H105800	S320	CR 5766 822
353884	6628-31092	WW		1.1				0.98	1.5	109650	129000	7.1	275777.77	6152667.53	54	H105800	S320	CR 5766 822
353892	6628-31100	WW		1.22		MON		-0.05	1.06	75600	108000		275683.77	6152557.51	54	H105800	S320	CR 5766 822
355076	6628-31239	WW		5.5	384998	MON							275794.34	6153570.79	54	H105800	S185	CT 5922 939
355112	6628-31247	WW		5	384999	MON							276068.86	6152749.66	54	H105800	S186	CT 5922 939
355489	6628-31337	WW		9	385697	MON							277613.76	6153131.51	54	H105800	S5017	CT 5922 939
369174	6628-31817	WW		6	416150	MON		2.85					276214.77	6154933.52	54	D4994	A1	CT 5657 584
369175	6628-31818	WW		5.5	416151	MON		2.95					276065.77	6154887.53	54	D4994	A1	CT 5657 584

Appendix H – Soil Logs

SOIL BOREHOLE BH01

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,291.22
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,741.61
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, with trace organics	SM	BH01_0.0-0.1 BH01_0.1-0.2
	0.25, 0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown, with gravels	SM	BH01_0.3-0.5
	0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

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SOIL BOREHOLE BH02

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,220
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,682
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** JA

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	D	BH02_0.0-0.1
						BH02_0.1-0.2
	0.2, 0.25, 0.3, 0.35, 0.4, 0.45, 0.5		CH-MH	Silty CLAY, orange-brown, high plasticity, with fine gravels	SM	BH02_0.2-0.5
	0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

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SOIL BOREHOLE BH03

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,291.96
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,710.8
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, with trace organics	SM	BH03_0.0-0.1 BH03_0.1-0.2
	0.25, 0.3, 0.35, 0.4		CL	CLAY, orange-brown, with fine grained sand and trace gravels	SM	BH03_0.3-0.5
	0.45, 0.5		CL-SC	Sandy CLAY, brown, low plasticity, fine to medium grained sand	SM	
	0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

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SOIL BOREHOLE BH04

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,352
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,669
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** JA

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05 0.1 0.15 0.2		SM	Silty SAND, dark brown, fine to medium grained, low plasticity fines, with trace organics	SM	BH04_0.0-0.1 BH04_0.1-0.2
	0.25 0.3 0.35 0.4 0.45 0.5		CL-SC	Sandy CLAY, orange-brown, medium plasticity, trace fine gravels	SM	BH04_0.2-0.5
	0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95			Termination Depth at: 0.50 m.		

SOIL BOREHOLE BH05

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,552.3
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,470.45
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, dark brown, fine to medium grained, low plasticity fines, with trace organics	M	BH05_0.0-0.1
	0.2, 0.25, 0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity, trace fine gravels and medium grained sand	W	BH05_0.1-0.3 BH05_0.3-0.5
	0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

SOIL BOREHOLE BH06

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,218.63
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,585.7
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, red-brown, fine to medium grained, low plasticity fines, with trace organics	SM	BH06_0.0-0.1 BH06_0.1-0.2
	0.25, 0.3, 0.35, 0.4		CL-SC	Sandy CLAY, red-brown, low plasticity, fine to medium grained sand, trace organics	SM	BH06_0.3-0.5
	0.45		CH	CLAY, orange-brown, high plasticity, with fine gravels	M	
	0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

SOIL BOREHOLE BH07

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,294.2
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,618.36
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05 0.1 0.15 0.2		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	SM	BH07_0.0-0.1 BH07_0.1-0.2
	0.25 0.3 0.35 0.4 0.45 0.5		CH	Sandy CLAY, dark brown, medium plasticity, with trace fine gravel	SM	BH07_0.2-0.5
	0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95			Termination Depth at: 0.50 m.		

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SOIL BOREHOLE BH08

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,378
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,603
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** JA

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2, 0.25, 0.3		SM	Silty SAND, dark brown, fine to medium grained, low plasticity fines, with organics	SM	BH08_0.0-0.1
						BH08_0.1-0.2
	0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity, with fine gravels	SM	BH08_0.3-0.5
	0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

SOIL BOREHOLE BH09

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,550.81
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,532.08
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, fine grained, low plasticity fines, with trace organics	M	BH09_0.0-0.1 BH09_0.1-0.2
	0.25		CL-ML	Silty CLAY, orange-brown, low plasticity, fine to medium grained sand	M	
	0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity	W	BH09_0.3-0.5
	0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

SOIL BOREHOLE BH10

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,195.44
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 30-Jun-22	**NORTHING** 6,153,492.65
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	SM	BH10_0.0-0.1
	0.1		CL-SC	Sandy CLAY, orange-brown, medium plasticity, fine to medium grained sand, with fine gravels	SM	BH10_0.1-0.2
	0.15					
	0.2		CH	CLAY, orange-brown, high plasticity, with fine grained sand and gravels	SM	
	0.25					
	0.3					BH10_0.3-0.5
	0.35					
	0.4					
	0.45					
	0.5			Termination Depth at: 0.50 m.		
	0.55					
	0.6					
	0.65					
	0.7					
	0.75					
	0.8					
	0.85					
	0.9					
	0.95					

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SOIL BOREHOLE BH11

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,297.18
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 30-Jun-22	**NORTHING** 6,153,495.11
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics		BH11_0.0-0.1
	0.2, 0.25, 0.3, 0.35, 0.4		CL-SC	Sandy CLAY, red-brown, low plasticity, fine to medium grained sand		BH11_0.2-0.4
	0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity, with fine gravels		BH11_0.4-0.5
	0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

SOIL BOREHOLE BH12

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,373.49
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 30-Jun-22	**NORTHING** 6,153,496.96
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05 0.1 0.15 0.2 0.25		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	SM	BH12_0.0-0.1 BH12_0.1-0.25
	0.3 0.35 0.4 0.45 0.5		SM	Silty SAND, red-brown, fine to medium grained, medium plasticity fines		BH12_0.25-0.5
	0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95			Termination Depth at: 0.50 m.		

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SOIL BOREHOLE BH13

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,501.42
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 30-Jun-22	**NORTHING** 6,153,469.22
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	SM	BH13_0.0-0.1
	0.2, 0.25, 0.3		CL-SC	Sandy CLAY, brown with orange mottling, medium plasticity, fine to medium grained sand	M	BH13_0.2-0.3
	0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity, with fine gravels	W	BH13_0.5-0.5
	0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

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SOIL BOREHOLE BH14

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,222.37
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 30-Jun-22	**NORTHING** 6,153,431.64
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	SM	BH14_0.0-0.15
	0.2, 0.25, 0.3, 0.35		CL-SC	Sandy CLAY, brown, low plasticity, fine to medium grained sand	SM	BH14_0.15-0.35
	0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity, with fine gravels and trace sand	W	BH14_0.35-0.5
	0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

SOIL BOREHOLE BH15

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,426
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 30-Jun-22	**NORTHING** 6,153,410
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** JA

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	SM	BH15_0.0-0.15
	0.2, 0.25, 0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity, with trace fine gravels	M	BH15_0.15-0.3 BH15_0.3-0.5
	0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

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SOIL BOREHOLE BH16

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,502.91
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 30-Jun-22	**NORTHING** 6,153,467.59
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	W	BH16_0.0-0.1
	0.2, 0.25, 0.3, 0.35, 0.4		CL-SC	Sandy CLAY, mottled orange-brown, medium plasticity, fine to medium grained sand	W	BH16_0.2-0.3 BH16_0.3-0.5
	0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity, with fine gravels	W	
	0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

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SOIL BOREHOLE BH17

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,533.79
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,408.82
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, dark brown, fine to medium grained, low plasticity fines, with trace organics	M	BH17_0.0-0.1
						BH17_0.1-0.2
	0.2, 0.25, 0.3		SM	Silty SAND, orange-brown, fine to medium grained, low plasticity fines, with trace fine gravels	W	BH17_0.2-0.5
	0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity		
	0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

Disclaimer This log is intended for environmental not geotechnical purposes.

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SOIL BOREHOLE BH18

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,455.77
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 30-Jun-22	**NORTHING** 6,153,252.3
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** AT

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace organics	W	BH18_0.0-0.1
	0.2, 0.25, 0.3		CL-SC	CLAY, red-brown to orange-brown, high plasticity, with sand	W	BH18_0.2-0.3
	0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown, high plasticity, with fine gravels	W	BH18_0.3-0.5
	0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

Disclaimer This log is intended for environmental not geotechnical purposes.

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SOIL BOREHOLE BH19

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,574
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,327
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** JA

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05		SM	Silty SAND, brown, fine to medium grained, low plasticity fines, with trace slag	W	BH19_0.0-0.1
	0.1		ML-SM	Sandy SILT, red-brown, low plasticity, with red brick, slag and gravels	W	BH19_0.1-0.2
	0.15					
	0.2					
	0.25					
	0.3		CH	CLAY, orange-brown, high plasticity, with trace fine to medium gravels and medium grained sand	W	BH19_0.3-0.5
	0.35					
	0.4					
	0.45					
	0.5			Termination Depth at: 0.50 m.		
	0.55					
	0.6					
	0.65					
	0.7					
	0.75					
	0.8					
	0.85					
	0.9					
	0.95					

Disclaimer This log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 14 Jul 2022

SOIL BOREHOLE BH20

PROJECT NUMBER 63155	**DRILLING COMPANY** JBS&G	**EASTING** 277,673
PROJECT NAME Waterloo Corner Soils July 2022	**DRILLING DATE** 29-Jun-22	**NORTHING** 6,153,158
CLIENT Renascor	**DRILL RIG** N/A	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**DRILLING METHOD** Hand Auger	**COORD SOURCE** GPS
	DIAMETER 75 mm	**LOGGED BY** JA

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples
HA	0.05, 0.1, 0.15, 0.2		SM	Silty SAND, brown, fine grained, low plasticity fines, with trace organics	M	BH20_0.0-0.1
						BH20_0.1-0.2
	0.2, 0.25, 0.3		CH-MH	Silty CLAY, red-brown, high plasticity, with gravel	SM	
	0.3, 0.35, 0.4, 0.45, 0.5		CH	CLAY, orange-brown with some brown mottling, high plasticity	W	BH20_0.3-0.5
	0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95			Termination Depth at: 0.50 m.		

Appendix I – NATA Laboratory Documentation (SOIL)

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt Street ADELAIDE SA 5000
T: +61 8 8431 7113 · F: +61 8 8431 7115
ACN 100 220 479 · ABN 62 100 220 479

JBS&G

CLIENT: JBS&G	LABORATORY: Eurofins	LABORATORY BATCH NO.:
SITE/PROJECT NAME: Renascor Waterloo Cnr Rd	COC Reference #: 5641	SAMPLERS: JA AT
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115
DATA NEEDED BY: **Standard TAT**	REPORT NEEDED BY: **Standard TAT**	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES
SITE/PROJECT NUMBER: 63155	**QUOTE #:**	JBS&G OFFICE TO SEND RESULTS: South Australia

RELINQUISHED BY:		**RECEIVED BY**		
NAME : Jack Ayers	DATE: 30/06/2022	NAME :	DATE:	METHOD OF SHIPMENT: Overnight
OF: JBS&G (Australia) Pty Ltd	TIME:	OF:	TIME:	CONSIGNMENT NOTE NO.
NAME:	DATE:	NAME :	DATE:	TRANSPORT CO. NAME.
OF:	TIME:	OF:	TIME:	

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

FOR LAB USE ONLY

COOLER SEAL

Yes ..... No .....

Broken ..... Intact ....

COOLER TEMP: deg.C

Please forward results and invoice to:
labresults@jbsg.com.au
msarunic@jbsg.com.au
jayers@jbsg.com.au
atschirn@jbsg.com.au

ANALYSIS REQUIRED

SAMPLE DATA				CONTAINER DATA			M12: Heavy Metals Suite	B14: OCP & OPP	B9: Metals, TRH, BTEX, PAH & OCP	PFAS: Short Suite	B19A: Nutrients	R7: SA Waste Screen	R21: NEPM Screen for Soil Classification	M8: Metals	BTEX	Asbestos	Coliforms (total)	PAH				
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field																
BH01_0.0-0.1	SOIL	29/06/2022		1 Jar					X		X											
BH01_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH01_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH02_0.0-0.1	SOIL	29/06/2022		1 Jar			X	X														
BH02_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH02_0.2-0.5	SOIL	29/06/2022		1 Jar																		
BH03_0.0-0.1	SOIL	29/06/2022		1 Jar			X											X				
BH03_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH03_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH04_0.0-0.1	SOIL	29/06/2022		1 Jar			X	X		X												
BH04_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH04_0.2-0.5	SOIL	29/06/2022		1 Jar																		
BH05_0.0-0.1	SOIL	29/06/2022		1 Jar					X				X									
BH05_0.1-0.3	SOIL	29/06/2022		1 Jar																		
BH05_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH06_0.0-0.1	SOIL	29/06/2022		1 Jar					X		X											
BH06_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH06_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH07_0.0-0.1	SOIL	29/06/2022		1 Jar			X	X		X												
BH07_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH07_0.2-0.5	SOIL	29/06/2022		1 Jar																		
BH08_0.0-0.1	SOIL	29/06/2022		1 Jar			X	X			X											
BH08_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH08_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH09_0.0-0.1	SOIL	29/06/2022		1 Jar			X			X								X				
BH09_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH09_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH10_0.0-0.1	SOIL	30/06/2022		1 Jar					X								X					

***Container Type and Preservative Codes:**
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosulphate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

'NOTES

Some Jars may be labelled "**SB**XX_depths". This is a field error and all soils samples should be reported with the prefix "**BH**XX_depths"

#903014
Matthew 4/7/22

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt Street ADELAIDE SA 5000
T: +61 8 8431 7113 · F: +61 8 8431 7115
ACN 100 220 479 · ABN 62 100 220 479

JBS&G

CLIENT: JBS&G	LABORATORY: Eurofins	LABORATORY BATCH NO.:
SITE/PROJECT NAME: Renascor Waterloo Cnr Rd	COC Reference #: 5641	SAMPLERS: JA AT
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115
DATA NEEDED BY: **Standard TAT**	REPORT NEEDED BY: **Standard TAT**	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES
SITE/PROJECT NUMBER: 63155	**QUOTE #:**	JBS&G OFFICE TO SEND RESULTS: South Australia

RELINQUISHED BY:		RECEIVED BY		
NAME : Jack Ayers	DATE: 30/06/2022	NAME :	DATE:	METHOD OF SHIPMENT: Overnight
OF: JBS&G (Australia) Pty Ltd	TIME:	OF:	TIME:	CONSIGNMENT NOTE NO.
NAME:	DATE:	NAME :	DATE:	TRANSPORT CO. NAME.
OF:	TIME:	OF:	TIME:	

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

FOR LAB USE ONLY

COOLER SEAL

Yes ..... No .....

Broken ..... Intact ....

COOLER TEMP: deg.C

Please forward results and invoice to:
labresults@jbsg.com.au
msarunic@jbsg.com.au
jayers@jbsg.com.au
atschirn@jbsg.com.au

***Container Type and Preservative Codes:**
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosulphate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

SAMPLE DATA				CONTAINER DATA			ANALYSIS REQUIRED																
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field	M12: Heavy Metals Suite	B14: OCP & OPP	B9: Metals, TRH, BTEX, PAH & OCP	PFAS: Short Suite	B19A: Nutrients	R7: SA Waste Screen	R21: NEPM Screen for Soil Classification	M8: Metals	BTEX	Asbestos	Coliforms (total)	PAH					'NOTES
BH10_0.1-0.2	SOIL	30/06/2022		1 Jar																			
BH10_0.3-0.5	SOIL	30/06/2022		1 Jar																			
BH11_0.0-0.1	SOIL	30/06/2022		1 Jar			X	X			X												
BH11_0.2-0.4	SOIL	30/06/2022		1 Jar																			
BH11_0.4-0.5	SOIL	30/06/2022		1 Jar																			
BH12_0.0-0.1	SOIL	30/06/2022		1 Jar			X	X															
BH12_0.1-0.25	SOIL	30/06/2022		1 Jar																			
BH12_0.25-0.5	SOIL	30/06/2022		1 Jar																			#403014
BH13_0.0-0.1	SOIL	30/06/2022		1 Jar					X														Matthew 4/7/22
BH13_0.2-0.3	SOIL	30/06/2022		1 Jar																			
BH13_0.5-0.5	SOIL	30/06/2022		1 Jar																			
BH14_0.0-0.15	SOIL	30/06/2022		1 Jar								X											
BH14_0.15-0.35	SOIL	30/06/2022		1 Jar																			
BH14_0.35-0.5	SOIL	30/06/2022		1 Jar																			
BH15_0.0-0.15	SOIL	30/06/2022		1 Jar			X	X															
BH15_0.15-0.3	SOIL	30/06/2022		1 Jar																			
BH15_0.3-0.5	SOIL	30/06/2022		1 Jar																			
BH16_0.0-0.1	SOIL	30/06/2022		1 Jar			X	X		X													
BH16_0.2-0.3	SOIL	30/06/2022		1 Jar																			
BH16_0.3-0.5	SOIL	30/06/2022		1 Jar																			
BH17_0.0-0.1	SOIL	29/06/2022		1 Jar					X														
BH17_0.1-0.2	SOIL	29/06/2022		1 Jar																			
BH17_0.2-0.5	SOIL	29/06/2022		1 Jar																			
BH18_0.0-0.1	SOIL	30/06/2022		1 Jar			X			X	X						X	X					
BH18_0.2-0.3	SOIL	30/06/2022		1 Jar																			
BH18_0.3-0.5	SOIL	30/06/2022		1 Jar																			
BH19_0.0-0.1	SOIL	29/06/2022		1 Jar			X				X						X						
BH19_0.1-0.2	SOIL	29/06/2022		1 Jar								X											

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt Street ADELAIDE SA 5000
T: +61 8 8431 7113 · F: +61 8 8431 7115
ACN 100 220 479 · ABN 62 100 220 479

JBS&G

CLIENT: JBS&G	LABORATORY: Eurofins
SITE/PROJECT NAME: Renascor Waterloo Cnr Rd	COC Reference #: 5641
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd
DATA NEEDED BY: **Standard TAT**	REPORT NEEDED BY: **Standard TAT**
SITE/PROJECT NUMBER: 63155	**QUOTE #:**

LABORATORY BATCH NO.:	
SAMPLERS: JA AT	
PHONE: 08 8431 7113 FAX: 08 8431 7115	
REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES	
JBS&G OFFICE TO SEND RESULTS: South Australia	

RELINQUISHED BY:		RECEIVED BY		
NAME : Jack Ayers	DATE: 30/06/2022	NAME :	DATE:	METHOD OF SHIPMENT: Overnight
OF: JBS&G (Australia) Pty Ltd	TIME:	OF:	TIME:	CONSIGNMENT NOTE NO.
NAME:	DATE:	NAME :	DATE:	
OF:	TIME:	OF:	TIME:	TRANSPORT CO. NAME.

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

FOR LAB USE ONLY

COOLER SEAL

Yes ..... No .....

Broken ..... Intact ....

COOLER TEMP: deg.C

Please forward results and invoice to:
labresults@jbsg.com.au
msarunic@jbsg.com.au
jayers@jbsg.com.au
atschirn@jbsg.com.au

ANALYSIS REQUIRED

SAMPLE DATA				CONTAINER DATA			M12: Heavy Metals Suite	B14: OCP & OPP	B9: Metals, TRH, BTEX, PAH & OCP	PFAS: Short Suite	B19A: Nutrients	R7: SA Waste Screen	R21: NEPM Screen for Soil Classification	M8: Metals	BTEX	Asbestos	Coliforms (total)	PAH				
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field																
BH19_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH20_0.0-0.1	SOIL	29/06/2022		1 Jar			X				X							X				
BH20_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH20_0.3-0.5	SOIL	29/06/2022		1 Jar																		
ACM01	CEMENT SHEET	29/06/2022														X						
DUP01	SOIL	29/06/2022		1 Jar																		
DUP02	SOIL	30/06/2022		1 Jar																		
SPLIT01	SOIL	29/06/2022		1 Jar																		
SPLIT02	SOIL	30/06/2022		1 Jar																		
TB01	WATER	29/06/2022		2 V											X							
RB01	WATER	30/06/2022		1 Metals										X								
						TOTAL	13	8	6	5	7	2	1	1	1	1	3	4	0	0	0	0

***Container Type and Preservative Codes:**
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosuplhate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

'NOTES

PLEASE FORWARD TO ENVIROLAB

#903014
Matthew 4/7/22

1

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt Street ADELAIDE SA 5000
T: +61 8 8431 7113 · F: +61 8 8431 7115
ACN 100 220 479 · ABN 62 100 220 479

JBS&G

CLIENT: JBS&G	LABORATORY: Eurofins	LABORATORY BATCH NO.:
SITE/PROJECT NAME: Renascor Waterloo Cnr Rd	COC Reference #: 5641	SAMPLERS: JA AT
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115
DATA NEEDED BY: **Standard TAT**	REPORT NEEDED BY: **Standard TAT**	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES
SITE/PROJECT NUMBER: 63155	**QUOTE #:**	JBS&G OFFICE TO SEND RESULTS: South Australia

RELINQUISHED BY:		RECEIVED BY		
NAME : Jack Ayers	DATE: 30/06/2022	NAME :	DATE:	METHOD OF SHIPMENT: Overnight
OF: JBS&G (Australia) Pty Ltd	TIME:	OF:	TIME:	CONSIGNMENT NOTE NO.
NAME:	DATE:	NAME :	DATE:	
OF:	TIME:	OF:	TIME:	TRANSPORT CO. NAME.

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

FOR LAB USE ONLY

COOLER SEAL

Yes ..... No .....

Broken ..... Intact ....

COOLER TEMP: deg.C

Please forward results and invoice to:
labresults@jbsg.com.au
msarunic@jbsg.com.au
jayers@jbsg.com.au
atschirn@jbsg.com.au

ANALYSIS REQUIRED

SAMPLE DATA				CONTAINER DATA			M12: Heavy Metals Suite	B14: OCP & OPP	B9: Metals, TRH, BTEX, PAH & OCP	PFAS: Short Suite	B19A: Nutrients	R7: SA Waste Screen	R21: NEPM Screen for Soil Classification	M8: Metals	BTEX	Asbestos	Coliforms (total)	PAH				
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field																
BH19_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH20_0.0-0.1	SOIL	29/06/2022		1 Jar			X				X							X				
BH20_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH20_0.3-0.5	SOIL	29/06/2022		1 Jar																		
ACM01	CEMENT SHEET	29/06/2022														X						
DUP01	SOIL	29/06/2022		1 Jar																		
DUP02	SOIL	30/06/2022		1 Jar																		
SPLIT01	SOIL	29/06/2022		1 Jar																		
SPLIT02	SOIL	30/06/2022		1 Jar																		
TB01	WATER	29/06/2022		2 V											X							
RB01	WATER	30/06/2022		1 Metals										X								
						TOTAL	13	8	6	5	7	2	1	1	1	1	3	4	0	0	0	0

***Container Type and Preservative Codes:**
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosuplhate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

'NOTES

PLEASE FORWARD TO ENVIROLAB

H90301a
Matthew 4/7/22

COPY 9

1

eurofins | Environment Testing

PROJECT INFORMATION

Date Received: 30/6/22

Company: JBS&G

Contact person: Jack Ayers

Contact Number: 0459534775

Contact E-mail: jayers@jbsg.com.au

Project Name/site: Renascor Waterloo Cnr Road

Project Number: 61355

#903014
Matthew 4/7/22

COC: Attached ☐
E-mailed ☑
Not received ☐

5.8°C
−1.2°C
4.6°C
on ice

2 x Esky's.

Last modified on: 16 October 2019	Approved on: 16 October 2019	Version: QS1039_R2
Last modified by: H. Le	Approver: M. Makarios	Page 1 of 1
Editorial Committee: T. Lakeland, F. Sanjaya, H. Le, M. Makarios		Next required review date: 16 October 2022

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NATA# 1261 Site# 1254

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179 Magowar Road
Girraween
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NATA# 1261 Site# 18217

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PO Box 60 Wickham 2293
Tel: +61 2 4968 8448
NATA# 1261 Site# 25079

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WA 6106
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NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland
35 O'Rorke Road
Penrose,
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Sample Receipt Advice

Company name:	JBS & G Australia (SA) P/L
Contact name:	Jack Ayers
Project name:	RENASCOR WATERLOO CNR RD
Project ID:	63155
Turnaround time:	5 Day
Date/Time received	Jul 4, 2022 6:13 PM
Eurofins reference	903019

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✓ Split sample sent to requested external lab.
- ✓ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Samples received by the laboratory after 5.30pm are deemed to have been received the following working day.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Michael Cassidy on phone : +61 3 8564 5000 or by email: MichaelCassidy@eurofins.com

Results will be delivered electronically via email to Jack Ayers - jayers@jbsg.com.au.

Global Leader - Results you can trust

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Certificate of Analysis

JBS & G Australia (SA) P/L
100 Hutt St
Adelaide
SA 5000

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition 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: **Jack Ayers**

Report **903019-S**
Project name RENASCOR WATERLOO CNR RD
Project ID 63155
Received Date Jul 04, 2022

Client Sample ID			**BH01_0.0-0.1**	**BH02_0.0-0.1**	**BH03_0.0-0.1**	**BH04_0.0-0.1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M22-JI0006698**	**M22-JI0006699**	**M22-JI0006700**	**M22-JI0006701**
Date Sampled			**Jun 29, 2022**	**Jun 29, 2022**	**Jun 29, 2022**	**Jun 29, 2022**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	-	-	-
TRH C10-C14	20	mg/kg	< 20	-	-	-
TRH C15-C28	50	mg/kg	< 50	-	-	-
TRH C29-C36	50	mg/kg	< 50	-	-	-
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	-
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	-
TRH C6-C10	20	mg/kg	< 20	-	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	-
TRH >C10-C16	50	mg/kg	< 50	-	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	-
TRH >C16-C34	100	mg/kg	< 100	-	-	-
TRH >C34-C40	100	mg/kg	< 100	-	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	-
Toluene	0.1	mg/kg	< 0.1	-	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	-
o-Xylene	0.1	mg/kg	< 0.1	-	-	-
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	-
4-Bromofluorobenzene (surr.)	1	%	91	-	-	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	-	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	-	< 0.5	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-

Client Sample ID			BH01_0.0-0.1	BH02_0.0-0.1	BH03_0.0-0.1	BH04_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006698	M22-JI0006699	M22-JI0006700	M22-JI0006701
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	-	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Naphthalene	0.5	mg/kg	< 0.5	-	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Total PAH*	0.5	mg/kg	< 0.5	-	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	119	-	129	-
p-Terphenyl-d14 (surr.)	1	%	84	-	97	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
a-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
b-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
d-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	74	100	-	71
Tetrachloro-m-xylene (surr.)	1	%	89	93	-	87
Nitrate & Nitrite (as N)	5	mg/kg	< 5	-	-	-
Total Kjeldahl Nitrogen (as N)	10	mg/kg	530	-	-	-
Total Nitrogen (as N)*	10	mg/kg	530	-	-	-
Phosphorus	5	mg/kg	210	-	-	-
% Moisture	1	%	14	7.8	10	17
Heavy Metals						
Arsenic	2	mg/kg	< 2	2.5	< 2	2.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	24	25	24	36
Copper	5	mg/kg	11	13	9.4	19
Lead	5	mg/kg	9.4	11	10	14

Client Sample ID			BH01_0.0-0.1	BH02_0.0-0.1	BH03_0.0-0.1	BH04_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006698	M22-JI0006699	M22-JI0006700	M22-JI0006701
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	5	mg/kg	-	< 5	< 5	< 5
Nickel	5	mg/kg	< 5	< 5	< 5	8.0
Selenium	2	mg/kg	-	< 2	< 2	< 2
Silver	2	mg/kg	-	< 2	< 2	< 2
Tin	10	mg/kg	-	< 10	< 10	< 10
Zinc	5	mg/kg	22	28	25	32
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Coumaphos	2	mg/kg	-	< 2	-	< 2
Demeton-S	0.2	mg/kg	-	< 0.2	-	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	-	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	-	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	-	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	-	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	-	< 0.2
EPN	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	-	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Malathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Merphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Methyl parathion	0.2	mg/kg	-	< 0.2	-	< 0.2
Mevinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Monocrotophos	2	mg/kg	-	< 2	-	< 2
Naled	0.2	mg/kg	-	< 0.2	-	< 0.2
Omethoate	2	mg/kg	-	< 2	-	< 2
Phorate	0.2	mg/kg	-	< 0.2	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	-	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	-	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	-	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	98	-	53
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	-	-	< 10
13C2-6:2 FTSA (surr.)	1	%	-	-	-	79
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	-	[N09]5.2

Client Sample ID			BH01_0.0-0.1	BH02_0.0-0.1	BH03_0.0-0.1	BH04_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006698	M22-JI0006699	M22-JI0006700	M22-JI0006701
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
18O2-PFHxS (surr.)	1	%	-	-	-	82
13C8-PFOS (surr.)	1	%	-	-	-	79
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	-	< 5
13C8-PFOA (surr.)	1	%	-	-	-	79
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	-	5.2
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	-	5.2
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	-	5.2

Client Sample ID			BH05_0.0-0.1	BH06_0.0-0.1	BH07_0.0-0.1	BH08_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006702	M22-JI0006703	M22-JI0006704	M22-JI0006705
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	-	-
TRH C10-C14	20	mg/kg	< 20	< 20	-	-
TRH C15-C28	50	mg/kg	< 50	< 50	-	-
TRH C29-C36	50	mg/kg	< 50	< 50	-	-
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	-	-
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	-	-
TRH C6-C10	20	mg/kg	< 20	< 20	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	-	-
TRH >C10-C16	50	mg/kg	< 50	< 50	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	-	-
TRH >C16-C34	100	mg/kg	< 100	< 100	-	-
TRH >C34-C40	100	mg/kg	< 100	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	-
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	-
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	-
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	-	-
4-Bromofluorobenzene (surr.)	1	%	95	142	-	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-	-

Client Sample ID			BH05_0.0-0.1	BH06_0.0-0.1	BH07_0.0-0.1	BH08_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006702	M22-JI0006703	M22-JI0006704	M22-JI0006705
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-	-
2-Fluorobiphenyl (surr.)	1	%	133	52	-	-
p-Terphenyl-d14 (surr.)	1	%	146	144	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	74	69	76	73
Tetrachloro-m-xylene (surr.)	1	%	74	51	88	121
Nitrate & Nitrite (as N)	5	mg/kg	-	< 5	-	< 5
Total Kjeldahl Nitrogen (as N)	10	mg/kg	-	360	-	1200
Total Nitrogen (as N)*	10	mg/kg	-	360	-	1200
Phosphorus	5	mg/kg	-	270	-	200
% Moisture	1	%	16	17	11	13
% Clay	1	%	7.4	-	-	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	240	-	-	-
pH (units)(1:5 soil:CaCl2 extract at 25°C as rec.)	0.1	pH Units	7.7	-	-	-
Total Organic Carbon	0.1	%	0.6	-	-	-

Client Sample ID			BH05_0.0-0.1	BH06_0.0-0.1	BH07_0.0-0.1	BH08_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006702	M22-JI0006703	M22-JI0006704	M22-JI0006705
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	11	22	16	17
Copper	5	mg/kg	< 5	9.7	9.7	9.0
Iron	20	mg/kg	7600	-	-	-
Lead	5	mg/kg	11	11	9.2	9.5
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	5	mg/kg	-	-	< 5	< 5
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Selenium	2	mg/kg	-	-	< 2	< 2
Silver	2	mg/kg	-	-	< 2	< 2
Tin	10	mg/kg	-	-	< 10	< 10
Zinc	5	mg/kg	17	30	17	19
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Bolstar	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Coumaphos	2	mg/kg	-	-	< 2	< 2
Demeton-S	0.2	mg/kg	-	-	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	-	-	< 0.2	< 0.2
Diazinon	0.2	mg/kg	-	-	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	-	-	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	-	-	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	-	-	< 0.2	< 0.2
EPN	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethion	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fenthion	0.2	mg/kg	-	-	< 0.2	< 0.2
Malathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Merphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Monocrotophos	2	mg/kg	-	-	< 2	< 2
Naled	0.2	mg/kg	-	-	< 0.2	< 0.2
Omethoate	2	mg/kg	-	-	< 2	< 2
Phorate	0.2	mg/kg	-	-	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	-	-	< 0.2	< 0.2
Ronnel	0.2	mg/kg	-	-	< 0.2	< 0.2
Terbufos	0.2	mg/kg	-	-	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	-	-	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	-	-	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	-	-	84	87

Client Sample ID			BH05_0.0-0.1	BH06_0.0-0.1	BH07_0.0-0.1	BH08_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006702	M22-JI0006703	M22-JI0006704	M22-JI0006705
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	-	< 10	-
13C2-6:2 FTSA (surr.)	1	%	-	-	86	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	< 5	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	< 5	-
18O2-PFHxS (surr.)	1	%	-	-	77	-
13C8-PFOS (surr.)	1	%	-	-	82	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	< 5	-
13C8-PFOA (surr.)	1	%	-	-	82	-
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	< 5	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	< 5	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	< 5	-
Heavy Metals						
Iron (%)	0.01	%	0.76	-	-	-
Cation Exchange Capacity						
Cation Exchange Capacity	0.05	meq/100g	22	-	-	-

Client Sample ID			BH09_0.0-0.1	BH10_0.0-0.1	BH11_0.0-0.1	BH12_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006706	M22-JI0006707	M22-JI0006708	M22-JI0006709
Date Sampled			Jun 29, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	-	< 20	-	-
TRH C10-C14	20	mg/kg	-	< 20	-	-
TRH C15-C28	50	mg/kg	-	< 50	-	-
TRH C29-C36	50	mg/kg	-	< 50	-	-
TRH C10-C36 (Total)	50	mg/kg	-	< 50	-	-
Naphthalene[N02]	0.5	mg/kg	-	< 0.5	-	-
TRH C6-C10	20	mg/kg	-	< 20	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	< 20	-	-
TRH >C10-C16	50	mg/kg	-	< 50	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	< 50	-	-
TRH >C16-C34	100	mg/kg	-	< 100	-	-
TRH >C34-C40	100	mg/kg	-	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	-	< 100	-	-
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	-	-
Toluene	0.1	mg/kg	-	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-	-
o-Xylene	0.1	mg/kg	-	< 0.1	-	-
Xylenes - Total*	0.3	mg/kg	-	< 0.3	-	-
4-Bromofluorobenzene (surr.)	1	%	-	91	-	-

Client Sample ID			BH09_0.0-0.1	BH10_0.0-0.1	BH11_0.0-0.1	BH12_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006706	M22-JI0006707	M22-JI0006708	M22-JI0006709
Date Sampled			Jun 29, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-	-
2-Fluorobiphenyl (surr.)	1	%	112	92	-	-
p-Terphenyl-d14 (surr.)	1	%	76	114	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
a-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
b-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
d-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	-	65	63	107
Tetrachloro-m-xylene (surr.)	1	%	-	101	114	147

Client Sample ID			BH09_0.0-0.1	BH10_0.0-0.1	BH11_0.0-0.1	BH12_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006706	M22-JI0006707	M22-JI0006708	M22-JI0006709
Date Sampled			Jun 29, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
Nitrate & Nitrite (as N)	5	mg/kg	-	-	< 5	-
Total Kjeldahl Nitrogen (as N)	10	mg/kg	-	-	630	-
Total Nitrogen (as N)*	10	mg/kg	-	-	630	-
Phosphorus	5	mg/kg	-	-	160	-
% Moisture	1	%	20	14	12	14
Heavy Metals						
Arsenic	2	mg/kg	2.6	3.3	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	25	42	11	20
Copper	5	mg/kg	12	22	5.7	9.2
Lead	5	mg/kg	11	14	11	13
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	5	mg/kg	< 5	-	< 5	< 5
Nickel	5	mg/kg	7.7	9.7	< 5	5.7
Selenium	2	mg/kg	< 2	-	< 2	< 2
Silver	2	mg/kg	< 2	-	< 2	< 2
Tin	10	mg/kg	< 10	-	< 10	< 10
Zinc	5	mg/kg	22	31	18	30
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Bolstar	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Coumaphos	2	mg/kg	-	-	< 2	< 2
Demeton-S	0.2	mg/kg	-	-	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	-	-	< 0.2	< 0.2
Diazinon	0.2	mg/kg	-	-	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	-	-	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	-	-	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	-	-	< 0.2	< 0.2
EPN	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethion	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fenthion	0.2	mg/kg	-	-	< 0.2	< 0.2
Malathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Merphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Monocrotophos	2	mg/kg	-	-	< 2	< 2
Naled	0.2	mg/kg	-	-	< 0.2	< 0.2
Omethoate	2	mg/kg	-	-	< 2	< 2
Phorate	0.2	mg/kg	-	-	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	-	-	< 0.2	< 0.2
Ronnel	0.2	mg/kg	-	-	< 0.2	< 0.2

Client Sample ID			BH09_0.0-0.1	BH10_0.0-0.1	BH11_0.0-0.1	BH12_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006706	M22-JI0006707	M22-JI0006708	M22-JI0006709
Date Sampled			Jun 29, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Terbufos	0.2	mg/kg	-	-	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	-	-	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	-	-	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	-	-	67	144
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	< 10	-	-	-
13C2-6:2 FTSA (surr.)	1	%	52	-	-	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-	-	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-	-	-
18O2-PFHxS (surr.)	1	%	69	-	-	-
13C8-PFOS (surr.)	1	%	62	-	-	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-	-	-
13C8-PFOA (surr.)	1	%	62	-	-	-
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-	-	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-	-	-
Pathogens						
Total Coliforms (MPN)	1	MPN/g	-	See attached	-	-

Client Sample ID			BH13_0.0-0.1	BH14_0.0-0.15	BH15_0.0-0.15	BH16_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006710	M22-JI0006711	M22-JI0006712	M22-JI0006713
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	-	-
TRH C10-C14	20	mg/kg	< 20	< 20	-	-
TRH C15-C28	50	mg/kg	< 50	< 50	-	-
TRH C29-C36	50	mg/kg	< 50	< 50	-	-
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	-	-
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	-	-
TRH C6-C10	20	mg/kg	< 20	< 20	-	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	-	-
TRH >C10-C16	50	mg/kg	< 50	< 50	-	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	-	-
TRH >C16-C34	100	mg/kg	< 100	< 100	-	-
TRH >C34-C40	100	mg/kg	< 100	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	-
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	-
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	-
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	-	-
4-Bromofluorobenzene (surr.)	1	%	81	115	-	-

Client Sample ID			BH13_0.0-0.1	BH14_0.0-0.15	BH15_0.0-0.15	BH16_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006710	M22-JI0006711	M22-JI0006712	M22-JI0006713
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-	-
2-Fluorobiphenyl (surr.)	1	%	92	97	-	-
p-Terphenyl-d14 (surr.)	1	%	125	120	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	68	68	67	68
Tetrachloro-m-xylene (surr.)	1	%	103	98	103	97

Client Sample ID			BH13_0.0-0.1	BH14_0.0-0.15	BH15_0.0-0.15	BH16_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006710	M22-JI0006711	M22-JI0006712	M22-JI0006713
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
% Moisture	1	%	18	15	16	19
Chromium (hexavalent)	1	mg/kg	-	< 1	-	-
Chromium (trivalent)	5	mg/kg	-	24	-	-
Cyanide (total)	5	mg/kg	-	< 5	-	-
Heavy Metals						
Arsenic	2	mg/kg	3.4	2.3	3.2	< 2
Barium	10	mg/kg	-	22	-	-
Beryllium	2	mg/kg	-	< 2	-	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	44	24	42	25
Cobalt	5	mg/kg	-	< 5	-	-
Copper	5	mg/kg	20	13	19	10
Iron	20	mg/kg	-	13000	-	-
Lead	5	mg/kg	19	16	20	14
Manganese	5	mg/kg	-	120	-	-
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	5	mg/kg	-	-	< 5	< 5
Nickel	5	mg/kg	9.4	< 5	6.8	< 5
Selenium	2	mg/kg	-	-	< 2	< 2
Silver	2	mg/kg	-	< 2	< 2	< 2
Tin	10	mg/kg	-	-	< 10	< 10
Zinc	5	mg/kg	45	39	39	30
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Bolstar	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	-	-	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Coumaphos	2	mg/kg	-	-	< 2	< 2
Demeton-S	0.2	mg/kg	-	-	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	-	-	< 0.2	< 0.2
Diazinon	0.2	mg/kg	-	-	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	-	-	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	-	-	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	-	-	< 0.2	< 0.2
EPN	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethion	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	-	-	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	-	-	< 0.2	< 0.2
Fenthion	0.2	mg/kg	-	-	< 0.2	< 0.2
Malathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Merphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	-	-	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Monocrotophos	2	mg/kg	-	-	< 2	< 2
Naled	0.2	mg/kg	-	-	< 0.2	< 0.2
Omethoate	2	mg/kg	-	-	< 2	< 2

Client Sample ID			BH13_0.0-0.1	BH14_0.0-0.15	BH15_0.0-0.15	BH16_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006710	M22-JI0006711	M22-JI0006712	M22-JI0006713
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Phorate	0.2	mg/kg	-	-	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	-	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	-	-	< 0.2	< 0.2
Ronnel	0.2	mg/kg	-	-	< 0.2	< 0.2
Terbufos	0.2	mg/kg	-	-	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	-	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	-	-	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	-	-	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	-	-	92	98
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	-	-	< 10
13C2-6:2 FTSA (surr.)	1	%	-	-	-	81
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	-	< 5
18O2-PFHxS (surr.)	1	%	-	-	-	78
13C8-PFOS (surr.)	1	%	-	-	-	87
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	-	< 5
13C8-PFOA (surr.)	1	%	-	-	-	77
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	-	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Volatile Organics						
Tetrachloroethene	0.5	mg/kg	-	< 0.5	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	-
Total PCB*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	-	68	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	98	-	-
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	-	< 0.5	-	-
2.4-Dichlorophenol	0.5	mg/kg	-	< 0.5	-	-
2.4.5-Trichlorophenol	1	mg/kg	-	< 1	-	-
2.4.6-Trichlorophenol	1	mg/kg	-	< 1	-	-
2.6-Dichlorophenol	0.5	mg/kg	-	< 0.5	-	-
4-Chloro-3-methylphenol	1	mg/kg	-	< 1	-	-
Pentachlorophenol	1	mg/kg	-	< 1	-	-
Tetrachlorophenols - Total	10	mg/kg	-	< 10	-	-
Total Halogenated Phenol*	1	mg/kg	-	< 1	-	-

Client Sample ID			BH13_0.0-0.1	BH14_0.0-0.15	BH15_0.0-0.15	BH16_0.0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006710	M22-JI0006711	M22-JI0006712	M22-JI0006713
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 30, 2022	Jun 30, 2022
Test/Reference	LOR	Unit				
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	-	< 20	-	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	-	< 5	-	-
2-Nitrophenol	1.0	mg/kg	-	< 1	-	-
2.4-Dimethylphenol	0.5	mg/kg	-	< 0.5	-	-
2.4-Dinitrophenol	5	mg/kg	-	< 5	-	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	-	< 0.2	-	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	-	< 0.4	-	-
Total cresols*	0.5	mg/kg	-	< 0.5	-	-
4-Nitrophenol	5	mg/kg	-	< 5	-	-
Dinoseb	20	mg/kg	-	< 20	-	-
Phenol	0.5	mg/kg	-	< 0.5	-	-
Phenol-d6 (surr.)	1	%	-	102	-	-
Total Non-Halogenated Phenol*	20	mg/kg	-	< 20	-	-

Client Sample ID			BH17_0.0-0.1	BH18_0.0-0.1	BH19_0.0-0.1	BH19_0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006714	M22-JI0006715	M22-JI0006716	M22-JI0006717
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	-	-	< 20
TRH C10-C14	20	mg/kg	< 20	-	-	< 20
TRH C15-C28	50	mg/kg	< 50	-	-	< 50
TRH C29-C36	50	mg/kg	< 50	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	< 50
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	-	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	< 20
TRH >C10-C16	50	mg/kg	< 50	-	-	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	< 50
TRH >C16-C34	100	mg/kg	< 100	-	-	< 100
TRH >C34-C40	100	mg/kg	< 100	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	< 100
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	75	-	-	77
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5

Client Sample ID			BH17_0.0-0.1	BH18_0.0-0.1	BH19_0.0-0.1	BH19_0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006714	M22-JI0006715	M22-JI0006716	M22-JI0006717
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
2-Fluorobiphenyl (surr.)	1	%	97	131	-	101
p-Terphenyl-d14 (surr.)	1	%	127	85	-	125
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	-	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	-	-	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	-	-	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	-	-	< 0.05
a-HCH	0.05	mg/kg	< 0.05	-	-	< 0.05
Aldrin	0.05	mg/kg	< 0.05	-	-	< 0.05
b-HCH	0.05	mg/kg	< 0.05	-	-	< 0.05
d-HCH	0.05	mg/kg	< 0.05	-	-	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	-	-	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.05	-	-	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	-	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	-	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	-	-	< 0.05
Toxaphene	0.5	mg/kg	< 0.5	-	-	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	-	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	-	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	-	-	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	-	-	< 0.1
Dibutylchlorendate (surr.)	1	%	68	-	-	86
Tetrachloro-m-xylene (surr.)	1	%	96	-	-	126
Nitrate & Nitrite (as N)	5	mg/kg	-	< 5	< 5	-
Total Kjeldahl Nitrogen (as N)	10	mg/kg	-	390	580	-
Total Nitrogen (as N)*	10	mg/kg	-	390	580	-
Phosphorus	5	mg/kg	-	270	230	-

Client Sample ID			BH17_0.0-0.1	BH18_0.0-0.1	BH19_0.0-0.1	BH19_0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006714	M22-JI0006715	M22-JI0006716	M22-JI0006717
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
% Moisture	1	%	22	17	23	21
Chromium (hexavalent)	1	mg/kg	-	-	-	< 1
Chromium (trivalent)	5	mg/kg	-	-	-	17
Cyanide (total)	5	mg/kg	-	-	-	< 5
Heavy Metals						
Arsenic	2	mg/kg	< 2	2.1	3.9	2.6
Barium	10	mg/kg	-	-	-	48
Beryllium	2	mg/kg	-	-	-	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	15	21	30	17
Cobalt	5	mg/kg	-	-	-	< 5
Copper	5	mg/kg	7.5	9.6	18	35
Iron	20	mg/kg	-	-	-	14000
Lead	5	mg/kg	18	21	10	24
Manganese	5	mg/kg	-	-	-	180
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	5	mg/kg	-	< 5	< 5	-
Nickel	5	mg/kg	< 5	< 5	9.4	< 5
Selenium	2	mg/kg	-	< 2	< 2	-
Silver	2	mg/kg	-	< 2	< 2	< 2
Tin	10	mg/kg	-	< 10	< 10	-
Zinc	5	mg/kg	31	28	31	85
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	10	ug/kg	-	< 10	-	-
13C2-6:2 FTSA (surr.)	1	%	-	62	-	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	< 5	-	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	< 5	-	-
18O2-PFHxS (surr.)	1	%	-	85	-	-
13C8-PFOS (surr.)	1	%	-	91	-	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	< 5	-	-
13C8-PFOA (surr.)	1	%	-	80	-	-
Sum (PFHxS + PFOS)*	5	ug/kg	-	< 5	-	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	< 5	-	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	< 5	-	-
Pathogens						
Total Coliforms (MPN)	1	MPN/g	-	See attached	See attached	-
Volatile Organics						
Tetrachloroethene	0.5	mg/kg	-	-	-	< 0.5
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	-	-	< 0.1
Total PCB*	0.1	mg/kg	-	-	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	-	-	86
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	126

Client Sample ID			BH17_0.0-0.1	BH18_0.0-0.1	BH19_0.0-0.1	BH19_0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006714	M22-JI0006715	M22-JI0006716	M22-JI0006717
Date Sampled			Jun 30, 2022	Jun 30, 2022	Jun 29, 2022	Jun 29, 2022
Test/Reference	LOR	Unit				
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	-	-	-	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	-	-	-	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	-	-	-	< 1
2.4.6-Trichlorophenol	1	mg/kg	-	-	-	< 1
2.6-Dichlorophenol	0.5	mg/kg	-	-	-	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	-	-	-	< 1
Pentachlorophenol	1	mg/kg	-	-	-	< 1
Tetrachlorophenols - Total	10	mg/kg	-	-	-	< 10
Total Halogenated Phenol*	1	mg/kg	-	-	-	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	-	-	-	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	-	-	-	< 5
2-Nitrophenol	1.0	mg/kg	-	-	-	< 1
2.4-Dimethylphenol	0.5	mg/kg	-	-	-	< 0.5
2.4-Dinitrophenol	5	mg/kg	-	-	-	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	-	-	-	< 0.2
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	-	-	-	< 0.4
Total cresols*	0.5	mg/kg	-	-	-	< 0.5
4-Nitrophenol	5	mg/kg	-	-	-	< 5
Dinoseb	20	mg/kg	-	-	-	< 20
Phenol	0.5	mg/kg	-	-	-	< 0.5
Phenol-d6 (surr.)	1	%	-	-	-	118
Total Non-Halogenated Phenol*	20	mg/kg	-	-	-	< 20

Client Sample ID			BH20_0.0-0.1	DUP01	DUP02
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006718	M22-JI0006760	M22-JI0006761
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 30, 2022
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons					
TRH C6-C9	20	mg/kg	-	< 20	-
TRH C10-C14	20	mg/kg	-	< 20	-
TRH C15-C28	50	mg/kg	-	< 50	-
TRH C29-C36	50	mg/kg	-	< 50	-
TRH C10-C36 (Total)	50	mg/kg	-	< 50	-
Naphthalene[N02]	0.5	mg/kg	-	< 0.5	-
TRH C6-C10	20	mg/kg	-	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	< 20	-
TRH >C10-C16	50	mg/kg	-	< 50	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	< 50	-
TRH >C16-C34	100	mg/kg	-	< 100	-
TRH >C34-C40	100	mg/kg	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	-	< 100	-
BTEX					
Benzene	0.1	mg/kg	-	< 0.1	-
Toluene	0.1	mg/kg	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-

Client Sample ID			BH20_0.0-0.1	DUP01	DUP02
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006718	M22-JI0006760	M22-JI0006761
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 30, 2022
Test/Reference	LOR	Unit			
BTEX					
o-Xylene	0.1	mg/kg	-	< 0.1	-
Xylenes - Total*	0.3	mg/kg	-	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	-	81	-
Polycyclic Aromatic Hydrocarbons					
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	102	83	-
p-Terphenyl-d14 (surr.)	1	%	110	80	-
Organochlorine Pesticides					
Chlordanes - Total	0.1	mg/kg	-	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	-	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	-	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	-	< 0.05	< 0.05
a-HCH	0.05	mg/kg	-	< 0.05	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	< 0.05
b-HCH	0.05	mg/kg	-	< 0.05	< 0.05
d-HCH	0.05	mg/kg	-	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	-	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	-	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	-	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	< 0.05

Client Sample ID			BH20_0.0-0.1	DUP01	DUP02
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006718	M22-JI0006760	M22-JI0006761
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 30, 2022
Test/Reference	LOR	Unit			
Organochlorine Pesticides					
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	-	95	120
Tetrachloro-m-xylene (surr.)	1	%	-	113	98
Nitrate & Nitrite (as N)	5	mg/kg	< 5	-	-
Total Kjeldahl Nitrogen (as N)	10	mg/kg	860	-	-
Total Nitrogen (as N)*	10	mg/kg	860	-	-
Phosphorus	5	mg/kg	110	-	-
% Moisture	1	%	17	20	14
Heavy Metals					
Arsenic	2	mg/kg	< 2	3.2	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	15	20	34
Copper	5	mg/kg	5.3	34	14
Lead	5	mg/kg	14	23	21
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Molybdenum	5	mg/kg	< 5	-	< 5
Nickel	5	mg/kg	< 5	8.0	5.2
Selenium	2	mg/kg	< 2	-	< 2
Silver	2	mg/kg	< 2	-	< 2
Tin	10	mg/kg	< 10	-	< 10
Zinc	5	mg/kg	22	100	59
Organophosphorus Pesticides					
Azinphos-methyl	0.2	mg/kg	-	-	< 0.2
Bolstar	0.2	mg/kg	-	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	-	< 0.2
Coumaphos	2	mg/kg	-	-	< 2
Demeton-S	0.2	mg/kg	-	-	< 0.2
Demeton-O	0.2	mg/kg	-	-	< 0.2
Diazinon	0.2	mg/kg	-	-	< 0.2
Dichlorvos	0.2	mg/kg	-	-	< 0.2
Dimethoate	0.2	mg/kg	-	-	< 0.2
Disulfoton	0.2	mg/kg	-	-	< 0.2
EPN	0.2	mg/kg	-	-	< 0.2
Ethion	0.2	mg/kg	-	-	< 0.2
Ethoprop	0.2	mg/kg	-	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	-	< 0.2
Fenitrothion	0.2	mg/kg	-	-	< 0.2
Fensulfothion	0.2	mg/kg	-	-	< 0.2
Fenthion	0.2	mg/kg	-	-	< 0.2
Malathion	0.2	mg/kg	-	-	< 0.2
Merphos	0.2	mg/kg	-	-	< 0.2
Methyl parathion	0.2	mg/kg	-	-	< 0.2
Mevinphos	0.2	mg/kg	-	-	< 0.2
Monocrotophos	2	mg/kg	-	-	< 2

Client Sample ID			BH20_0.0-0.1	DUP01	DUP02
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			M22-JI0006718	M22-JI0006760	M22-JI0006761
Date Sampled			Jun 29, 2022	Jun 29, 2022	Jun 30, 2022
Test/Reference	LOR	Unit			
Organophosphorus Pesticides					
Naled	0.2	mg/kg	-	-	< 0.2
Omethoate	2	mg/kg	-	-	< 2
Phorate	0.2	mg/kg	-	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	-	< 0.2
Pyrazophos	0.2	mg/kg	-	-	< 0.2
Ronnel	0.2	mg/kg	-	-	< 0.2
Terbufos	0.2	mg/kg	-	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	-	< 0.2
Tokuthion	0.2	mg/kg	-	-	< 0.2
Trichloronate	0.2	mg/kg	-	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	-	107

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
Eurofins Suite B9			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jul 07, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jul 07, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jul 07, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Jul 07, 2022	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Polycyclic Aromatic Hydrocarbons	Melbourne	Jul 07, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organochlorine Pesticides	Melbourne	Jul 07, 2022	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Metals M8	Melbourne	Jul 07, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N)	Melbourne	Jul 04, 2022	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Total Kjeldahl Nitrogen (as N)	Melbourne	Jul 04, 2022	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Eurofins Suite B19A: Total N (TKN, NOx), Total P			
Phosphorus	Melbourne	Jul 04, 2022	180 Days
- Method: LTM-MET-3010 Alkali Metals Sulfur Silicon and Phosphorus by ICP-AES			
% Moisture	Melbourne	Jul 06, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			
NEPM Screen for Soil Classification			
% Clay	Brisbane	Jul 07, 2022	14 Days
- Method: LTM-GEN-7040			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Jul 04, 2022	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (units)(1:5 soil:CaCl2 extract at 25°C as rec.)	Melbourne	Jul 04, 2022	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Total Organic Carbon	Melbourne	Jul 05, 2022	28 Days
- Method: LTM-INO-4060 Total Organic Carbon in water and soil			
Heavy Metals	Melbourne	Jul 04, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Cation Exchange Capacity	Melbourne	Jul 07, 2022	28 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
SA Waste Screen			
Chromium (hexavalent)	Melbourne	Jul 04, 2022	28 Days
- Method: LTM-INO-4230 Hexavalent Chromium by UV-Vis			
Cyanide (total)	Melbourne	Jul 05, 2022	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
SA Waste Metals : Metals M14SA	Melbourne	Jul 04, 2022	28 Days
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
Volatile Organics	Melbourne	Jul 04, 2022	7 Days
- Method: USEPA 8260 - MGT 350A Volatile Organics by GCMS			
Polychlorinated Biphenyls	Melbourne	Jul 04, 2022	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8082)			
Phenols (Halogenated)	Melbourne	Jul 04, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			

Description	Testing Site	Extracted	Holding Time
Phenols (non-Halogenated)	Melbourne	Jul 04, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals IWRG 621 : Metals M12	Melbourne	Jul 07, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Per- and Polyfluoroalkyl Substances (PFASs) - Short	Melbourne	Jul 04, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Suite B14: OCP/OPP			
Organophosphorus Pesticides	Melbourne	Jul 07, 2022	14 Days
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS (USEPA 8270)			

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Company Name:	JBS & G Australia (SA) P/L	**Order No.:**		**Received:**	Jul 4, 2022 6:13 PM
Address:	100 Hutt St Adelaide SA 5000	**Report #:**	903019	**Due:**	Jul 12, 2022
		Phone:	08 8431 7113	**Priority:**	5 Day
		Fax:	08 8431 7115	**Contact Name:**	Jack Ayers
Project Name:	RENASCOR WATERLOO CNR RD				
Project ID:	63155				

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Asbestos Absence /Presence	HOLD	Total Coliforms (MPN)	Polycyclic Aromatic Hydrocarbons	Metals M8	Metals IWRG 621 : Metals M12	BTEX	Suite B14: OCP/OPP	Moisture Set	NEPM Screen for Soil Classification	SA Waste Screen	Eurofins Suite B9	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
External Laboratory								X											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	BH01_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006698									X			X	X	
2	BH02_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006699						X		X	X					
3	BH03_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006700				X		X			X					
4	BH04_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006701						X		X	X					X
5	BH05_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006702									X	X		X		
6	BH06_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006703									X			X	X	
7	BH07_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006704						X		X	X					X
8	BH08_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006705						X		X	X				X	
9	BH09_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006706				X		X			X					X
10	BH10_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006707			X						X			X		
11	BH11_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006708						X		X	X				X	
12	BH12_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006709						X		X	X					
13	BH13_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006710									X			X		

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Company Name: JBS & G Australia (SA) P/L
Address: 100 Hutt St
Adelaide
SA 5000

Project Name: RENASCOR WATERLOO CNR RD
Project ID: 63155

Order No.:
Report #: 903019
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Jul 4, 2022 6:13 PM
Due: Jul 12, 2022
Priority: 5 Day
Contact Name: Jack Ayers

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Asbestos Absence /Presence	HOLD	Total Coliforms (MPN)	Polycyclic Aromatic Hydrocarbons	Metals M8	Metals IWRG 621 : Metals M12	BTEX	Suite B14: OCP/OPP	Moisture Set	NEPM Screen for Soil Classification	SA Waste Screen	Eurofins Suite B9	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
14	BH14_0.0-0.15	Jun 30, 2022		Soil	M22-Jl0006711									X		X			
15	BH15_0.0-0.15	Jun 30, 2022		Soil	M22-Jl0006712						X		X	X					
16	BH16_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006713						X		X	X					X
17	BH17_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006714									X			X		
18	BH18_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006715			X	X		X			X				X	X
19	BH19_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006716			X			X			X				X	
20	BH19_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006717									X		X			
21	BH20_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006718				X		X			X				X	
22	TB01	Jun 29, 2022		Water	M22-Jl0006719							X							
23	RB01	Jun 30, 2022		Water	M22-Jl0006720					X									
24	BH01_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006721		X												
25	BH01_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006722		X												
26	BH02_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006723		X												
27	BH02_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006724		X												
28	BH03_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006725		X												
29	BH03_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006726		X												

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Christchurch 7675
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IANZ# 1290

Company Name: JBS & G Australia (SA) P/L
Address: 100 Hutt St
Adelaide
SA 5000

Order No.:
Report #: 903019
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Jul 4, 2022 6:13 PM
Due: Jul 12, 2022
Priority: 5 Day
Contact Name: Jack Ayers

Project Name: RENASCOR WATERLOO CNR RD
Project ID: 63155

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Asbestos Absence /Presence	HOLD	Total Coliforms (MPN)	Polycyclic Aromatic Hydrocarbons	Metals M8	Metals IWRG 621 : Metals M12	BTEX	Suite B14: OCP/OPP	Moisture Set	NEPM Screen for Soil Classification	SA Waste Screen	Eurofins Suite B9	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
30	BH04_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006727		X												
31	BH04_0.2-0.5	Jun 29, 2022		Soil	M22-JI0006728		X												
32	BH05_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006729		X												
33	BH05_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006730		X												
34	BH06_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006731		X												
35	BH06_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006732		X												
36	BH07_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006733		X												
37	BH07_0.2-0.5	Jun 29, 2022		Soil	M22-JI0006734		X												
38	BH08_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006735		X												
39	BH08_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006736		X												
40	BH09_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006737		X												
41	BH09_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006738		X												
42	BH10_0.1-0.2	Jun 30, 2022		Soil	M22-JI0006739		X												
43	BH10_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006740		X												
44	BH11_0.2-0.4	Jun 30, 2022		Soil	M22-JI0006741		X												
45	BH11_0.4-0.5	Jun 30, 2022		Soil	M22-JI0006742		X												

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Project Name: RENASCOR WATERLOO CNR RD
Project ID: 63155

Order No.:
Report #: 903019
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Jul 4, 2022 6:13 PM
Due: Jul 12, 2022
Priority: 5 Day
Contact Name: Jack Ayers

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Asbestos Absence /Presence	HOLD	Total Coliforms (MPN)	Polycyclic Aromatic Hydrocarbons	Metals M8	Metals IWRG 621 : Metals M12	BTEX	Suite B14: OCP/OPP	Moisture Set	NEPM Screen for Soil Classification	SA Waste Screen	Eurofins Suite B9	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
46	BH12_0.1-0.25	Jun 30, 2022		Soil	M22-JI0006743		X												
47	BH12_0.25-0.5	Jun 30, 2022		Soil	M22-JI0006744		X												
48	BH13_0.2-0.3	Jun 30, 2022		Soil	M22-JI0006745		X												
49	BH13_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006746		X												
50	BH14_0.15-0.35	Jun 30, 2022		Soil	M22-JI0006747		X												
51	BH14_0.35-0.5	Jun 30, 2022		Soil	M22-JI0006748		X												
52	BH15_0.15-0.3	Jun 30, 2022		Soil	M22-JI0006749		X												
53	BH15_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006750		X												
54	BH16_0.2-0.3	Jun 30, 2022		Soil	M22-JI0006751		X												
55	BH16_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006752		X												
56	BH17_0.1-0.2	Jun 30, 2022		Soil	M22-JI0006753		X												
57	BH17_0.2-0.5	Jun 30, 2022		Soil	M22-JI0006754		X												
58	BH18_0.2-0.3	Jun 30, 2022		Soil	M22-JI0006755		X												
59	BH18_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006756		X												
60	BH19_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006757		X												

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Address:	100 Hutt St Adelaide SA 5000	**Report #:**	903019	**Due:**	Jul 12, 2022
		Phone:	08 8431 7113	**Priority:**	5 Day
		Fax:	08 8431 7115	**Contact Name:**	Jack Ayers
Project Name:	RENASCOR WATERLOO CNR RD				
Project ID:	63155				

Eurofins Analytical Services Manager : Michael Cassidy

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Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
61	BH20_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006758		X												
62	BH20_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006759		X												
63	DUP01	Jun 29, 2022		Soil	M22-Jl0006760									X			X		
64	DUP02	Jun 30, 2022		Soil	M22-Jl0006761						X		X	X					
65	ACM01	Jun 30, 2022		Building Materials	M22-Jl0008347	X													
Test Counts						1	39	3	4	1	14	1	9	23	1	2	7	7	5

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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
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

Terms

APHA	American Public Health Association
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 a moisture has been determined on a solid sample the result is expressed on a dry 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 is representative of 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 like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-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 5.4
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 be used as a guide only 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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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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. 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
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-HCH	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-HCH	mg/kg	< 0.05			0.05	Pass	
d-HCH	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-HCH (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Nitrate & Nitrite (as N)	mg/kg	< 5			5	Pass	
Phosphorus	mg/kg	< 5			5	Pass	
Total Organic Carbon	%	0.1			0.1	Pass	
Chromium (hexavalent)	mg/kg	< 1			1	Pass	
Cyanide (total)	mg/kg	< 5			5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Chromium	mg/kg	< 5			5	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Iron	mg/kg	< 20			20	Pass	
Iron	mg/kg	< 20			20	Pass	
Lead	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Molybdenum	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Silver	mg/kg	< 2			2	Pass	
Silver	mg/kg	< 2			2	Pass	
Tin	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Per- and Polyfluoroalkyl Substances (PFASs) - Short							
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Sum (PFHxS + PFOS)*	ug/kg	-			5	N/A	
Sum of US EPA PFAS (PFOS + PFOA)*	ug/kg	-			5	N/A	
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	ug/kg	-			5	N/A	
Method Blank							
Cation Exchange Capacity							
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
Method Blank							
Volatile Organics							
Tetrachloroethene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Phenols (Halogenated)							
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2.4.5-Trichlorophenol	mg/kg	< 1			1	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1	Pass	
Pentachlorophenol	mg/kg	< 1			1	Pass	
Tetrachlorophenols - Total	mg/kg	< 10			10	Pass	
Method Blank							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	mg/kg	< 20			20	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Nitrophenol	mg/kg	< 1			1.0	Pass	
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
Dinoseb	mg/kg	< 20			20	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	81			70-130	Pass	
TRH C10-C14	%	88			70-130	Pass	
Naphthalene	%	97			70-130	Pass	
TRH C6-C10	%	80			70-130	Pass	
TRH >C10-C16	%	91			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	89			70-130	Pass	
Toluene	%	81			70-130	Pass	
Ethylbenzene	%	93			70-130	Pass	
m&p-Xylenes	%	91			70-130	Pass	
Xylenes - Total*	%	91			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	98			70-130	Pass	
Acenaphthylene	%	94			70-130	Pass	
Anthracene	%	74			70-130	Pass	
Benz(a)anthracene	%	92			70-130	Pass	
Benzo(a)pyrene	%	76			70-130	Pass	
Benzo(b&j)fluoranthene	%	74			70-130	Pass	
Benzo(g.h.i)perylene	%	79			70-130	Pass	
Benzo(k)fluoranthene	%	72			70-130	Pass	
Chrysene	%	86			70-130	Pass	
Dibenz(a.h)anthracene	%	110			70-130	Pass	
Fluoranthene	%	74			70-130	Pass	
Fluorene	%	90			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	85			70-130	Pass	
Naphthalene	%	97			70-130	Pass	
Phenanthrene	%	96			70-130	Pass	
Pyrene	%	72			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	87			70-130	Pass	
4.4'-DDD	%	123			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4.4'-DDE	%	99			70-130	Pass	
4.4'-DDT	%	96			70-130	Pass	
a-HCH	%	86			70-130	Pass	
Aldrin	%	87			70-130	Pass	
b-HCH	%	112			70-130	Pass	
d-HCH	%	71			70-130	Pass	
Dieldrin	%	82			70-130	Pass	
Endosulfan I	%	78			70-130	Pass	
Endosulfan II	%	91			70-130	Pass	
Endosulfan sulphate	%	98			70-130	Pass	
Endrin	%	76			70-130	Pass	
Endrin aldehyde	%	81			70-130	Pass	
Endrin ketone	%	100			70-130	Pass	
g-HCH (Lindane)	%	116			70-130	Pass	
Heptachlor	%	81			70-130	Pass	
Heptachlor epoxide	%	96			70-130	Pass	
Hexachlorobenzene	%	90			70-130	Pass	
Methoxychlor	%	120			70-130	Pass	
LCS - % Recovery							
Nitrate & Nitrite (as N)	%	80			70-130	Pass	
% Clay	%	100			70-130	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	%	92			70-130	Pass	
Total Organic Carbon	%	106			70-130	Pass	
Chromium (hexavalent)	%	107			70-130	Pass	
Cyanide (total)	%	73			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	96			80-120	Pass	
Arsenic	%	105			80-120	Pass	
Barium	%	91			80-120	Pass	
Beryllium	%	109			80-120	Pass	
Cadmium	%	92			80-120	Pass	
Cadmium	%	100			80-120	Pass	
Chromium	%	95			80-120	Pass	
Chromium	%	108			80-120	Pass	
Cobalt	%	97			80-120	Pass	
Copper	%	95			80-120	Pass	
Copper	%	109			80-120	Pass	
Iron	%	108			80-120	Pass	
Iron	%	114			80-120	Pass	
Lead	%	95			80-120	Pass	
Lead	%	110			80-120	Pass	
Manganese	%	96			80-120	Pass	
Mercury	%	93			80-120	Pass	
Mercury	%	108			80-120	Pass	
Molybdenum	%	92			80-120	Pass	
Nickel	%	89			80-120	Pass	
Nickel	%	102			80-120	Pass	
Selenium	%	93			80-120	Pass	
Silver	%	96			80-120	Pass	
Silver	%	105			80-120	Pass	
Tin	%	90			80-120	Pass	
Zinc	%	95			80-120	Pass	
Zinc	%	107			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Organophosphorus Pesticides									
Diazinon			%	95			70-130	Pass	
Dimethoate			%	108			70-130	Pass	
Ethion			%	93			70-130	Pass	
Fenitrothion			%	72			70-130	Pass	
Methyl parathion			%	74			70-130	Pass	
Mevinphos			%	85			70-130	Pass	
LCS - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short									
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	103			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	112			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	96			50-150	Pass	
Perfluorooctanoic acid (PFOA)			%	103			50-150	Pass	
LCS - % Recovery									
Polychlorinated Biphenyls									
Aroclor-1260			%	76			70-130	Pass	
LCS - % Recovery									
Phenols (Halogenated)									
2-Chlorophenol			%	47			25-140	Pass	
2.4-Dichlorophenol			%	46			25-140	Pass	
2.4.5-Trichlorophenol			%	44			25-140	Pass	
2.4.6-Trichlorophenol			%	48			25-140	Pass	
2.6-Dichlorophenol			%	41			25-140	Pass	
4-Chloro-3-methylphenol			%	37			25-140	Pass	
Pentachlorophenol			%	44			25-140	Pass	
Tetrachlorophenols - Total			%	54			25-140	Pass	
LCS - % Recovery									
Phenols (non-Halogenated)									
2-Cyclohexyl-4.6-dinitrophenol			%	89			25-140	Pass	
2-Methyl-4.6-dinitrophenol			%	31			25-140	Pass	
2-Nitrophenol			%	53			25-140	Pass	
2.4-Dimethylphenol			%	52			25-140	Pass	
2.4-Dinitrophenol			%	37			25-140	Pass	
2-Methylphenol (o-Cresol)			%	35			25-140	Pass	
3&4-Methylphenol (m&p-Cresol)			%	42			25-140	Pass	
4-Nitrophenol			%	36			25-140	Pass	
Dinoseb			%	32			25-140	Pass	
Phenol			%	38			25-140	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M22-Jl0009314	NCP	%	122			70-130	Pass	
Acenaphthylene	M22-Jl0009314	NCP	%	128			70-130	Pass	
Anthracene	M22-Jl0009314	NCP	%	98			70-130	Pass	
Benz(a)anthracene	M22-Jl0009314	NCP	%	119			70-130	Pass	
Benzo(a)pyrene	M22-Jl0009314	NCP	%	106			70-130	Pass	
Benzo(b&j)fluoranthene	M22-Jl0009314	NCP	%	104			70-130	Pass	
Benzo(g.h.i)perylene	M22-Jl0009314	NCP	%	87			70-130	Pass	
Benzo(k)fluoranthene	M22-Jl0009314	NCP	%	118			70-130	Pass	
Chrysene	M22-Jl0009314	NCP	%	131			70-130	Fail	Q08
Dibenz(a.h)anthracene	M22-Jl0009314	NCP	%	102			70-130	Pass	
Fluoranthene	M22-Jl0009314	NCP	%	106			70-130	Pass	
Fluorene	M22-Jl0009314	NCP	%	126			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Indeno(1.2.3-cd)pyrene	M22-JI0009314	NCP	%	88			70-130	Pass	
Naphthalene	M22-JI0009314	NCP	%	117			70-130	Pass	
Phenanthrene	M22-JI0009314	NCP	%	106			70-130	Pass	
Pyrene	M22-JI0009314	NCP	%	102			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M22-JI0005659	NCP	%	114			75-125	Pass	
Cadmium	M22-JI0005659	NCP	%	92			75-125	Pass	
Chromium	M22-JI0005659	NCP	%	108			75-125	Pass	
Copper	M22-JI0005659	NCP	%	125			75-125	Pass	
Lead	M22-JI0003514	NCP	%	119			75-125	Pass	
Mercury	M22-JI0005659	NCP	%	113			75-125	Pass	
Nickel	M22-JI0005659	NCP	%	124			75-125	Pass	
Zinc	M22-JI0003514	NCP	%	106			75-125	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Molybdenum	M22-JI0005659	NCP	%	104			75-125	Pass	
Selenium	M22-JI0005659	NCP	%	99			75-125	Pass	
Silver	M22-JI0005659	NCP	%	107			75-125	Pass	
Tin	M22-JI0003514	NCP	%	104			75-125	Pass	
Spike - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short				Result 1					
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M22-JI0004309	NCP	%	102			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M22-JI0004309	NCP	%	107			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M22-JI0004309	NCP	%	107			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M22-JI0004309	NCP	%	105			50-150	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	M22-JI0006702	CP	%	89			70-130	Pass	
4.4'-DDD	M22-JI0006702	CP	%	116			70-130	Pass	
4.4'-DDE	M22-JI0006702	CP	%	90			70-130	Pass	
4.4'-DDT	M22-JI0006702	CP	%	87			70-130	Pass	
a-HCH	M22-JI0006702	CP	%	94			70-130	Pass	
Aldrin	M22-JI0006702	CP	%	85			70-130	Pass	
b-HCH	M22-JI0006702	CP	%	98			70-130	Pass	
d-HCH	M22-JI0006702	CP	%	86			70-130	Pass	
Dieldrin	M22-JI0006702	CP	%	94			70-130	Pass	
Endosulfan I	M22-JI0006702	CP	%	88			70-130	Pass	
Endosulfan II	M22-JI0006702	CP	%	90			70-130	Pass	
Endosulfan sulphate	M22-JI0006702	CP	%	78			70-130	Pass	
Endrin	M22-JI0006702	CP	%	83			70-130	Pass	
Endrin aldehyde	M22-JI0006702	CP	%	85			70-130	Pass	
Endrin ketone	M22-JI0006702	CP	%	98			70-130	Pass	
g-HCH (Lindane)	M22-JI0006702	CP	%	78			70-130	Pass	
Heptachlor	M22-JI0006702	CP	%	79			70-130	Pass	
Heptachlor epoxide	M22-JI0006702	CP	%	77			70-130	Pass	
Hexachlorobenzene	M22-JI0006702	CP	%	91			70-130	Pass	
Methoxychlor	M22-JI0006702	CP	%	112			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	M22-JI0006711	CP	%	104			70-130	Pass	
Naphthalene	M22-JI0006711	CP	%	91			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C6-C10	M22-JI0006711	CP	%	114			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M22-JI0006711	CP	%	80			70-130	Pass	
Toluene	M22-JI0006711	CP	%	83			70-130	Pass	
Ethylbenzene	M22-JI0006711	CP	%	77			70-130	Pass	
m&p-Xylenes	M22-JI0006711	CP	%	78			70-130	Pass	
o-Xylene	M22-JI0006711	CP	%	83			70-130	Pass	
Xylenes - Total*	M22-JI0006711	CP	%	80			70-130	Pass	
Spike - % Recovery									
				Result 1					
Cyanide (total)	M22-JI0005975	NCP	%	124			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Barium	M22-JI0005659	NCP	%	98			75-125	Pass	
Beryllium	M22-JI0005659	NCP	%	115			75-125	Pass	
Cobalt	M22-JI0005659	NCP	%	105			75-125	Pass	
Manganese	M22-JI0006172	NCP	%	115			75-125	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1016	M22-JI0005910	NCP	%	98			70-130	Pass	
Aroclor-1260	M22-JI0005910	NCP	%	110			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C10-C14	M22-JI0007451	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M22-JI0007451	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M22-JI0007451	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C10-C16	M22-JI0007451	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M22-JI0007451	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M22-JI0007451	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M22-JI0011148	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-HCH	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-HCH	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-HCH	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-HCH (Lindane)	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M22-JI0011148	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M22-JI0011148	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Nitrate & Nitrite (as N)	M22-JI0002811	NCP	mg/kg	69	53	26	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M22-JI0004619	NCP	mg/kg	3500	3600	2.2	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M22-JI0003618	NCP	mg/kg	4.3	4.9	13	30%	Pass	
Cadmium	M22-JI0003618	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M22-JI0003618	NCP	mg/kg	57	54	5.2	30%	Pass	
Copper	M22-JI0003618	NCP	mg/kg	29	28	2.8	30%	Pass	
Lead	M22-JI0003618	NCP	mg/kg	7.3	8.1	11	30%	Pass	
Mercury	M22-JI0003618	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	M22-JI0003618	NCP	mg/kg	41	45	8.9	30%	Pass	
Zinc	M22-JI0003618	NCP	mg/kg	30	32	5.6	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M22-JI0006699	CP	%	7.8	8.2	5.8	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Molybdenum	M22-JI0003618	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Selenium	M22-JI0003618	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M22-JI0003618	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	M22-JI0003618	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	M22-JI0008850	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Diazinon	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	M22-JI0008850	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	M22-JI0008850	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	M22-JI0008850	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Per- and Polyfluoroalkyl Substances (PFASs) - Short				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M22-JI0004308	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M22-JI0004308	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M22-JI0004308	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M22-JI0004308	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M22-JI0006702	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Naphthalene	M22-JI0006702	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M22-JI0006702	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M22-JI0006702	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M22-JI0006702	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M22-JI0006702	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M22-JI0006702	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M22-JI0006702	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M22-JI0006702	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Clay	M22-JI0010702	NCP	%	7.0	7.0	<1	30%	Pass	
Conductivity (1:5 aqueous extract at 25°C as rec.)	M22-JI0006465	NCP	uS/cm	200	180	11	30%	Pass	
pH (units)(1:5 soil:CaCl2 extract at 25°C as rec.)	M22-JI0008654	NCP	pH Units	8.4	8.3	pass	30%	Pass	
Total Organic Carbon	S22-JI0008938	NCP	%	0.9	1.2	32	30%	Fail	Q15

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Iron	M22-JI0005659	NCP	mg/kg	32000	33000	1.7	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M22-JI0006710	CP	%	18	18	3.8	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M22-JI0006711	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Naphthalene	M22-JI0006711	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M22-JI0006711	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M22-JI0006711	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	M22-JI0006711	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	M22-JI0006711	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	M22-JI0006711	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	M22-JI0006711	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	M22-JI0006711	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M22-JI0007453	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Cyanide (total)	M22-JI0005863	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Barium	M22-JI0005659	NCP	mg/kg	280	290	1.9	30%	Pass	
Beryllium	M22-JI0003618	NCP	mg/kg	2.3	2.9	21	30%	Pass	
Cobalt	M22-JI0003618	NCP	mg/kg	21	30	36	30%	Fail	Q15
Manganese	M22-JI0005659	NCP	mg/kg	440	440	1.1	30%	Pass	
Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
Tetrachloroethene	M22-JI0006711	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	M22-JI0003619	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	M22-JI0003619	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	M22-JI0003619	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	M22-JI0003619	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	M22-JI0003619	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	M22-JI0003619	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	M22-JI0003619	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	M22-JI0003619	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M22-JI0003619	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M22-JI0003619	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M22-JI0003619	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M22-JI0003619	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M22-JI0003619	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M22-JI0003619	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M22-JI0003619	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M22-JI0003619	NCP	mg/kg	< 10	< 10	<1	30%	Pass	

Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M22-Jl0003619	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M22-Jl0003619	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Nitrophenol	M22-Jl0003619	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M22-Jl0003619	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M22-Jl0003619	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M22-Jl0003619	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M22-Jl0003619	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M22-Jl0003619	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M22-Jl0003619	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M22-Jl0003619	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Comments

Analysis of (Total Coliforms) has been completed by (Eurofins Food Testing Australia), NATA Accreditation Number (20293), report reference (AR-22-NV-008658-01)

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	Yes

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Catherine Wilson	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS
Scott Beddoes	Senior Analyst-Metal
Caitlin Breeze	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal
Linda Chouman	Senior Analyst-Sample Properties
Joseph Edouard	Senior Analyst-Organic
Edward Lee	Senior Analyst-Organic
Jonathon Angell	Senior Analyst-Inorganic
Vivian Wang	Senior Analyst-Volatile
Harry Bacalis	Senior Analyst-Volatile
Scott Beddoes	Senior Analyst-Inorganic
Carroll Lee	Senior Analyst-Volatile

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025–Testing NATA is a signatory to the ILAC Mutual Recognition 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.

JBS & G Australia (SA) P/L
100 Hutt St
Adelaide
SA 5000

Attention:	Jack Ayers
Report	903019-AID
Project Name	RENASCOR WATERLOO CNR RD
Project ID	63155
Received Date	Jul 04, 2022
Date Reported	Jul 12, 2022

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name RENASCOR WATERLOO CNR RD
Project ID 63155
Date Sampled Jun 30, 2022
Report 903019-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
ACM01	22-Jl0008347	Jun 30, 2022	Approximate Sample 71g / 80 x 50 x 5mm Sample consisted of: Cement sheet	Chrysotile asbestos detected. Organic fibres detected.

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
Asbestos - LTM-ASB-8020	Melbourne	Jul 05, 2022	Indefinite

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Order No.:
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Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Jul 4, 2022 6:13 PM
Due: Jul 12, 2022
Priority: 5 Day
Contact Name: Jack Ayers

Project Name: RENASCOR WATERLOO CNR RD
Project ID: 63155

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Asbestos Absence /Presence	HOLD	Total Coliforms (MPN)	Polycyclic Aromatic Hydrocarbons	Metals M8	Metals IWRG 621 : Metals M12	BTEX	Suite B14: OCP/OPP	Moisture Set	NEPM Screen for Soil Classification	SA Waste Screen	Eurofins Suite B9	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
External Laboratory								X											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	BH01_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006698									X			X	X	
2	BH02_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006699						X		X	X					
3	BH03_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006700				X		X			X					
4	BH04_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006701						X		X	X					X
5	BH05_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006702									X	X		X		
6	BH06_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006703									X			X	X	
7	BH07_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006704						X		X	X					X
8	BH08_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006705						X		X	X				X	
9	BH09_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006706				X		X			X					X
10	BH10_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006707			X						X			X		
11	BH11_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006708						X		X	X				X	
12	BH12_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006709						X		X	X					
13	BH13_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006710									X			X		

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Company Name: JBS & G Australia (SA) P/L
Address: 100 Hutt St
Adelaide
SA 5000

Order No.:
Report #: 903019
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Jul 4, 2022 6:13 PM
Due: Jul 12, 2022
Priority: 5 Day
Contact Name: Jack Ayers

Project Name: RENASCOR WATERLOO CNR RD
Project ID: 63155

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Asbestos Absence /Presence	HOLD	Total Coliforms (MPN)	Polycyclic Aromatic Hydrocarbons	Metals M8	Metals IWRG 621 : Metals M12	BTEX	Suite B14: OCP/OPP	Moisture Set	NEPM Screen for Soil Classification	SA Waste Screen	Eurofins Suite B9	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
14	BH14_0.0-0.15	Jun 30, 2022		Soil	M22-Jl0006711									X		X			
15	BH15_0.0-0.15	Jun 30, 2022		Soil	M22-Jl0006712						X		X	X					
16	BH16_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006713						X		X	X					X
17	BH17_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006714									X			X		
18	BH18_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006715			X	X		X			X				X	X
19	BH19_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006716			X			X			X				X	
20	BH19_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006717									X		X			
21	BH20_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006718				X		X			X				X	
22	TB01	Jun 29, 2022		Water	M22-Jl0006719							X							
23	RB01	Jun 30, 2022		Water	M22-Jl0006720					X									
24	BH01_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006721		X												
25	BH01_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006722		X												
26	BH02_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006723		X												
27	BH02_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006724		X												
28	BH03_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006725		X												
29	BH03_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006726		X												

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Received: Jul 4, 2022 6:13 PM
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Project Name: RENASCOR WATERLOO CNR RD
Project ID: 63155

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Asbestos Absence /Presence	HOLD	Total Coliforms (MPN)	Polycyclic Aromatic Hydrocarbons	Metals M8	Metals IWRG 621 : Metals M12	BTEX	Suite B14: OCP/OPP	Moisture Set	NEPM Screen for Soil Classification	SA Waste Screen	Eurofins Suite B9	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
30	BH04_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006727		X												
31	BH04_0.2-0.5	Jun 29, 2022		Soil	M22-JI0006728		X												
32	BH05_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006729		X												
33	BH05_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006730		X												
34	BH06_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006731		X												
35	BH06_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006732		X												
36	BH07_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006733		X												
37	BH07_0.2-0.5	Jun 29, 2022		Soil	M22-JI0006734		X												
38	BH08_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006735		X												
39	BH08_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006736		X												
40	BH09_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006737		X												
41	BH09_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006738		X												
42	BH10_0.1-0.2	Jun 30, 2022		Soil	M22-JI0006739		X												
43	BH10_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006740		X												
44	BH11_0.2-0.4	Jun 30, 2022		Soil	M22-JI0006741		X												
45	BH11_0.4-0.5	Jun 30, 2022		Soil	M22-JI0006742		X												

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Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
46	BH12_0.1-0.25	Jun 30, 2022		Soil	M22-Jl0006743		X												
47	BH12_0.25-0.5	Jun 30, 2022		Soil	M22-Jl0006744		X												
48	BH13_0.2-0.3	Jun 30, 2022		Soil	M22-Jl0006745		X												
49	BH13_0.3-0.5	Jun 30, 2022		Soil	M22-Jl0006746		X												
50	BH14_0.15-0.35	Jun 30, 2022		Soil	M22-Jl0006747		X												
51	BH14_0.35-0.5	Jun 30, 2022		Soil	M22-Jl0006748		X												
52	BH15_0.15-0.3	Jun 30, 2022		Soil	M22-Jl0006749		X												
53	BH15_0.3-0.5	Jun 30, 2022		Soil	M22-Jl0006750		X												
54	BH16_0.2-0.3	Jun 30, 2022		Soil	M22-Jl0006751		X												
55	BH16_0.3-0.5	Jun 30, 2022		Soil	M22-Jl0006752		X												
56	BH17_0.1-0.2	Jun 30, 2022		Soil	M22-Jl0006753		X												
57	BH17_0.2-0.5	Jun 30, 2022		Soil	M22-Jl0006754		X												
58	BH18_0.2-0.3	Jun 30, 2022		Soil	M22-Jl0006755		X												
59	BH18_0.3-0.5	Jun 30, 2022		Soil	M22-Jl0006756		X												
60	BH19_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006757		X												

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Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
61	BH20_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006758		X												
62	BH20_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006759		X												
63	DUP01	Jun 29, 2022		Soil	M22-Jl0006760									X			X		
64	DUP02	Jun 30, 2022		Soil	M22-Jl0006761						X		X	X					
65	ACM01	Jun 30, 2022		Building Materials	M22-Jl0008347	X													
Test Counts						1	39	3	4	1	14	1	9	23	1	2	7	7	5

Internal Quality Control Review and Glossary General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with the colour **blue** indicates data provided by customer that may have an impact on the results.
5. Information identified on this report with the colour **orange** indicates sections of the report not covered by the laboratory's scope of NATA accreditation.
6. This report replaces any interim results previously issued.

Holding Times

Please refer to the most recent version of the 'Sample Preservation and Container Guide' for holding times (QS3001).
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.

Units

% w/w:	Percentage weight-for-weight basis, e.g. of asbestos in asbestos-containing finds in soil samples (**% w/w**)
F/fld	Airborne fibre filter loading as Fibres (**N**) per Fields counted (**n**)
F/mL	Airborne fibre reported concentration as Fibres per millilitre of air drawn over the sampler membrane (**C**)
g, kg	Mass, e.g. of whole sample (**M**) or asbestos-containing find within the sample (**m**)
g/kg	Concentration in grams per kilogram
L, mL	Volume, e.g. of air as measured in AFM (**V** = **r** x **t**)
L/min	Airborne fibre sampling Flowrate as litres per minute of air drawn over the sampler membrane (**r**)
min	Time (**t**), e.g. of air sample collection period

Calculations

Airborne Fibre Concentration: $C = \left(\frac{A}{a}\right) \times \left(\frac{N}{n}\right) \times \left(\frac{1}{r}\right) \times \left(\frac{1}{t}\right) = K \times \left(\frac{N}{n}\right) \times \left(\frac{1}{V}\right)$

Asbestos Content (as asbestos): $\%\, w/w = \frac{(m \times P_A)}{M}$

Weighted Average (of asbestos): $\%_{WA} = \sum \frac{(m \times P_A)_x}{x}$

Terms

%asbestos	Estimated percentage of asbestos in a given matrix. May be derived from knowledge or experience of the material, informed by HSG264 *Appendix 2*, else assumed to be 15% in accordance with WA DOH *Appendix 2* (**P_A**).
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded (non-friable) condition. For the purposes of the NEPM and WA DOH, ACM corresponds to material larger than 7 mm x 7 mm.
AF	Asbestos Fines. Asbestos contamination within a soil sample, as defined by WA DOH. Includes loose fibre bundles and small pieces of friable and non-friable material such as asbestos cement fragments mixed with soil. Considered under the NEPM as equivalent to "non-bonded / friable".
AFM	Airborne Fibre Monitoring, e.g. by the MFM.
Amosite	Amosite Asbestos Detected. Amosite may also refer to Fibrous Grunerite or Brown Asbestos. Identified in accordance with AS 4964-2004.
AS	Australian Standard.
Asbestos Content (as asbestos)	Total % w/w asbestos content in asbestos-containing finds in a soil sample (**% w/w**).
Chrysotile	Chrysotile Asbestos Detected. Chrysotile may also refer to Fibrous Serpentine or White Asbestos. Identified in accordance with AS 4964-2004.
COC	Chain of Custody.
Crocidolite	Crocidolite Asbestos Detected. Crocidolite may also refer to Fibrous Riebeckite or Blue Asbestos. Identified in accordance with AS 4964-2004.
Dry	Sample is dried by heating prior to analysis.
DS	Dispersion Staining. Technique required for Unequivocal Identification of asbestos fibres by PLM.
FA	Fibrous Asbestos. Asbestos containing material that is wholly or in part friable, including materials with higher asbestos content with a propensity to become friable with handling, and any material that was previously non-friable and in a severely degraded condition. For the purposes of the NEPM and WA DOH, FA generally corresponds to material larger than 7 mm x 7 mm, although FA may be more difficult to visibly distinguish and may be assessed as AF.
Fibre Count	Total of all fibres (whether asbestos or not) meeting the counting criteria set out in the NOHSC:3003
Fibre ID	Fibre Identification. Unequivocal identification of asbestos fibres according to AS 4964-2004. Includes Chrysotile, Amosite (Grunerite) or Crocidolite asbestos.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
HSG248	UK HSE HSG248, *Asbestos: The Analysts Guide*, 2nd Edition (2021).
HSG264	UK HSE HSG264, *Asbestos: The Survey Guide* (2012).
ISO (also ISO/IEC)	International Organization for Standardization / International Electrotechnical Commission.
K Factor	Microscope constant (**K**) as derived from the effective filter area of the given AFM membrane used for collecting the sample (**A**) and the projected eyepiece graticule area of the specific microscope used for the analysis (**a**).
LOR	Limit of Reporting.
MFM (also NOHSC:3003)	Membrane Filter Method. As described by the Australian Government National Occupational Health and Safety Commission, *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres*, 2nd Edition [NOHSC:3003(2005)].
NEPM (also ASC NEPM)	National Environment Protection (Assessment of Site Contamination) Measure, (2013, as amended).
Organic	Organic Fibres Detected. Organic may refer to Natural or Man-Made Polymeric Fibres. Identified in accordance with AS 4964-2004.
PCM	Phase Contrast Microscopy. As used for Fibre Counting according to the MFM.
PLM	Polarised Light Microscopy. As used for Fibre Identification and Trace Analysis according to AS 4964-2004.
SMF	Synthetic Mineral Fibre Detected. SMF may also refer to Man Made Vitreous Fibres. Identified in accordance with AS 4964-2004.
SRA	Sample Receipt Advice.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres (particularly asbestos) in a given sample matrix.
UK HSE HSG	United Kingdom, Health and Safety Executive, Health and Safety Guidance, publication.
UMF	Unidentified Mineral Fibre Detected. Fibrous minerals that are detected but have not been unequivocally identified by PLM with DS according the AS 4964-2004. May include (but not limited to) Actinolite, Anthophyllite or Tremolite asbestos.
WA DOH	Reference document for the NEPM. Government of Western Australia, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (updated 2021), including Appendix Four: *Laboratory analysis*
Weighted Average	Combined average % w/w asbestos content of all asbestos-containing finds in the given aliquot or total soil sample (**$\%_{WA}$**).

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	Yes

Asbestos Counter/Identifier:

Hiren Patel	Senior Analyst-Asbestos

Authorised by:

Zoe Burke	Senior Analyst-Asbestos

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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ANALYTICAL REPORT

REPORT CODE **AR-22-NV-008658-01**

REPORT DATE **07/07/2022**

For the attention of

Eurofins Environment Testing Australia Pty Ltd
Analytical Reports
6 Monterey Road
Dandenong South
3175 Melbourne
AUSTRALIA

Phone
Email EnviroReportsau@eurofins.com

Contact for your orders: Ruvini Herath
Submission Reference: Merged from order cau001-order-903019-220705.xml

Order code: EUAUTWU-00019235
Purchase Order Number: 903019

SAMPLE CODE 726-2022-00023956

Client Reference: 22-JI0006716
Sample described as: BH19_0.0-0.1
Reception Date: 05/07/2022
Analysis Starting Date: 05/07/2022
Sampled Date & Time 29/06/2022 12:00:00

Reception temperature: 5.6 °C
Analysis Ending Date: 07/07/2022

	RESULTS		LOQ
VQ237 Total Coliforms			
Analysis Starting Date: 5/07/2022 10:00			
Total Coliforms	300	MPN/g	1

SAMPLE CODE 726-2022-00023957

Client Reference: 22-JI0006707
Sample described as: BH10_0.0-0.1
Reception Date: 05/07/2022
Analysis Starting Date: 05/07/2022
Sampled Date & Time 30/06/2022 12:00:00

Reception temperature: 5.6 °C
Analysis Ending Date: 07/07/2022

	RESULTS		LOQ
VQ237 Total Coliforms			
Analysis Starting Date: 5/07/2022 10:00			
Total Coliforms	17000	MPN/g	1

SAMPLE CODE 726-2022-00023958

Client Reference: 22-JI0006715
Sample described as: BH18_0.0-0.1
Reception Date: 05/07/2022
Analysis Starting Date: 05/07/2022
Sampled Date & Time 30/06/2022 12:00:00

Reception temperature: 5.6 °C
Analysis Ending Date: 07/07/2022

	RESULTS		LOQ
VQ237 Total Coliforms			
Analysis Starting Date: 5/07/2022 10:00			
Total Coliforms	3100	MPN/g	1

LIST OF METHODS

VQ237	**Total Coliforms:** Internal Method, E-Cultural technique (MPN tubes)

Signature

Di Shen Scientist

EXPLANATORY NOTE

- ◆ Test is not accredited
- ○ Test is subcontracted within Eurofins group and is accredited
- ● Test is subcontracted within Eurofins group and is not accredited
- □ Test is subcontracted outside Eurofins group and is accredited
- ■ Test is subcontracted outside Eurofins group and is not accredited

N/A means Not applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ Limit of Quantification
U Measurement Uncertainty
< Less than, ≤ Less than or equal to
> Greater than, ≥ Greater than or equal to
The tests are identified by a 5 digit code, full details can be provided on request.
Information supplied by the client. This information can have an impact on the validity of results.
Samples are tested as received and the results relate only to the sample tested.
Analysis date is reported as the start date of extraction for a method.
The results may not be reproduced except in full, without a written approval from the laboratory.

Eurofins General Terms and Conditions apply.

END OF REPORT

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Accredited for compliance with ISO/IEC 17025 - Testing
NATA is a signatory to the ILAC Mutual Recognition 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.
Accreditation Number 20293

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Certificate of Analysis

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100 Hutt St
Adelaide
SA 5000

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Accreditation Number 1261
Site Number 1254

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Attention: **Jack Ayers**

Report **903019-W**
Project name RENASCOR WATERLOO CNR RD
Project ID 63155
Received Date Jul 04, 2022

Client Sample ID			**TB01**	**RB01**
Sample Matrix			**Water**	**Water**
Eurofins Sample No.			**M22-JI0006719**	**M22-JI0006720**
Date Sampled			**Jun 29, 2022**	**Jun 30, 2022**
Test/Reference	LOR	Unit		
BTEX				
Benzene	0.001	mg/L	< 0.001	-
Toluene	0.001	mg/L	< 0.001	-
Ethylbenzene	0.001	mg/L	< 0.001	-
m&p-Xylenes	0.002	mg/L	< 0.002	-
o-Xylene	0.001	mg/L	< 0.001	-
Xylenes - Total*	0.003	mg/L	< 0.003	-
4-Bromofluorobenzene (surr.)	1	%	106	-
Heavy Metals				
Arsenic	0.001	mg/L	-	< 0.001
Cadmium	0.0002	mg/L	-	< 0.0002
Chromium	0.001	mg/L	-	< 0.001
Copper	0.001	mg/L	-	< 0.001
Lead	0.001	mg/L	-	< 0.001
Mercury	0.0001	mg/L	-	< 0.0001
Nickel	0.001	mg/L	-	< 0.001
Zinc	0.005	mg/L	-	< 0.005

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
Eurofins Suite B9			
BTEX	Melbourne	Jul 04, 2022	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Metals M8	Melbourne	Jul 04, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			

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Order No.:
Report #: 903019
Phone: 08 8431 7113
Fax: 08 8431 7115

Received: Jul 4, 2022 6:13 PM
Due: Jul 12, 2022
Priority: 5 Day
Contact Name: Jack Ayers

Project Name: RENASCOR WATERLOO CNR RD
Project ID: 63155

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Asbestos Absence /Presence	HOLD	Total Coliforms (MPN)	Polycyclic Aromatic Hydrocarbons	Metals M8	Metals IWRG 621 : Metals M12	BTEX	Suite B14: OCP/OPP	Moisture Set	NEPM Screen for Soil Classification	SA Waste Screen	Eurofins Suite B9	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
External Laboratory								X											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**														
1	BH01_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006698									X			X	X	
2	BH02_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006699						X		X	X					
3	BH03_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006700				X		X			X					
4	BH04_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006701						X		X	X					X
5	BH05_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006702									X	X		X		
6	BH06_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006703									X			X	X	
7	BH07_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006704						X		X	X					X
8	BH08_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006705						X		X	X				X	
9	BH09_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006706				X		X			X					X
10	BH10_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006707			X						X			X		
11	BH11_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006708						X		X	X				X	
12	BH12_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006709						X		X	X					
13	BH13_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006710									X			X		

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Fax: 08 8431 7115

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Contact Name: Jack Ayers

Eurofins Analytical Services Manager : Michael Cassidy

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Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
14	BH14_0.0-0.15	Jun 30, 2022		Soil	M22-Jl0006711									X		X			
15	BH15_0.0-0.15	Jun 30, 2022		Soil	M22-Jl0006712						X		X	X					
16	BH16_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006713						X		X	X					X
17	BH17_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006714									X			X		
18	BH18_0.0-0.1	Jun 30, 2022		Soil	M22-Jl0006715			X	X		X			X				X	X
19	BH19_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006716			X			X			X				X	
20	BH19_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006717									X		X			
21	BH20_0.0-0.1	Jun 29, 2022		Soil	M22-Jl0006718				X		X			X				X	
22	TB01	Jun 29, 2022		Water	M22-Jl0006719							X							
23	RB01	Jun 30, 2022		Water	M22-Jl0006720					X									
24	BH01_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006721		X												
25	BH01_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006722		X												
26	BH02_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006723		X												
27	BH02_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006724		X												
28	BH03_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006725		X												
29	BH03_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006726		X												

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Project ID: 63155

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Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
30	BH04_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006727		X												
31	BH04_0.2-0.5	Jun 29, 2022		Soil	M22-JI0006728		X												
32	BH05_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006729		X												
33	BH05_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006730		X												
34	BH06_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006731		X												
35	BH06_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006732		X												
36	BH07_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006733		X												
37	BH07_0.2-0.5	Jun 29, 2022		Soil	M22-JI0006734		X												
38	BH08_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006735		X												
39	BH08_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006736		X												
40	BH09_0.1-0.2	Jun 29, 2022		Soil	M22-JI0006737		X												
41	BH09_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006738		X												
42	BH10_0.1-0.2	Jun 30, 2022		Soil	M22-JI0006739		X												
43	BH10_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006740		X												
44	BH11_0.2-0.4	Jun 30, 2022		Soil	M22-JI0006741		X												
45	BH11_0.4-0.5	Jun 30, 2022		Soil	M22-JI0006742		X												

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Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
46	BH12_0.1-0.25	Jun 30, 2022		Soil	M22-JI0006743		X												
47	BH12_0.25-0.5	Jun 30, 2022		Soil	M22-JI0006744		X												
48	BH13_0.2-0.3	Jun 30, 2022		Soil	M22-JI0006745		X												
49	BH13_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006746		X												
50	BH14_0.15-0.35	Jun 30, 2022		Soil	M22-JI0006747		X												
51	BH14_0.35-0.5	Jun 30, 2022		Soil	M22-JI0006748		X												
52	BH15_0.15-0.3	Jun 30, 2022		Soil	M22-JI0006749		X												
53	BH15_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006750		X												
54	BH16_0.2-0.3	Jun 30, 2022		Soil	M22-JI0006751		X												
55	BH16_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006752		X												
56	BH17_0.1-0.2	Jun 30, 2022		Soil	M22-JI0006753		X												
57	BH17_0.2-0.5	Jun 30, 2022		Soil	M22-JI0006754		X												
58	BH18_0.2-0.3	Jun 30, 2022		Soil	M22-JI0006755		X												
59	BH18_0.3-0.5	Jun 30, 2022		Soil	M22-JI0006756		X												
60	BH19_0.3-0.5	Jun 29, 2022		Soil	M22-JI0006757		X												

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Melbourne Laboratory - NATA # 1261 Site # 1254						X	X		X	X	X	X	X	X	X	X	X	X	X
61	BH20_0.1-0.2	Jun 29, 2022		Soil	M22-Jl0006758		X												
62	BH20_0.3-0.5	Jun 29, 2022		Soil	M22-Jl0006759		X												
63	DUP01	Jun 29, 2022		Soil	M22-Jl0006760									X			X		
64	DUP02	Jun 30, 2022		Soil	M22-Jl0006761						X		X	X					
65	ACM01	Jun 30, 2022		Building Materials	M22-Jl0008347	X													
Test Counts						1	39	3	4	1	14	1	9	23	1	2	7	7	5

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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
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

Terms

APHA	American Public Health Association
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 a moisture has been determined on a solid sample the result is expressed on a dry 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 is representative of 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 like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-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 5.4
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 be used as a guide only 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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

.

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. 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
Method Blank									
BTEX									
Benzene			mg/L	< 0.001			0.001	Pass	
Toluene			mg/L	< 0.001			0.001	Pass	
Ethylbenzene			mg/L	< 0.001			0.001	Pass	
m&p-Xylenes			mg/L	< 0.002			0.002	Pass	
o-Xylene			mg/L	< 0.001			0.001	Pass	
Xylenes - Total*			mg/L	< 0.003			0.003	Pass	
Method Blank									
Heavy Metals									
Arsenic			mg/L	< 0.001			0.001	Pass	
Cadmium			mg/L	< 0.0002			0.0002	Pass	
Chromium			mg/L	< 0.001			0.001	Pass	
Copper			mg/L	< 0.001			0.001	Pass	
Lead			mg/L	< 0.001			0.001	Pass	
Mercury			mg/L	< 0.0001			0.0001	Pass	
Nickel			mg/L	< 0.001			0.001	Pass	
Zinc			mg/L	< 0.005			0.005	Pass	
LCS - % Recovery									
BTEX									
Benzene			%	100			70-130	Pass	
Toluene			%	110			70-130	Pass	
Ethylbenzene			%	96			70-130	Pass	
m&p-Xylenes			%	96			70-130	Pass	
Xylenes - Total*			%	95			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic			%	102			80-120	Pass	
Cadmium			%	102			80-120	Pass	
Chromium			%	102			80-120	Pass	
Copper			%	102			80-120	Pass	
Lead			%	105			80-120	Pass	
Mercury			%	104			80-120	Pass	
Nickel			%	103			80-120	Pass	
Zinc			%	103			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
BTEX				Result 1					
Benzene	S22-Jl0004054	NCP	%	100			70-130	Pass	
Toluene	S22-Jl0004054	NCP	%	112			70-130	Pass	
Ethylbenzene	S22-Jl0004054	NCP	%	101			70-130	Pass	
m&p-Xylenes	S22-Jl0004054	NCP	%	99			70-130	Pass	
o-Xylene	S22-Jl0004054	NCP	%	98			70-130	Pass	
Xylenes - Total*	S22-Jl0004054	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M22-Jl0002217	NCP	%	101			75-125	Pass	
Cadmium	M22-Jl0002217	NCP	%	103			75-125	Pass	
Chromium	M22-Jl0002217	NCP	%	101			75-125	Pass	
Copper	M22-Jl0002217	NCP	%	101			75-125	Pass	
Lead	M22-Jl0002217	NCP	%	111			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Mercury	M22-JI0002217	NCP	%	97			75-125	Pass	
Nickel	M22-JI0002217	NCP	%	100			75-125	Pass	
Zinc	M22-JI0002217	NCP	%	104			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M22-JI0004047	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M22-JI0004047	NCP	mg/L	< 0.001	0.002	14	30%	Pass	
Ethylbenzene	M22-JI0004047	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M22-JI0004047	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M22-JI0004047	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	M22-JI0004047	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M22-JI0002217	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	M22-JI0002217	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M22-JI0002217	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	M22-JI0002217	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead	M22-JI0002217	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury	M22-JI0002217	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M22-JI0002217	NCP	mg/L	0.001	0.002	12	30%	Pass	
Zinc	M22-JI0002217	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	Yes

Authorised by:

Catherine Wilson	Analytical Services Manager
Scott Beddoes	Senior Analyst-Metal
Vivian Wang	Senior Analyst-Volatile

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt Street ADELAIDE SA 5000
T: +61 8 8431 7113 F: +61 8 8431 7115
ACN 100 220 479 ABN 62 100 220 479

JBS&G

CLIENT: JBS&G	LABORATORY: Eurofins	LABORATORY BATCH NO.:
SITE/PROJECT NAME: Renascor Waterloo Cnr Rd	COC Reference #: 5641	SAMPLERS: JA AT
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115
DATA NEEDED BY: **Standard TAT**	REPORT NEEDED BY: **Standard TAT**	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES
SITE/PROJECT NUMBER: 63155	**QUOTE #:**	JBS&G OFFICE TO SEND RESULTS: South Australia

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT: Overnight
NAME : Jack Ayers	DATE: 30/06/2022	NAME :	DATE:	CONSIGNMENT NOTE NO.
OF: JBS&G (Australia) Pty Ltd	TIME:	OF:	TIME:	
NAME:	DATE:	NAME :	DATE:	TRANSPORT CO. NAME.
OF:	TIME:	OF:	TIME:	

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

FOR LAB USE ONLY
COOLER SEAL
Yes ..... No .....
Broken ..... Intact .....
COOLER TEMP: deg.C

Please forward results and invoice to:
labresults@jbsg.com.au
msarunic@jbsg.com.au
jayers@jbsg.com.au
atschirn@jbsg.com.au

ANALYSIS REQUIRED

SAMPLE DATA				CONTAINER DATA																		
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field	M12: Heavy Metals Suite	B14: OCP & OPP	B9: Metals, TRH, BTEX, PAH & OCP	PFAS: Short Suite	B19A: Nutrients	R7: SA Waste Screen	R21: NEPM Screen for Soil Classification	M8: Metals	BTEX	Asbestos	Coliforms (total)	PAH				
BH19_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH20_0.0-0.1	SOIL	29/06/2022		1 Jar			X				X							X				
BH20_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH20_0.3-0.5	SOIL	29/06/2022		1 Jar																		
ACM01	CEMENT SHEET	29/06/2022														X						
DUP01	SOIL	29/06/2022		1 Jar					X													
DUP02	SOIL	30/06/2022		1 Jar			X	X														
SPLIT01	SOIL	29/06/2022		1 Jar					X													
SPLIT02	SOIL	30/06/2022		1 Jar			X	X														
TB01	WATER	29/06/2022		2 V											X							
RB01	WATER	30/06/2022		1 Metals										X								
						TOTAL	15	10	8	5	7	2	1	1	1	1	3	4	0	0	0	0

***Container Type and Preservative Codes:**
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosuplhate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

***NOTES**

PLEASE FORWARD TO ENVIROLAB

COC received 6/7 6.17pm

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt Street ADELAIDE SA 5000
T: +61 8 8431 7113 · F: +61 8 8431 7115
ACN 100 220 479 · ABN 62 100 220 479

JBS&G

CLIENT: JBS&G	LABORATORY: Eurofins
SITE/PROJECT NAME: Renascor Waterloo Cnr Rd	COC Reference #: 5641
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd
DATA NEEDED BY: **Standard TAT**	REPORT NEEDED BY: **Standard TAT**
SITE/PROJECT NUMBER: 63155	**QUOTE #:**

LABORATORY BATCH NO.:
SAMPLERS: JA AT
PHONE: 08 8431 7113 FAX: 08 8431 7115
REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES
JBS&G OFFICE TO SEND RESULTS: South Australia

RELINQUISHED BY:

NAME : Jack Ayers	DATE: 30/06/2022
OF: JBS&G (Australia) Pty Ltd	TIME:
NAME:	DATE:
OF:	TIME:

RECEIVED BY

NAME : Alisha P	DATE: 5/7/22
OF: ELS Melb	TIME: 11:45am
NAME :	DATE:
OF:	TIME:

METHOD OF SHIPMENT: Overnight
CONSIGNMENT NOTE NO.
TRANSPORT CO. NAME.

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

FOR LAB USE ONLY
COOLER SEAL
Yes ..... No .....
Broken ..... Intact .....
COOLER TEMP: deg.C

Please forward results and invoice to:
labresults@jbsg.com.au
msarunic@jbsg.com.au
jayers@jbsg.com.au
atschirn@jbsg.com.au

ANALYSIS REQUIRED

SAMPLE DATA				CONTAINER DATA			M12: Heavy Metals Suite	B14: OCP & OPP	B9: Metals, TRH, BTEX, PAH & OCP	PFAS: Short Suite	B19A: Nutrients	R7: SA Waste Screen	R21: NEPM Screen for Soil Classification	M8: Metals	BTEX	Asbestos	Coliforms (total)	PAH				
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field																
BH19_0.3-0.5	SOIL	29/06/2022		1 Jar																		
BH20_0.0-0.1	SOIL	29/06/2022		1 Jar			X				X							X				
BH20_0.1-0.2	SOIL	29/06/2022		1 Jar																		
BH20_0.3-0.5	SOIL	29/06/2022		1 Jar																		
ACM01	CEMENT SHEET	29/06/2022														X						
DUP01	SOIL	29/06/2022		1 Jar																		
DUP02	SOIL	30/06/2022		1 Jar																		
1 SPLIT01	SOIL	29/06/2022		1 Jar																		
2 SPLIT02	SOIL	30/06/2022		1 Jar																		
TB01	WATER	29/06/2022		2 V											X							
RB01	WATER	30/06/2022		1 Metals										X								
						TOTAL	13	8	6	5	7	2	1	1	1	1	3	4	0	0	0	0

***Container Type and Preservative Codes:**
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserve Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; =Sodium Thiosuphate Preserved Plastic, E = EDTA Preserv Bottles; ST = Sterile Bottle; O = Other.

'NOTES

PLEASE FORWARD TO ENVIROLAB

RELINQUISHED BY:
ELANE G. 5/7/22 8AM

Envirolab Services
2a Re[illegible]rch Drive
Croydon South VIC 3136
Ph. (03) 9763 2500
Job No: 32327
Date Received: 5/7/22
Time Received: 11:45am
Received By: AP
Temp: Cool/Ambient 3.2
Cooling: Ice/Icepack
Security: Intact/Broken/None

COPY 9

1

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	JBS & G Australia Pty Ltd
Attention	Jack Ayers

Sample Login Details

Your reference	63155 Renascor Waterloo Cnr Rd
Envirolab Reference	32327
Date Sample Received	05/07/2022
Date Instructions Received	07/07/2022
Date Results Expected to be Reported	13/07/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	3.2
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Pamela Adams	Chris De Luca
Phone: 03 9763 2500	**Phone: 03 9763 2500**
Fax: 03 9763 2633	**Fax: 03 9763 2633**
Email: padams@envirolab.com.au	**Email: cdeluca@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Soil	TRH Soil C10-C40 NEPM	PAHs in Soil	OCP in Soil	OP in Soil	Acid Extractable metalsin soil
Split01	✓	✓	✓	✓		✓
Split02				✓	✓	✓

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 32327

Client Details

Client	JBS & G Australia Pty Ltd
Attention	Jack Ayers
Address	100 Hutt Street, ADELAIDE, SA, 5000

Sample Details

Your Reference	**63155 Renascor Waterloo Cnr Rd**
Number of Samples	2 Soil
Date samples received	05/07/2022
Date completed instructions received	07/07/2022

Analysis Details

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

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

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

Report Details

Date results requested by	13/07/2022
Date of Issue	13/07/2022

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Chris De Luca, Operations Manager

Authorised By

P. Adams.

Pamela Adams, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		32327-1
Your Reference	UNITS	Split01
Date Sampled		29/06/2022
Type of sample		Soil
Date extracted	-	07/07/2022
Date analysed	-	12/07/2022
vTRH C_6 - C_9	mg/kg	<25
vTRH C_6 - C_{10}	mg/kg	<25
TRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Naphthalene	mg/kg	<1
Total BTEX	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	98

TRH Soil C10-C40 NEPM		
Our Reference		32327-1
Your Reference	UNITS	Split01
Date Sampled		29/06/2022
Type of sample		Soil
Date extracted	-	07/07/2022
Date analysed	-	09/07/2022
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
Total +ve TRH (C10-C36)	mg/kg	<50
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	103

PAHs in Soil		
Our Reference		32327-1
Your Reference	UNITS	Split01
Date Sampled		29/06/2022
Type of sample		Soil
Date extracted	-	07/07/2022
Date analysed	-	09/07/2022
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc (Half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d_{14}	%	108

OCP in Soil			
Our Reference		32327-1	32327-2
Your Reference	UNITS	Split01	Split02
Date Sampled		29/06/2022	30/06/2022
Type of sample		Soil	Soil
Date extracted	-	07/07/2022	07/07/2022
Date analysed	-	09/07/2022	09/07/2022
alpha-BHC	mg/kg	<0.1	<0.1
Hexachlorobenzene	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve reported Aldrin + Dieldrin	mg/kg	<0.1	<0.1
Total +ve reported DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate 2-chlorophenol-d4	%	98	88

OP in Soil		
Our Reference		32327-2
Your Reference	UNITS	Split02
Date Sampled		30/06/2022
Type of sample		Soil
Date extracted	-	07/07/2022
Date analysed	-	09/07/2022
Azinphos-methyl	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyrifos	mg/kg	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorovos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate 2-chlorophenol-d4	%	88

Acid Extractable metals in soil			
Our Reference		32327-1	32327-2
Your Reference	UNITS	Split01	Split02
Date Sampled		29/06/2022	30/06/2022
Type of sample		Soil	Soil
Date digested	-	08/07/2022	08/07/2022
Date analysed	-	08/07/2022	08/07/2022
Arsenic	mg/kg	<4	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	23	41
Copper	mg/kg	26	15
Lead	mg/kg	14	22
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	13	6
Zinc	mg/kg	49	44

Moisture			
Our Reference		32327-1	32327-2
Your Reference	UNITS	Split01	Split02
Date Sampled		29/06/2022	30/06/2022
Type of sample		Soil	Soil
Date prepared	-	07/07/2022	07/07/2022
Date analysed	-	08/07/2022	08/07/2022
Moisture	%	22	18

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105°C for a minimum of 12 hours.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021/022	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD or GC-MS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, For OCs the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

Method ID	Methodology Summary
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			07/07/2022	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Date analysed	-			12/07/2022	[NT]	[NT]	[NT]	[NT]	12/07/2022	[NT]
vTRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	97	[NT]
vTRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	97	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	99	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	100	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	96	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	112	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: TRH Soil C10-C40 NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			07/07/2022	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Date analysed	-			09/07/2022	[NT]	[NT]	[NT]	[NT]	09/07/2022	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	120	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	120	[NT]
Surrogate o-Terphenyl	%		Org-020	89	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			07/07/2022	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Date analysed	-			09/07/2022	[NT]	[NT]	[NT]	[NT]	09/07/2022	[NT]
Naphthalene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Acenaphthylene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Fluorene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Phenanthrene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Anthracene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Pyrene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022	<0.05	[NT]	[NT]	[NT]	[NT]	84	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022	110	[NT]	[NT]	[NT]	[NT]	110	[NT]

QUALITY CONTROL: OCP in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			07/07/2022	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Date analysed	-			09/07/2022	[NT]	[NT]	[NT]	[NT]	09/07/2022	[NT]
alpha-BHC	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Hexachlorobenzene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	84	[NT]
gamma-BHC	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	84	[NT]
delta-BHC	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
alpha-chlordane	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Dieldrin	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Endrin	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Methoxychlor	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022	86	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: OP in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			07/07/2022	[NT]	[NT]	[NT]	[NT]	07/07/2022	[NT]
Date analysed	-			09/07/2022	[NT]	[NT]	[NT]	[NT]	09/07/2022	[NT]
Azinphos-methyl	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Diazinon	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Dichlorovos	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Fenitrothion	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Malathion	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022	86	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date digested	-			08/07/2022	[NT]	[NT]	[NT]	[NT]	08/07/2022	[NT]
Date analysed	-			08/07/2022	[NT]	[NT]	[NT]	[NT]	08/07/2022	[NT]
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	[NT]	[NT]	105	[NT]
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	[NT]	[NT]	105	[NT]
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

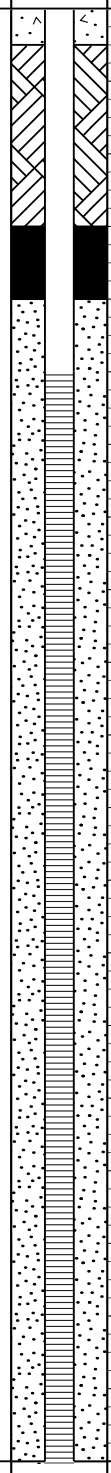
Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Appendix J – Groundwater Logs

GROUNDWATER WELL GW01

PROJECT NUMBER 63155	**DRILLING COMPANY** SMS Geotechnical	**EASTING** 277,271
PROJECT NAME Waterloo Corner Baseline	**DRILLING DATE** 10-Nov-22	**NORTHING** 6,153,651
CLIENT Renascor	**DRILL RIG** DrillMan	**ELEVATION** 5 m AHD
PERMIT NO. 428528	**DRILLING METHOD** Hollow Flight Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**TOTAL DEPTH** 4 m bgl	**COORD SOURCE** GPS
	DIAMETER 150 mm	**LOGGED BY** JA
COMPLETION Gatic	**CASING** Class 18 PVC - 50mm	**SCREEN INTERVAL** 1 - 4 m bgl

COMMENTS



Drilling Method	Water (m bgl)	Depth (m bgl)	Lithological Class	Lithological Description	Moisture
HA			SM	Silty SAND, brown, fine to medium, low plasticity fines.	D
		0.2	CH-SC	Silty CLAY, brown to red-brown, medium plasticity, with some fine to medium sand.	SM
		0.4	CH-SC	Sandy CLAY, brown to orange-brown, medium plasticity, fine to medium sand.	SM
		0.6	CL-ML	Silty CLAY, orange-brown, medium plasticity, fine to medium sand, trace or medium gravels.	M
		0.8			
HFA	▽	1			
			SM	Silty SAND, dark brown, fine to medium, low plasticity fines, with some decayed organics.	W
		1.2	CL-ML	Silty CLAY, brown, low plasticity.	M
		1.4			
		1.6			
		1.8	SM	Silty SAND, brown, fine, low plasticity fines, trace of medium gravels.	W
		2			
		2.2	CH-SC	Sandy CLAY, pale brown, high plasticity, fine to medium sand.	SM
		2.4			
		2.6			
		2.8			
		3	CH	CLAY, dark orange-brown with grey mottling, high plasticity, with some white gravels.	D
		3.2			
		3.4			
		3.6			
		3.8			
		4		Termination Depth at: 4.00 m.	

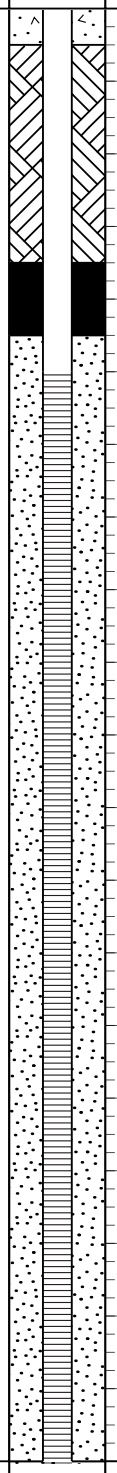
Disclaimer This log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 24 Nov 2022

GROUNDWATER WELL GW02

PROJECT NUMBER 63155	**DRILLING COMPANY** SMS Geotechnical	**EASTING** 277,203
PROJECT NAME Waterloo Corner Baseline	**DRILLING DATE** 10-Nov-22	**NORTHING** 6,153,499
CLIENT Renascor	**DRILL RIG** DrillMan	**ELEVATION** 5 m AHD
PERMIT NO. 428529	**DRILLING METHOD** Hollow Flight Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**TOTAL DEPTH** 4 m bgl	**COORD SOURCE** GPS
	DIAMETER 150 mm	**LOGGED BY** JA
COMPLETION Gatic	**CASING** Class 18 PVC - 50mm	**SCREEN INTERVAL** 1 - 4 m bgl

COMMENTS



Drilling Method	Water (m bgl)	Depth (m bgl)	Lithological Class	Lithological Description	Moisture
HA		0.2	SM	Silty SAND, brown, fine, low plasticity fines.	D
		0.4, 0.6, 0.8, 1	CL-SC	Sandy CLAY, brown to red-brown, low plasticity, medium to coarse sand, with some fine gravels.	M
HFA	▽	1.2	SM	Silty SAND, dark brown, fine to medium, low plasticity fines.	SM
		1.4, 1.6, 1.8	CL-ML	Silty CLAY, orange-brown, low plasticity, with some fine sand.	M
		2, 2.2	CL-ML	Silty CLAY, orange-brown with grey mottling, medium plasticity.	M
		2.4, 2.6, 2.8	ML-CL	Clayey SILT, pale brown with grey mottling, low plasticity, trace of fine sand.	M
		3, 3.2, 3.4, 3.6	SM	Silty SAND, pale brown, medium, low plasticity fines.	W
		3.8	CH	CLAY, grey-brown, high plasticity.	D
		4		Termination Depth at: 4.00 m.	

Disclaimer This log is intended for environmental not geotechnical purposes.

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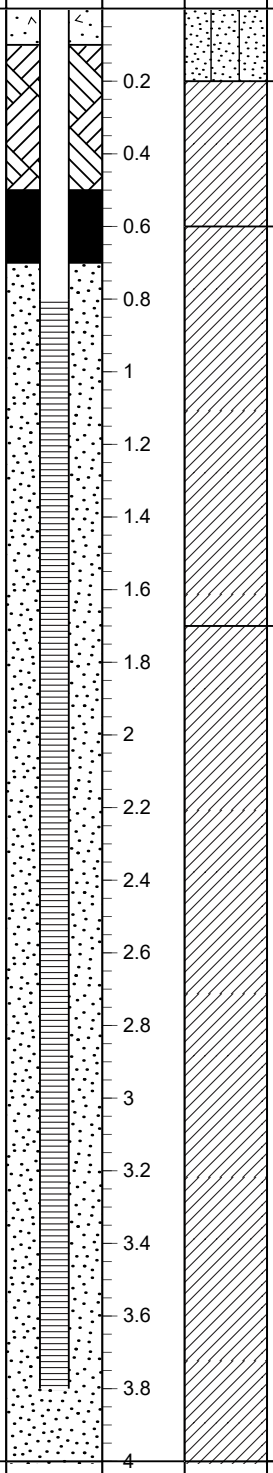
GROUNDWATER WELL GW03

PROJECT NUMBER 63155	**DRILLING COMPANY** SMS Geotechnical	**EASTING** 277,453
PROJECT NAME Waterloo Corner Baseline	**DRILLING DATE** 11-Nov-22	**NORTHING** 6,153,384
CLIENT Renascor	**DRILL RIG** DrillMan	**ELEVATION** 5 m AHD
PERMIT NO. 428530	**DRILLING METHOD** Hollow Flight Auger	**COORD SYS** GDA94_MGA_zone_54
ADDRESS Robinson Road, Waterloo Corner SA	**TOTAL DEPTH** 4 m bgl	**COORD SOURCE** GPS
	DIAMETER 150 mm	**LOGGED BY** JA
COMPLETION Gatic	**CASING** Class 18 PVC - 50mm	**SCREEN INTERVAL** 0.8 - 3.8 m bgl

COMMENTS



Drilling Method	Water (m bgl)	Well Details	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture
HA					SM	Silty SAND, dark brown to black, fine to medium, medium plasticity clay.	SM
					CL-SC	Sandy CLAY, orange-brown, low plasticity, fine to medium sand, trace of fine gravels.	M
					CL-ML	Silty CLAY, brown, low to medium plasticity.	W
HFA					CH	CLAY, pale brown with grey mottling, high plasticity.	D
						Termination Depth at: 4.00 m.	

Disclaimer This log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 24 Nov 2022

Appendix K – Groundwater Field Sampling Sheets

GROUNDWATER WELL FIELD SAMPLING SHEET

JBS&G

Project Number:	63155	**WELL ID**	GW01
Client:	Remascor	**Purging date:**	18/11/22
Site Location:	Waterloo Cnr Rd	**Sampling date:**	18/11/22
Field Sampler(s):	AJ / JA / JB	**Stick up (m):**	–
Casing Diameter (mm):	50mm / 100mm / 150mm	**Depth to NAPL (mBTOC):**	–
Well completion:	Gatic / Standpipe	**Depth to SWL (mBTOC):**	0.565
Cap type:	Envirocap / PVC End cap	**NAPL thickness (m):**	–
Well condition:	Comprimised / Good	**Well Depth (mBTOC):**	3.810
Sampling method:	Purge / Low Flow / Manifold	**Water Column Depth (m)**	
	Low Flow: Pump submersion depth (mBTOC): 3.3	Sampling SWL (mBTOC): 0.565	

Volume Purged	Dissolved Oxygen	Electrical Conductivity	pH	Redox Potential	Temperature	Comments	Time
L	ppm	µS/cm @25°C	pH units	mV	°C	SWL for low flow (mBTOC)	
0.5	0.30	26627	7.07	109.3	17.0	0.565	13:12
1.3	0.19	26540	7.03	104.6	17.0	↓	13:15
2.1	0.13	26329	7.01	100.8	17.1		13:18
2.9	0.15	26880	7.00	99.8	17.1		13:21
Acceptable Variation	+/-10%	+/-5%	+/- 0.1pH unit	+/- 10mV	+/- 0.1 °C	**Field results acceptable:**	YES / NO

LOW FLOW: Max. flow rate = 0.5 L/min - Max. drawdown = 0.1 m - Well stable when 3 consecutive readings of 3 parameters (either 3min apart or 1L apart)

PURGE: Min. sampling volume is 4 casing volumes or dry twice - 1 casing volume (50mm wells) = 2 L/m - 1 casing volume (100mm wells) = 8 L/m

Turbidity	High / Medium / Low	**Hydrocarbon sheen?**	YES / NO
Colour:	OBN	**Odour:**	Nil
Shaker Test:	X	**Foam Observed**	None

		Analyte	*No.*	*Bottle/label colour (Eurofins)*
Primary sample ID:	GW01			
Duplicate (intra) sample ID:	–	Metals	1	plastic - red/orange (preserved) ~60ml
Triplicate (inter) sample ID:	–	Inorganic	1	plastic - green (unpreserved) ~500ml
Rinse blank after?	YES / NO ID: RB01	Semi Vols.	1	Amber Glass - orange (unpreserved) ~ 200ml
Samples filtered for metals?	YES / NO	Volitiles	2	Glass Vials (x2) - pink (preserved) ~ 40ml
Filter Method:	0.45um stericup filter	Nutrients		plastic - purple (preserved) ~60ml
Water Quality Meter:	YSI 2	Cyanide/ Cr6+		plastic - aqua blue (preserved) ~60ml
Dipper / Interface probe:	Solinst 150m	Microbiological		plastic - black/red (preserved) ~500ml
Pump:	Peri	PFAS	1	plastic - blue (unpreserved) ~600ml

Notes: Bailed ~5L from top of well.
Fast recovery.

GROUNDWATER WELL FIELD SAMPLING SHEET

JBS&G

Project Number:	63155	**WELL ID**	GW02
Client:	Renascor	**Purging date:**	18/11/22
Site Location:	Waterloo Cnr Rd	**Sampling date:**	18/11/22
Field Sampler(s):	AJ / JA / JB	**Stick up (m):**	0
Casing Diameter (mm):	50mm / 100mm / 150mm	**Depth to NAPL (mBTOC):**	–
Well completion:	Gatic / Standpipe	**Depth to SWL (mBTOC):**	0.731
Cap type:	Envirocap / PVC End cap	**NAPL thickness (m):**	–
Well condition:	Comprimised / Good	**Well Depth (mBTOC):**	3.940
Sampling method:	Purge / Low Flow / Manifold	**Water Column Depth (m)**	
	Low Flow: Pump submersion depth (mBTOC): 3.5	Sampling SWL (mBTOC): 0.731	

Volume Purged	Dissolved Oxygen	Electrical Conductivity	pH	Redox Potential	Temperature	Comments	Time
L	ppm	µS/cm @25°C	pH units	mV	°C	SWL for low flow (mBTOC)	
0.5	0.63	28296	7.12	89.3	18.0	0.731	12:12
1.5	0.39	27440	7.10	79.4	17.1	↓	12:15
2.5	0.44	27394	7.09	77.4	17.1		12:18
3.5	0.51	27364	7.09	76.1	17.1		12:21
4.5	0.60	27294	7.09	75.4	17.2		12:24
Acceptable Variation	+/-10%	+/-5%	+/- 0.1pH unit	+/- 10mV	+/- 0.1 °C	Field results acceptable:	YES / NO

LOW FLOW: Max. flow rate = 0.5 L/min - Max. drawdown = 0.1 m - Well stable when 3 consecutive readings of 3 parameters (either 3min apart or 1L apart)

PURGE: Min. sampling volume is 4 casing volumes or dry twice - 1 casing volume (50mm wells) = 2 L/m - 1 casing volume (100mm wells) = 8 L/m

Turbidity	High / Medium / Low	**Hydrocarbon sheen?**	YES / NO
Colour:	OBN	**Odour:**	Nil
Shaker Test:	Y	**Foam Observed**	Nil

Primary sample ID:	GW02	*Analyte*	*No.*	*Bottle/label colour (Eurofins)*
Duplicate (intra) sample ID:	DUP01	Metals	1 + 2	plastic - red/orange (preserved) ~60ml
Triplicate (inter) sample ID:	SPLIT01	Inorganic	1 + 2	plastic - green (unpreserved) ~500ml
Rinse blank after?	YES / NO ID:	Semi Vols.	1 + 2	Amber Glass - orange (unpreserved) ~ 200ml
Samples filtered for metals?	YES / NO	Volitiles	2 + 4	Glass Vials (x2) - pink (preserved) ~ 40ml
Filter Method:	0.45um stericup filter	Nutrients		plastic - purple (preserved) ~60ml
Water Quality Meter:	YSI 2	Cyanide/ Cr6+		plastic - aqua blue (preserved) ~60ml
Dipper / Interface probe:	Solinst 150m	Microbiological		plastic - black/red (preserved) ~500ml
Pump:	Peri	PFAS	1 + 2	plastic - blue (unpreserved) ~600ml

Notes: ~5 L bailed from top of well.

GROUNDWATER WELL FIELD SAMPLING SHEET

JBS&G

Project Number:	631 55	**WELL ID**	GW03
Client:	Renascor	**Purging date:**	18/11/22
Site Location:	Waterloo Cur Rd	**Sampling date:**	18/11/22
Field Sampler(s):	AJ / JA / JB	**Stick up (m):**	–
Casing Diameter (mm):	50mm / 100mm / 150mm	**Depth to NAPL (mBTOC):**	–
Well completion:	Gatic / Standpipe	**Depth to SWL (mBTOC):**	0.15
Cap type:	Envirocap / PVC End cap	**NAPL thickness (m):**	–
Well condition:	Comprimised / Good	**Well Depth (mBTOC):**	3.98
Sampling method:	Purge / Low Flow / Manifold	**Water Column Depth (m)**	–
	Low Flow: Pump submersion depth (mBTOC): 3.5	Sampling SWL (mBTOC): 0.15	

Volume Purged	Dissolved Oxygen	Electrical Conductivity	pH	Redox Potential	Temperature	Comments	Time
L	ppm	µS/cm @25°C	pH units	mV	°C	SWL for low flow (mBTOC)	
0.5	0.33	34835	7.09	37.7	18.8	0.15	11:07
1.2	0.21	34873	7.10	38.3	18.8	↓	11:10
1.9	0.15	34869	7.11	39.5	18.6	↓	11:13
2.6	0.12	34842	7.12	40.5	18.5	↓	11:16
3.3	0.13	34792	7.12	40.9	18.5	↓	11:19
Acceptable Variation	+/-10%	+/-5%	+/- 0.1pH unit	+/- 10mV	+/- 0.1 °C	**Field results acceptable:**	YES / NO

LOW FLOW: Max. flow rate = 0.5 L/min - Max. drawdown = 0.1 m - Well stable when 3 consecutive readings of 3 parameters (either 3min apart or 1L apart)

PURGE: Min. sampling volume is 4 casing volumes or dry twice - 1 casing volume (50mm wells) = 2 L/m - 1 casing volume (100mm wells) = 8 L/m

Turbidity	High / Medium / Low	**Hydrocarbon sheen?**	YES / NO
Colour:	OBN	**Odour:**	Nil
Shaker Test:	Y	**Foam Observed**	Nil

Primary sample ID:	GW03	*Analyte*	*No.*	*Bottle/label colour (Eurofins)*
Duplicate (intra) sample ID:	–	Metals	1	plastic - red/orange (preserved) ~60ml
Triplicate (inter) sample ID:	–	Inorganic	1	plastic - green (unpreserved) ~500ml
Rinse blank after?	YES / NO ID:	Semi Vols.	1	Amber Glass - orange (unpreserved) ~ 200ml
Samples filtered for metals?	YES / NO	Volitiles	2	Glass Vials (x2) - pink (preserved) ~ 40ml
Filter Method:	0.45um stericup filter	Nutrients		plastic - purple (preserved) ~60ml
Water Quality Meter:	YSI 2	Cyanide/ Cr6+		plastic - aqua blue (preserved) ~60ml
Dipper / Interface probe:	Solinst 150m	Microbiological		plastic - black/red (preserved) ~500ml
Pump:	Peri	PFAS	1	plastic - blue (unpreserved) ~600ml

Notes: Bailed ~5L from top of well prior to sampling

Appendix L – NATA Laboratory Documentation (Groundwater)

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt St, ADELAIDE, SA, 5000
T: +61 8 8431 7113 · F: +61 8 8431 7115
ACN 100 220 479 · ABN 82 100 220 479

JBS&G

CLIENT: JBS&G	LABORATORY: Eurofins
SITE/PROJECT NAME: Renascor / Waterloo Corner	COC Reference 5708
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd
DATA NEEDED BY: Std TAT	REPORT NEEDED BY: Std TAT
SITE/PROJECT NUMBER: 63155	QUOTE #

RELINQUISHED BY:

NAME : Marina Sarunic	DATE: 18/11/22
OF: JBS&G (Australia) Pty Ltd	TIME:
NAME:	DATE:
OF:	TIME:

LABORATORY BATCH NO.:	
SAMPLERS: JA	
PHONE: 08 8431 7113 FAX: 08 8431 7115	
REPORT FORMAT HARD: NO FAX: NO E-MAIL: YES	
JBS&G OFFICE TO SEND RESULTS: South Australia	

RECEIVED BY

NAME Rassmal	DATE: 18/11
OF: Eurofins	TIME: 3:15pm
NAME	DATE:
OF:	TIME:

METHOD OF SHIPMENT: Overnight
CONSIGNMENT NOTE NO.
TRANSPORT CO. NAME

P.O. NO.:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

FOR LAB USE ONLY
COOLER SEAL
Yes ..... No .....
Broken ..... Intact ....
COOLER TEMP: deg.C

Please forward results and invoice to:
labresults@jbsg.com.au
msarunic@jbsg.com.au

ANALYSIS REQUIRED

SAMPLE ID	MATRIX	DATE	TIME	CONTAINER DATA: TYPE & PRESERVATIVE	NO.	pH field	TDS	B7 - TRH / BTEXN / PAH / Metals	VOC	PFAS	Metals M8	BTEX									
GW01	Water	22.03.22		1 Amber, 1 Metals, 1 Plastic (Unpreserved), 2 Vials, 1 Plastic (Preserved)			X	X	X	X											
GW02	Water	22.03.22					X	X	X	X											
GW03	Water	22.03.22					X	X	X	X											
DUP01	Water	22.03.22					X	X	X	X											
[illegible]	Water	[illegible]					X	X	X	X											
TB01	Water	22.03.22		2 Vials								X									
RB01	Water	22.03.22		1 Plastic (Preserved)							X										
						TOTAL	0	5	5	5	5	1	1	0	0	0	0	0	0	0	0	0

***Container Type and Preservative Codes:**
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosulphate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

*NOTES

PLEASE FORWARD TO ENVIROLAB

12.2°C
− 1.2°C
11.0°C
on 1B.

#942724
19/11 TW

Parimal Acharya

From: Jack Ayers <jayers@jbsg.com.au>
Sent: Friday, 18 November 2022 2:50 PM
To: Parimal Acharya
Cc: Marina Sarunic
Subject: 63155 GW COC
Attachments: 5708_63155_COC - GW.xlsx

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Parimal,

Please find attached the COC for water samples delivered today.

Please not that some reference number may be mislabelled as 61355, this is my bad! All are from the same reference.

Thanks,

Jack

Jack Ayers | Project Scientist | JBS&G
Kaurna Country | 100 Hutt St, Adelaide, SA
T: 08 8431 7113 | M: 0459 534 775 | E: jayers@jbsg.com.au | W: jbsg.com.au | L: Conditions and Limitations

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt St, ADELAIDE, SA, 5000
T: +61 8 8431 7113 · F: +61 8 8431 7115
ACN 100 220 479 · ABN 62 100 220 479

JBS&G

COPY 18

CLIENT: JBS&G	LABORATORY: Eurofins	LABORATORY BATCH NO.:	
SITE/PROJECT NAME: Renascor / Waterloo Corner	COC Reference 5708	SAMPLERS: JA	
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115	
DATA NEEDED BY: Std TAT	REPORT NEEDED BY: Std TAT	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES	
SITE/PROJECT NUMBER: 63155	QUOTE #:	JBS&G OFFICE TO SEND RESULTS: South Australia	
RELINQUISHED BY:		RECEIVED BY	METHOD OF SHIPMENT: Overnight
NAME : Marina Saruric	DATE: 18/11/22	NAME : Rabiyna	DATE: 18/11
OF: JBS&G (Australia) Pty Ltd	TIME:	OF: Eurofins	TIME: 3:15pm
NAME:	DATE:	NAME :	DATE:
OF:	TIME:	OF:	TIME:
P.O. NO.:	COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:		CONSIGNMENT NOTE NO.
FOR LAB USE ONLY	Please forward results and invoice to:		TRANSPORT CO. NAME.
COOLER SEAL	labresults@jbsg.com.au		
Yes ..... No	msaruric@jbsg.com.au		
Broken ..... Intact			
COOLER TEMP: deg.C			

SAMPLE DATA				CONTAINER DATA			ANALYSIS REQUIRED														
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	pH field	TDS	B7 - TRH / BTEXN / PAH / Metals	VOC	PFAS	Metals M8	BTEX									
GW01	Water	22.03.22		1 Amber, 1 Metals, 1 Plastic (Unpreserved), 2 Vials, 1 Plastic (Preserved)			X	X	X	X											
GW02	Water	22.03.22					X	X	X	X											
GW03	Water	22.03.22					X	X	X	X											
DUP01	Water	22.03.22					X	X	X	X											
SPLIT01	Water	22.03.22					X	X	X	X											
TB01	Water	22.03.22		2 Vials								X									
RB01	Water	22.03.22		1 Plastic (Preserved)							X										
						TOTAL	0	5	5	5	5	1	1	0	0	0	0	0	0	0	0	0

***Container Type and Preservative Codes:**
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST =Sodium Thiosulphate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

*NOTES

PLEASE FORWARD TO ENVIROLAB

12.2°C
− 1.2°C
11.0°C
on IB.

1

Amy Meunier

From: Marina Sarunic <msarunic@jbsg.com.au>
Sent: Wednesday, 23 November 2022 5:52 PM
To: Michael Cassidy; #AU_CAU001_EnviroSampleVic
Subject: FW: 63155 GW COC
Attachments: 5708_63155_COC - GW.xlsx

Follow Up Flag: Follow up
Flag Status: Flagged

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Michael,

Could I please order **B19A: Nutrients** testing to groundwater samples GW01, GW02 and GW03 for the attached COC (I don't think I have received a SRA).

Let me know if there are any issues with this.

Thanks,
Marina

Marina Sarunic | Associate Environmental Scientist | JBS&G
Kaurna Country | 100 Hutt St, Adelaide, SA
T: 08 8431 7113 | M: 0432 799 882 | E: msarunic@jbsg.com.au | W: jbsg.com.au | L: Conditions and Limitations

Exceptional Outcomes

From: Jack Ayers <jayers@jbsg.com.au>
Sent: Friday, 18 November 2022 2:50 PM
To: Parimal Acharya <ParimalAcharya@eurofins.com>
Cc: Marina Sarunic <msarunic@jbsg.com.au>
Subject: 63155 GW COC

Hi Parimal,

Please find attached the COC for water samples delivered today.

Please not that some reference number may be mislabelled as 61355, this is my bad! All are from the same reference.

Thanks,

Jack

Jack Ayers | Project Scientist | JBS&G
Kaurna Country | 100 Hutt St, Adelaide, SA
T: 08 8431 7113 | M: 0459 534 775 | E: jayers@jbsg.com.au | W: jbsg.com.au | L: Conditions and Limitations

eurofins | Environment Testing

www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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

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19/8 Lewalan Street
Grovedale
VIC 3216
Tel: +61 3 8564 5000
NATA# 1261 Site# 1254

Sydney
179 Magowar Road
Girraween
NSW 2145
Tel: +61 2 9900 8400
NATA# 1261 Site# 18217

Canberra
Unit 1,2 Dacre Street
Mitchell
ACT 2911
Tel: +61 2 6113 8091

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

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

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

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

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

Sample Receipt Advice

Company name:	JBS & G Australia (SA) P/L
Contact name:	Marina Sarunic
Project name:	RENASCOR/ WATERLOO CORNER
Project ID:	63155
Turnaround time:	5 Day
Date/Time received	Nov 18, 2022 2:50 PM
Eurofins reference	942724

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Michael Cassidy on phone : +61 3 8564 5000 or by email: MichaelCassidy@eurofins.com

Results will be delivered electronically via email to Marina Sarunic - msarunic@jbsg.com.au.

Global Leader - Results you can trust

eurofins | Environment Testing

Certificate of Analysis

JBS & G Australia (SA) P/L
100 Hutt St
Adelaide
SA 5000

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition 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: **Marina Sarunic**

Report **942724-W**
Project name RENASCOR/ WATERLOO CORNER
Project ID 63155
Received Date Nov 18, 2022

Client Sample ID			**GW01**	**GW02**	**GW03**	**DUP01**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**M22-No0047219**	**M22-No0047220**	**M22-No0047221**	**M22-No0047222**
Date Sampled			**Nov 18, 2022**	**Nov 18, 2022**	**Nov 18, 2022**	**Nov 18, 2022**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	0.06	0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	79	144	141	148
Volatile Organics						
1.1-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2.4-Trimethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			GW01	GW02	GW03	DUP01
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M22-No0047219	M22-No0047220	M22-No0047221	M22-No0047222
Date Sampled			Nov 18, 2022	Nov 18, 2022	Nov 18, 2022	Nov 18, 2022
Test/Reference	LOR	Unit				
Volatile Organics						
1.3-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3.5-Trimethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Butanone (MEK)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
2-Propanone (Acetone)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
4-Chlorotoluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
4-Methyl-2-pentanone (MIBK)	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Allyl chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromoform	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Carbon disulfide	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chloroethane	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chloroform	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chloromethane	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dichlorodifluoromethane	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iodomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Isopropyl benzene (Cumene)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methylene Chloride	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Styrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichlorofluoromethane	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
Total MAH*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
Vic EPA IWRG 621 CHC (Total)*	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Vic EPA IWRG 621 Other CHC (Total)*	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
4-Bromofluorobenzene (surr.)	1	%	79	144	141	148
Toluene-d8 (surr.)	1	%	88	97	96	96

Client Sample ID			GW01	GW02	GW03	DUP01
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M22-No0047219	M22-No0047220	M22-No0047221	M22-No0047222
Date Sampled			Nov 18, 2022	Nov 18, 2022	Nov 18, 2022	Nov 18, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	70	79	76	82
p-Terphenyl-d14 (surr.)	1	%	116	138	116	118
Nitrate & Nitrite (as N)	0.05	mg/L	10	19	18	-
Phosphate total (as P)	0.01	mg/L	0.02	0.01	0.01	-
Total Dissolved Solids Dried at 180 °C ± 2 °C	10	mg/L	17000	16000	22000	16000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	1.0	1.5	0.5	-
Total Nitrogen (as N)*	0.2	mg/L	11	20.5	18.5	-
Heavy Metals						
Arsenic	0.001	mg/L	0.001	0.001	0.001	0.001
Cadmium	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper	0.001	mg/L	0.003	0.006	0.006	0.007
Lead	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel	0.001	mg/L	0.002	0.002	0.002	0.002
Zinc	0.005	mg/L	0.007	0.005	0.008	0.006
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	45	39	53	105
13C5-PFPeA (surr.)	1	%	57	52	61	107
13C5-PFHxA (surr.)	1	%	64	56	67	109

Client Sample ID			GW01	GW02	GW03	DUP01
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M22-No0047219	M22-No0047220	M22-No0047221	M22-No0047222
Date Sampled			Nov 18, 2022	Nov 18, 2022	Nov 18, 2022	Nov 18, 2022
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
13C4-PFHpA (surr.)	1	%	53	47	59	103
13C8-PFOA (surr.)	1	%	58	52	60	94
13C5-PFNA (surr.)	1	%	70	60	69	93
13C6-PFDA (surr.)	1	%	71	60	70	80
13C2-PFUnDA (surr.)	1	%	70	56	73	79
13C2-PFDoDA (surr.)	1	%	80	56	74	72
13C2-PFTeDA (surr.)	1	%	163	104	158	101
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	79	75	103	95
D3-N-MeFOSA (surr.)	1	%	63	50	62	60
D5-N-EtFOSA (surr.)	1	%	66	49	65	61
D7-N-MeFOSE (surr.)	1	%	43	35	40	44
D9-N-EtFOSE (surr.)	1	%	54	44	59	50
D5-N-EtFOSAA (surr.)	1	%	49	43	45	75
D3-N-MeFOSAA (surr.)	1	%	35	30	39	54
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	< 0.01	[N09]0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	63	58	68	102
18O2-PFHxS (surr.)	1	%	45	45	51	81
13C8-PFOS (surr.)	1	%	62	53	64	83
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	71	63	65	64
13C2-6:2 FTSA (surr.)	1	%	74	77	68	69
13C2-8:2 FTSA (surr.)	1	%	112	99	103	117
13C2-10:2 FTSA (surr.)	1	%	59	48	59	59

Client Sample ID			GW01	GW02	GW03	DUP01
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			M22-No0047219	M22-No0047220	M22-No0047221	M22-No0047222
Date Sampled			Nov 18, 2022	Nov 18, 2022	Nov 18, 2022	Nov 18, 2022
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	< 0.01	0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			TB01	RB01
Sample Matrix			Water	Water
Eurofins Sample No.			M22-No0047223	M22-No0047224
Date Sampled			Nov 18, 2022	Nov 18, 2022
Test/Reference	LOR	Unit		
BTEX				
Benzene	0.001	mg/L	< 0.001	-
Toluene	0.001	mg/L	< 0.001	-
Ethylbenzene	0.001	mg/L	< 0.001	-
m&p-Xylenes	0.002	mg/L	< 0.002	-
o-Xylene	0.001	mg/L	< 0.001	-
Xylenes - Total*	0.003	mg/L	< 0.003	-
4-Bromofluorobenzene (surr.)	1	%	147	-
Heavy Metals				
Arsenic	0.001	mg/L	-	< 0.001
Cadmium	0.0002	mg/L	-	< 0.0002
Chromium	0.001	mg/L	-	< 0.001
Copper	0.001	mg/L	-	< 0.001
Lead	0.001	mg/L	-	< 0.001
Mercury	0.0001	mg/L	-	< 0.0001
Nickel	0.001	mg/L	-	< 0.001
Zinc	0.005	mg/L	-	< 0.005

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
Eurofins Suite B7			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 22, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 22, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 22, 2022	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 22, 2022	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Polycyclic Aromatic Hydrocarbons	Melbourne	Nov 22, 2022	7 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Melbourne	Nov 22, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Volatile Organics	Melbourne	Nov 22, 2022	7 Days
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices (USEPA 8260)			
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N)	Melbourne	Nov 24, 2022	28 Days
- Method: LTM-INO-4120 Analysis of NOx NO2 NH3 by FIA			
Total Kjeldahl Nitrogen (as N)	Melbourne	Nov 24, 2022	28 Days
- Method: APHA 4500-Norg B,D Total Kjeldahl Nitrogen by FIA			
Eurofins Suite B19A: Total N (TKN, NOx), Total P			
Phosphate total (as P)	Melbourne	Nov 24, 2022	28 Days
- Method: LTM-INO-4040 Phosphate by CFA			
Total Dissolved Solids Dried at 180 °C ± 2 °C	Melbourne	Nov 22, 2022	28 Days
- Method: LTM-INO-4170 Total Dissolved Solids in Water			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Nov 22, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Nov 22, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Nov 22, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Nov 22, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Nov 19, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

eurofins

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Fax: 08 8431 7115

Received: Nov 18, 2022 2:50 PM
Due: Nov 23, 2022
Priority: 5 Day
Contact Name: Marina Sarunic

Project Name: RENASCOR/ WATERLOO CORNER
Project ID: 63155

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Metals M8	BTEX	Volatile Organics	Eurofins Suite B7	Eurofins Suite B19A: Total N (TKN, NOx), Total P	Per- and Polyfluoroalkyl Substances (PFASs)	Total Dissolved Solids Dried at 180 °C ± 2 °C
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X	X	X
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	GW01	Nov 18, 2022		Water	M22-No0047219			X	X	X	X	X
2	GW02	Nov 18, 2022		Water	M22-No0047220			X	X	X	X	X
3	GW03	Nov 18, 2022		Water	M22-No0047221			X	X	X	X	X
4	DUP01	Nov 18, 2022		Water	M22-No0047222			X	X		X	X
5	TB01	Nov 18, 2022		Water	M22-No0047223		X					
6	RB01	Nov 18, 2022		Water	M22-No0047224	X						
Test Counts						1	1	4	4	3	4	4

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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
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

Terms

APHA	American Public Health Association
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 a moisture has been determined on a solid sample the result is expressed on a dry 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 is representative of 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 like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-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 5.4
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 be used as a guide only 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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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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. 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
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Volatile Organics							
1.1-Dichloroethane	mg/L	< 0.001			0.001	Pass	
1.1-Dichloroethene	mg/L	< 0.001			0.001	Pass	
1.1.1-Trichloroethane	mg/L	< 0.001			0.001	Pass	
1.1.1.2-Tetrachloroethane	mg/L	< 0.001			0.001	Pass	
1.1.2-Trichloroethane	mg/L	< 0.001			0.001	Pass	
1.1.2.2-Tetrachloroethane	mg/L	< 0.001			0.001	Pass	
1.2-Dibromoethane	mg/L	< 0.001			0.001	Pass	
1.2-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
1.2-Dichloroethane	mg/L	< 0.001			0.001	Pass	
1.2-Dichloropropane	mg/L	< 0.001			0.001	Pass	
1.2.3-Trichloropropane	mg/L	< 0.001			0.001	Pass	
1.2.4-Trimethylbenzene	mg/L	< 0.001			0.001	Pass	
1.3-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
1.3-Dichloropropane	mg/L	< 0.001			0.001	Pass	
1.3.5-Trimethylbenzene	mg/L	< 0.001			0.001	Pass	
1.4-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
2-Butanone (MEK)	mg/L	< 0.005			0.005	Pass	
2-Propanone (Acetone)	mg/L	< 0.005			0.005	Pass	
4-Chlorotoluene	mg/L	< 0.001			0.001	Pass	
4-Methyl-2-pentanone (MIBK)	mg/L	< 0.005			0.005	Pass	
Allyl chloride	mg/L	< 0.001			0.001	Pass	
Bromobenzene	mg/L	< 0.001			0.001	Pass	
Bromochloromethane	mg/L	< 0.001			0.001	Pass	
Bromodichloromethane	mg/L	< 0.001			0.001	Pass	
Bromoform	mg/L	< 0.001			0.001	Pass	
Bromomethane	mg/L	< 0.005			0.005	Pass	
Carbon disulfide	mg/L	< 0.001			0.001	Pass	
Carbon Tetrachloride	mg/L	< 0.001			0.001	Pass	
Chlorobenzene	mg/L	< 0.001			0.001	Pass	
Chloroethane	mg/L	< 0.005			0.005	Pass	
Chloroform	mg/L	< 0.005			0.005	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Chloromethane	mg/L	< 0.005			0.005	Pass	
cis-1.2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
cis-1.3-Dichloropropene	mg/L	< 0.001			0.001	Pass	
Dibromochloromethane	mg/L	< 0.001			0.001	Pass	
Dibromomethane	mg/L	< 0.001			0.001	Pass	
Dichlorodifluoromethane	mg/L	< 0.005			0.005	Pass	
Iodomethane	mg/L	< 0.001			0.001	Pass	
Isopropyl benzene (Cumene)	mg/L	< 0.001			0.001	Pass	
Methylene Chloride	mg/L	< 0.005			0.005	Pass	
Styrene	mg/L	< 0.001			0.001	Pass	
Tetrachloroethene	mg/L	< 0.001			0.001	Pass	
trans-1.2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
trans-1.3-Dichloropropene	mg/L	< 0.001			0.001	Pass	
Trichloroethene	mg/L	< 0.001			0.001	Pass	
Trichlorofluoromethane	mg/L	< 0.005			0.005	Pass	
Vinyl chloride	mg/L	< 0.005			0.005	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g.h.i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a.h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1.2.3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Phosphate total (as P)	mg/L	< 0.01			0.01	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	75			70-130	Pass	
TRH C10-C14	%	116			70-130	Pass	
Naphthalene	%	80			70-130	Pass	
TRH C6-C10	%	76			70-130	Pass	
TRH >C10-C16	%	112			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	88			70-130	Pass	
Toluene	%	90			70-130	Pass	
Ethylbenzene	%	83			70-130	Pass	
m&p-Xylenes	%	112			70-130	Pass	
Xylenes - Total*	%	113			70-130	Pass	
LCS - % Recovery							
Volatile Organics							
1.1-Dichloroethene	%	80			70-130	Pass	
1.1.1-Trichloroethane	%	77			70-130	Pass	
1.2-Dichlorobenzene	%	75			70-130	Pass	
1.2-Dichloroethane	%	75			70-130	Pass	
Trichloroethene	%	79			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	112			70-130	Pass	
Acenaphthylene	%	110			70-130	Pass	
Anthracene	%	104			70-130	Pass	
Benz(a)anthracene	%	72			70-130	Pass	
Benzo(a)pyrene	%	98			70-130	Pass	
Benzo(b&j)fluoranthene	%	102			70-130	Pass	
Benzo(g.h.i)perylene	%	126			70-130	Pass	
Benzo(k)fluoranthene	%	112			70-130	Pass	
Chrysene	%	94			70-130	Pass	
Dibenz(a.h)anthracene	%	100			70-130	Pass	
Fluoranthene	%	104			70-130	Pass	
Fluorene	%	108			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	94			70-130	Pass	
Naphthalene	%	82			70-130	Pass	
Phenanthrene	%	102			70-130	Pass	
Pyrene	%	80			70-130	Pass	
LCS - % Recovery							
Nitrate & Nitrite (as N)	%	94			70-130	Pass	
Phosphate total (as P)	%	96			70-130	Pass	
Total Dissolved Solids Dried at 180 °C ± 2 °C	%	106			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	%	101			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	95			80-120	Pass	
Cadmium	%	88			80-120	Pass	
Chromium	%	89			80-120	Pass	
Copper	%	91			80-120	Pass	
Lead	%	91			80-120	Pass	
Mercury	%	83			80-120	Pass	
Nickel	%	91			80-120	Pass	
Zinc	%	91			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	93			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	84			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	68			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	75			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	77			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	80			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	98			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	71			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	72			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	71			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	65			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	77			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	80			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	86			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	84			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	75			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	79			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	75			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)									
Perfluorobutanesulfonic acid (PFBS)			%	59			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	68			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	63			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	75			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	82			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	67			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	65			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	63			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	64			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	104			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	71			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	65			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	M22-No0046902	NCP	%	92			70-130	Pass	
TRH C10-C14	W22-No0043869	NCP	%	126			70-130	Pass	
Naphthalene	M22-No0046902	NCP	%	83			70-130	Pass	
TRH C6-C10	M22-No0046902	NCP	%	94			70-130	Pass	
TRH >C10-C16	W22-No0043869	NCP	%	128			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M22-No0046902	NCP	%	87			70-130	Pass	
Toluene	M22-No0046902	NCP	%	91			70-130	Pass	
Ethylbenzene	M22-No0046902	NCP	%	109			70-130	Pass	
m&p-Xylenes	M22-No0046902	NCP	%	130			70-130	Pass	
o-Xylene	M22-No0046902	NCP	%	100			70-130	Pass	
Xylenes - Total*	M22-No0046902	NCP	%	120			70-130	Pass	
Spike - % Recovery									
Volatile Organics				Result 1					
1.1-Dichloroethene	M22-No0046902	NCP	%	87			70-130	Pass	
1.1.1-Trichloroethane	M22-No0046902	NCP	%	71			70-130	Pass	
1.2-Dichlorobenzene	M22-No0046902	NCP	%	99			70-130	Pass	
1.2-Dichloroethane	M22-No0046902	NCP	%	85			70-130	Pass	
Trichloroethene	M22-No0046902	NCP	%	77			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M22-No0045874	NCP	%	84			70-130	Pass	
Acenaphthylene	M22-No0045874	NCP	%	78			70-130	Pass	
Anthracene	M22-No0045874	NCP	%	98			70-130	Pass	
Benz(a)anthracene	M22-No0045874	NCP	%	86			70-130	Pass	
Benzo(a)pyrene	M22-No0045874	NCP	%	104			70-130	Pass	
Benzo(b&j)fluoranthene	M22-No0045874	NCP	%	86			70-130	Pass	
Benzo(g.h.i)perylene	M22-No0045874	NCP	%	100			70-130	Pass	
Benzo(k)fluoranthene	M22-No0045874	NCP	%	82			70-130	Pass	
Chrysene	M22-No0045874	NCP	%	113			70-130	Pass	
Dibenz(a.h)anthracene	M22-No0045874	NCP	%	83			70-130	Pass	
Fluoranthene	M22-No0045874	NCP	%	85			70-130	Pass	
Fluorene	M22-No0045874	NCP	%	93			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Indeno(1.2.3-cd)pyrene	M22-No0045874	NCP	%	100			70-130	Pass	
Naphthalene	M22-No0050054	NCP	%	54			70-130	Fail	Q08
Phenanthrene	M22-No0045874	NCP	%	80			70-130	Pass	
Pyrene	M22-No0045874	NCP	%	81			70-130	Pass	
Spike - % Recovery									
				Result 1					
Nitrate & Nitrite (as N)	M22-No0051417	NCP	%	101			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M22-No0053743	NCP	%	79			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M22-No0045846	NCP	%	93			75-125	Pass	
Cadmium	M22-No0045846	NCP	%	94			75-125	Pass	
Chromium	M22-No0046482	NCP	%	108			75-125	Pass	
Copper	M22-No0045846	NCP	%	85			75-125	Pass	
Lead	M22-No0045846	NCP	%	84			75-125	Pass	
Mercury	M22-No0045846	NCP	%	114			75-125	Pass	
Nickel	M22-No0046482	NCP	%	103			75-125	Pass	
Zinc	M22-No0045846	NCP	%	100			75-125	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	M22-No0045851	NCP	%	83			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M22-No0045851	NCP	%	83			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M22-No0045851	NCP	%	71			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M22-No0045851	NCP	%	85			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M22-No0045851	NCP	%	87			50-150	Pass	
Perfluorononanoic acid (PFNA)	M22-No0045851	NCP	%	91			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M22-No0045851	NCP	%	110			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M22-No0045851	NCP	%	80			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M22-No0045851	NCP	%	67			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M22-No0045851	NCP	%	75			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M22-No0045851	NCP	%	62			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	M22-No0045851	NCP	%	94			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M22-No0045851	NCP	%	79			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M22-No0045851	NCP	%	85			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M22-No0045851	NCP	%	81			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M22-No0045851	NCP	%	76			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M22-No0045851	NCP	%	83			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M22-No0045851	NCP	%	72			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M22-No0045851	NCP	%	64			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M22-No0045851	NCP	%	77			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoropropanesulfonic acid (PFPrS)	M22-No0045851	NCP	%	69			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M22-No0045851	NCP	%	79			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M22-No0045851	NCP	%	98			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M22-No0045851	NCP	%	71			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M22-No0045851	NCP	%	73			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M22-No0045851	NCP	%	77			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M22-No0045851	NCP	%	68			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M22-No0045851	NCP	%	82			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M22-No0045851	NCP	%	80			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M22-No0045851	NCP	%	74			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C10-C14	L22-No0049294	NCP	mg/L	0.06	0.08	31	30%	Fail	Q15
TRH C15-C28	L22-No0049294	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	L22-No0049294	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C10-C16	L22-No0049294	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	L22-No0049294	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	L22-No0049294	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Acenaphthylene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Anthracene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benz(a)anthracene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(a)pyrene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(b&j)fluoranthene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(g.h.i)perylene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(k)fluoranthene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chrysene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibenz(a.h)anthracene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluoranthene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluorene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Naphthalene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Phenanthrene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Pyrene	M22-No0045867	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Nitrate & Nitrite (as N)	S22-No0032348	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Phosphate total (as P)	S22-No0044084	NCP	mg/L	0.04	0.02	45	30%	Fail	Q15
Total Dissolved Solids Dried at 180 °C ± 2 °C	W22-No0044487	NCP	mg/L	220	210	2.8	30%	Pass	
Total Kjeldahl Nitrogen (as N)	R22-No0039941	NCP	mg/L	1.9	2.1	13	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M22-No0045846	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium	M22-No0045846	NCP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium	M22-No0045846	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper	M22-No0045846	NCP	mg/L	0.032	0.032	1.0	30%	Pass	
Lead	M22-No0045846	NCP	mg/L	0.001	0.001	3.6	30%	Pass	
Mercury	M22-No0045846	NCP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel	M22-No0045846	NCP	mg/L	0.013	0.013	1.0	30%	Pass	
Zinc	M22-No0039468	NCP	mg/L	13	14	4.8	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M22-No0047220	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M22-No0047220	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Michael Cassidy	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Carroll Lee	Senior Analyst-PFAS
Edward Lee	Senior Analyst-Organic
Emily Rosenberg	Senior Analyst-Metal
Joseph Edouard	Senior Analyst-Volatile
Mary Makarios	Senior Analyst-Inorganic
Mary Makarios	Senior Analyst-Metal
Mele Singh	Senior Analyst-Volatile

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CHAIN OF CUSTODY DOCUMENTATION

JBS&G (Australia) Pty Ltd

Adelaide
100 Hutt St, ADELAIDE, SA, 5000
T: +61 8 8431 7113 - F: +61 8 8431 7115
ACN 100 220 479 - ABN 62 100 220 479

JBS&G

COPY 18

CLIENT: JBS&G	LABORATORY: Eurofins	LABORATORY BATCH NO.:	
SITE/PROJECT NAME: Renascor / Waterloo Corner	COC Reference 5708	SAMPLERS: JA	
SEND REPORT TO: JBS&G Australia Pty Ltd	SEND INVOICE TO: JBS&G Australia Pty Ltd	PHONE: 08 8431 7113 FAX: 08 8431 7115	
DATA NEEDED BY: Std TAT	REPORT NEEDED BY: Std TAT	REPORT FORMAT: HARD: NO FAX: NO E-MAIL: YES	
SITE/PROJECT NUMBER: 63155	QUOTE #:	JBS&G OFFICE TO SEND RESULTS: South Australia	
	RELINQUISHED BY: Tyrone G EF	RECEIVED BY	
NAME: Marina Sarunic	DATE: 18/11/22 21/11/22 8am	NAME: Pasuna DATE: 18/11	METHOD OF SHIPMENT: Overnight
OF: JBS&G (Australia) Pty Ltd	TIME:	OF: Eurofins TIME: 3:15pm	CONSIGNMENT NOTE NO.
NAME:	DATE:	NAME: Alisha DATE: 21/11/22	
OF:	TIME:	OF: ELS Melb TIME: 11:55am	TRANSPORT CO. NAME.
P.O. NO.:	COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:		

FOR LAB USE ONLY
COOLER SEAL
Yes ..... No .....
Broken ..... Intact ....
COOLER TEMP: deg.C

Please forward results and invoice to:
labresults@jbsg.com.au
msarunic@jbsg.com.au

ANALYSIS REQUIRED

SAMPLE ID	MATRIX	DATE	TIME	CONTAINER DATA: TYPE & PRESERVATIVE	NO.	pH field	TDS	B7 - TRH / BTEXN / PAH / Metals	VOC	PFAS	Metals M8	BTEX									
GW01	Water	22.03.22		1 Amber, 1 Metals, 1 Plastic (Unpreserved), 2 Vials, 1 Plastic (Preserved)			X	X	X	X											
GW02	Water	22.03.22					X	X	X	X											
GW03	Water	22.03.22					X	X	X	X											
DUP01	Water	22.03.22					X	X	X	X											
SPLIT01	Water	22.03.22					X	X	X	X											
TB01	Water	22.03.22		2 Vials			X	X	X	X											
RB01	Water	22.03.22		1 Plastic (Preserved)								X									
						TOTAL	0	5	5	5	5	1	1	0	0	0	0	0	0	0	0	0

*Container Type and Preservative Codes:
P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Jar; S = Solvent Washed Glass Bottle; VC = HCL Preserved Vial; PC = HCL Preserved Plastic; PS = Sulfuric Acid Preserved Plastic; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; ST = Sodium Thiosulphate Preserved Plastic, E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

*NOTES

PLEASE FORWARD TO ENVIROLAB

Envirolab Services
25 Research Drive
Croydon South VIC 3136
Ph: (03) 9763 2500

Job No: 34654
Date Received: 21/11/22
Time Received: 11:55am
Received By: LO
Temp: Cool/Ambient 5.4°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

12.2°C
− 1.2°C
11.0°C
on IB.

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	JBS & G Australia Pty Ltd
Attention	Marina Sarunic

Sample Login Details

Your reference	63155 Renascor/ Waterloo Comer
Envirolab Reference	34654
Date Sample Received	21/11/2022
Date Instructions Received	21/11/2022
Date Results Expected to be Reported	28/11/2022

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	1 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	5.4
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Pamela Adams	Chris De Luca
Phone: 03 9763 2500	**Phone: 03 9763 2500**
Fax: 03 9763 2633	**Fax: 03 9763 2633**
Email: padams@envirolab.com.au	**Email: cdeluca@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

Sample ID	VOCs in water - Routine Level	vTRH(C6-C10)/BTEXN in Water	TRH Water(C10-C40) NEPM	PAHs in Water	HM in water - dissolved	Total Dissolved Solids(grav)	PFAS in Waters Extended
SPLIT01	✓	✓	✓	✓	✓	✓	✓

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

Additional Info
Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 34654

Client Details

Client	JBS & G Australia Pty Ltd
Attention	Marina Sarunic
Address	100 Hutt Street, ADELAIDE, SA, 5000

Sample Details

Your Reference	**63155 Renascor/ Waterloo Comer**
Number of Samples	1 Water
Date samples received	21/11/2022
Date completed instructions received	21/11/2022

Analysis Details

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

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

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

Report Details

Date results requested by	28/11/2022
Date of Issue	28/11/2022

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VOCs in water - Routine Level		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Date extracted	-	23/11/2022
Date analysed	-	23/11/2022
Dichlorodifluoromethane	µg/L	<10
Chloromethane	µg/L	<10
Vinyl Chloride	µg/L	<10
Bromomethane	µg/L	<10
Chloroethane	µg/L	<10
Trichlorofluoromethane	µg/L	<10
1,1-Dichloroethene	µg/L	<1
Trans-1,2-dichloroethene	µg/L	<1
1,1-dichloroethane	µg/L	<1
Cis-1,2-dichloroethene	µg/L	<1
Bromochloromethane	µg/L	<1
Chloroform	µg/L	<1
2,2-dichloropropane	µg/L	<1
1,2-dichloroethane	µg/L	<1
1,1,1-trichloroethane	µg/L	<1
1,1-dichloropropene	µg/L	<1
Cyclohexane	µg/L	<1
Carbon tetrachloride	µg/L	<1
Benzene	µg/L	<1
Dibromomethane	µg/L	<1
1,2-dichloropropane	µg/L	<1
Trichloroethene	µg/L	<1
Bromodichloromethane	µg/L	<1
trans-1,3-dichloropropene	µg/L	<1
cis-1,3-dichloropropene	µg/L	<1
1,1,2-trichloroethane	µg/L	<1
Toluene	µg/L	<1
1,3-dichloropropane	µg/L	<1
Dibromochloromethane	µg/L	<1
1,2-dibromoethane	µg/L	<1
Tetrachloroethene	µg/L	<1
1,1,1,2-tetrachloroethane	µg/L	<1
Chlorobenzene	µg/L	<1
Ethylbenzene	µg/L	<1

VOCs in water - Routine Level		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Bromoform	µg/L	<1
m+p-xylene	µg/L	<2
Styrene	µg/L	<1
1,1,2,2-tetrachloroethane	µg/L	<1
o-xylene	µg/L	<1
1,2,3-trichloropropane	µg/L	<1
Isopropylbenzene	µg/L	<1
Bromobenzene	µg/L	<1
n-propyl benzene	µg/L	<1
2-chlorotoluene	µg/L	<1
4-chlorotoluene	µg/L	<1
1,3,5-trimethyl benzene	µg/L	<1
Tert-butyl benzene	µg/L	<1
1,2,4-trimethyl benzene	µg/L	<1
1,3-dichlorobenzene	µg/L	<1
Sec-butyl benzene	µg/L	<1
1,4-dichlorobenzene	µg/L	<1
4-isopropyl toluene	µg/L	<1
1,2-dichlorobenzene	µg/L	<1
n-butyl benzene	µg/L	<1
1,2-dibromo-3-chloropropane	µg/L	<1
1,2,4-trichlorobenzene	µg/L	<1
Hexachlorobutadiene	µg/L	<1
1,2,3-trichlorobenzene	µg/L	<1
Surrogate Dibromofluoromethane	%	108
Surrogate toluene-d8	%	103
Surrogate 4-BFB	%	98

vTRH(C6-C10)/BTEXN in Water		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Date extracted	-	23/11/2022
Date analysed	-	23/11/2022
TRH C_6 - C_9	µg/L	<10
TRH C_6 - C_{10}	µg/L	<10
TRH C_6 -C_{10} less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Total +ve Xylenes	µg/L	<1
Total BTEX in water	µg/L	<1
Surrogate Dibromofluoromethane	%	111
Surrogate toluene-d8	%	107
Surrogate 4-BFB	%	98

TRH Water(C10-C40) NEPM		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Date extracted	-	23/11/2022
Date analysed	-	24/11/2022
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	<100
TRH C_{29} - C_{36}	µg/L	<100
Total +ve TRH (C10-C36)	µg/L	<50
TRH >C_{10} - C_{16}	µg/L	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Total +ve TRH (>C10-C40)	µg/L	<50
Surrogate o-Terphenyl	%	81

PAHs in Water		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Date extracted	-	23/11/2022
Date analysed	-	24/11/2022
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j&k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Total +ve PAH's	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Surrogate p-Terphenyl-d_{14}	%	90

HM in water - dissolved		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Date prepared	-	25/11/2022
Date analysed	-	25/11/2022
Arsenic-Dissolved	µg/L	1
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	2
Copper-Dissolved	µg/L	7
Lead-Dissolved	µg/L	<1
Nickel-Dissolved	µg/L	3
Zinc-Dissolved	µg/L	9
Mercury-Dissolved	µg/L	<0.05

Miscellaneous Inorganics		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Date prepared	-	22/11/2022
Date analysed	-	22/11/2022
Total Dissolved Solids (grav)	mg/L	19,000

PFAS in Waters Extended		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Date prepared	-	21/11/2022
Date analysed	-	21/11/2022
Perfluorobutanesulfonic acid	µg/L	<0.01
Perfluoropentanesulfonic acid	µg/L	<0.01
Perfluorohexanesulfonic acid PFHxS	µg/L	<0.01
Perfluoroheptanesulfonic acid	µg/L	<0.01
Perfluorooctanesulfonic acid PFOS	µg/L	<0.01
Perfluorodecanesulfonic acid	µg/L	<0.02
Perfluorobutanoic acid	µg/L	<0.02
Perfluoropentanoic acid	µg/L	<0.02
Perfluorohexanoic acid	µg/L	<0.01
Perfluoroheptanoic acid	µg/L	<0.01
Perfluorooctanoic acid PFOA	µg/L	<0.01
Perfluorononanoic acid	µg/L	<0.01
Perfluorodecanoic acid	µg/L	<0.02
Perfluoroundecanoic acid	µg/L	<0.02
Perfluorododecanoic acid	µg/L	<0.05
Perfluorotridecanoic acid	µg/L	<0.1
Perfluorotetradecanoic acid	µg/L	<0.5
4:2 FTS	µg/L	<0.01
6:2 FTS	µg/L	<0.01
8:2 FTS	µg/L	<0.02
10:2 FTS	µg/L	<0.02
Perfluorooctane sulfonamide	µg/L	<0.1
N-Methyl perfluorooctane sulfonamide	µg/L	<0.05
N-Ethyl perfluorooctanesulfon -amide	µg/L	<0.1
N-Me perfluorooctanesulfonamid -oethanol	µg/L	<0.05
N-Et perfluorooctanesulfonamid -oethanol	µg/L	<0.5
MePerfluorooctanesulf- amid oacetic acid	µg/L	<0.02
EtPerfluorooctanesulf- amid oacetic acid	µg/L	<0.02
Surrogate $^{13}C_8$ PFOS	%	100
Surrogate $^{13}C_2$ PFOA	%	101
Extracted ISTD $^{13}C_3$ PFBS	%	107
Extracted ISTD $^{18}O_2$ PFHxS	%	108
Extracted ISTD $^{13}C_4$ PFOS	%	102
Extracted ISTD $^{13}C_4$ PFBA	%	110

PFAS in Waters Extended		
Our Reference		34654-1
Your Reference	UNITS	SPLIT01
Date Sampled		18/11/2022
Type of sample		Water
Extracted ISTD $^{13}C_3$ *PFPeA*	%	129
Extracted ISTD $^{13}C_2$ *PFHxA*	%	105
Extracted ISTD $^{13}C_4$ *PFHpA*	%	106
Extracted ISTD $^{13}C_4$ *PFOA*	%	121
Extracted ISTD $^{13}C_5$ *PFNA*	%	120
Extracted ISTD $^{13}C_2$ *PFDA*	%	116
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	117
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	112
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	110
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	126
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	122
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	108
Extracted ISTD $^{13}C_8$ *FOSA*	%	109
Extracted ISTD d_3 *N MeFOSA*	%	117
Extracted ISTD d_5 *NEtFOSA*	%	124
Extracted ISTD d_7 *N MeFOSE*	%	115
Extracted ISTD d_9 *N EtFOSE*	%	102
Extracted ISTD d_3 *N MeFOSAA*	%	106
Extracted ISTD d_5 *N EtFOSAA*	%	131
Total Positive PFHxS & PFOS	µg/L	<0.01
Total Positive PFOS & PFOA	µg/L	<0.01
Total Positive PFAS	µg/L	<0.01

Method ID	Methodology Summary
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±10°C.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLP/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER

QUALITY CONTROL: VOCs in water - Routine Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			23/11/2022	[NT]	[NT]	[NT]	[NT]	23/11/2022	[NT]
Date analysed	-			23/11/2022	[NT]	[NT]	[NT]	[NT]	23/11/2022	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Cyclohexane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromoform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Styrene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VOCs in water - Routine Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	106	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate toluene-d8	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate 4-BFB	%		Org-023	94	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			23/11/2022	[NT]	[NT]	[NT]	[NT]	23/11/2022	[NT]
Date analysed	-			23/11/2022	[NT]	[NT]	[NT]	[NT]	23/11/2022	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	114	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	117	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	115	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate Dibromofluoromethane	%		Org-023	108	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate toluene-d8	%		Org-023	104	[NT]	[NT]	[NT]	[NT]	98	[NT]
Surrogate 4-BFB	%		Org-023	94	[NT]	[NT]	[NT]	[NT]	93	[NT]

QUALITY CONTROL: TRH Water(C10-C40) NEPM						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			23/11/2022	[NT]	[NT]	[NT]	[NT]	23/11/2022	[NT]
Date analysed	-			24/11/2022	[NT]	[NT]	[NT]	[NT]	24/11/2022	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	74	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	80	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	74	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	80	[NT]
Surrogate o-Terphenyl	%		Org-020	84	[NT]	[NT]	[NT]	[NT]	77	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			23/11/2022	[NT]	[NT]	[NT]	[NT]	23/11/2022	[NT]
Date analysed	-			24/11/2022	[NT]	[NT]	[NT]	[NT]	24/11/2022	[NT]
Naphthalene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Acenaphthylene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Fluorene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Phenanthrene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Anthracene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Pyrene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Benzo(a)anthracene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Benzo(b,j&k)fluoranthene	µg/L	2	Org-022	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-022	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022	98	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			25/11/2022	[NT]	[NT]	[NT]	[NT]	25/11/2022	[NT]
Date analysed	-			25/11/2022	[NT]	[NT]	[NT]	[NT]	25/11/2022	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			22/11/2022	[NT]	[NT]	[NT]	[NT]	22/11/2022	[NT]
Date analysed	-			22/11/2022	[NT]	[NT]	[NT]	[NT]	22/11/2022	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: PFAS in Waters Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Perfluorobutanesulfonic acid	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	101	[NT]
Perfluoropentanesulfonic acid	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	104	[NT]
Perfluorohexanesulfonic acid PFHxS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	99	[NT]
Perfluoroheptanesulfonic acid	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	103	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	97	[NT]
Perfluorodecanesulfonic acid	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	99	[NT]
Perfluorobutanoic acid	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	109	[NT]
Perfluoropentanoic acid	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	107	[NT]
Perfluorohexanoic acid	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	105	[NT]
Perfluoroheptanoic acid	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	104	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	105	[NT]
Perfluorononanoic acid	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	103	[NT]
Perfluorodecanoic acid	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	107	[NT]
Perfluoroundecanoic acid	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	98	[NT]
Perfluorododecanoic acid	µg/L	0.05	Org-029	<0.05	[NT]	[NT]	[NT]	[NT]	102	[NT]
Perfluorotridecanoic acid	µg/L	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Perfluorotetradecanoic acid	µg/L	0.5	Org-029	<0.5	[NT]	[NT]	[NT]	[NT]	106	[NT]
4:2 FTS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	101	[NT]
6:2 FTS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	97	[NT]
8:2 FTS	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	104	[NT]
10:2 FTS	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	109	[NT]
Perfluorooctane sulfonamide	µg/L	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]
N-Methyl perfluorooctane sulfonamide	µg/L	0.05	Org-029	<0.05	[NT]	[NT]	[NT]	[NT]	103	[NT]
N-Ethyl perfluorooctanesulfon -amide	µg/L	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
N-Me perfluorooctanesulfonamid -oethanol	µg/L	0.05	Org-029	<0.05	[NT]	[NT]	[NT]	[NT]	104	[NT]
N-Et perfluorooctanesulfonamid -oethanol	µg/L	0.5	Org-029	<0.5	[NT]	[NT]	[NT]	[NT]	108	[NT]
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	106	[NT]
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	95	[NT]
Surrogate $^{13}C_8$ PFOS	%		Org-029	103	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate $^{13}C_2$ PFOA	%		Org-029	102	[NT]	[NT]	[NT]	[NT]	100	[NT]
Extracted ISTD $^{13}C_3$ PFBS	%		Org-029	103	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: PFAS in Waters Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	100	[NT]	[NT]	[NT]	[NT]	103	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	101	[NT]
Extracted ISTD $^{13}C_4$ *PFBA*	%		Org-029	105	[NT]	[NT]	[NT]	[NT]	102	[NT]
Extracted ISTD $^{13}C_3$ *PFPeA*	%		Org-029	112	[NT]	[NT]	[NT]	[NT]	109	[NT]
Extracted ISTD $^{13}C_2$ *PFHxA*	%		Org-029	100	[NT]	[NT]	[NT]	[NT]	101	[NT]
Extracted ISTD $^{13}C_4$ *PFHpA*	%		Org-029	102	[NT]	[NT]	[NT]	[NT]	102	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	110	[NT]	[NT]	[NT]	[NT]	108	[NT]
Extracted ISTD $^{13}C_5$ *PFNA*	%		Org-029	113	[NT]	[NT]	[NT]	[NT]	109	[NT]
Extracted ISTD $^{13}C_2$ *PFDA*	%		Org-029	113	[NT]	[NT]	[NT]	[NT]	108	[NT]
Extracted ISTD $^{13}C_2$ *PFUnDA*	%		Org-029	108	[NT]	[NT]	[NT]	[NT]	110	[NT]
Extracted ISTD $^{13}C_2$ *PFDoDA*	%		Org-029	102	[NT]	[NT]	[NT]	[NT]	102	[NT]
Extracted ISTD $^{13}C_2$ *PFTeDA*	%		Org-029	93	[NT]	[NT]	[NT]	[NT]	94	[NT]
Extracted ISTD $^{13}C_2$ *4:2FTS*	%		Org-029	112	[NT]	[NT]	[NT]	[NT]	110	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	116	[NT]	[NT]	[NT]	[NT]	112	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	108	[NT]	[NT]	[NT]	[NT]	97	[NT]
Extracted ISTD $^{13}C_8$ *FOSA*	%		Org-029	108	[NT]	[NT]	[NT]	[NT]	102	[NT]
Extracted ISTD d_3 *N MeFOSA*	%		Org-029	114	[NT]	[NT]	[NT]	[NT]	108	[NT]
Extracted ISTD d_5 *NEtFOSA*	%		Org-029	114	[NT]	[NT]	[NT]	[NT]	109	[NT]
Extracted ISTD d_7 *N MeFOSE*	%		Org-029	108	[NT]	[NT]	[NT]	[NT]	109	[NT]
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	101	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: PFAS in Waters Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	106	[NT]	[NT]	[NT]	[NT]	99	[NT]
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	110	[NT]	[NT]	[NT]	[NT]	110	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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Document Distribution

Rev No.	Copies	Recipient	Date
0	1 x Electronic	Simon Ballestrin	28 July 2022
1	1 x Electronic	Simon Ballestrin & William Tregenza	22 December 2022

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
0	Marina Sarunic	Will Ellis	Will Ellis		28 July 2022
1	Marina Sarunic	Will Ellis	Will Ellis		22 December 2022

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Appendix 08 Geotechnical Investigation

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Project Number #20651.000.001

Geotechnical Investigation - Factual and Interpretative Report

Bolivar, South Australia

Submitted to:
Renascor Resources Limited
36 North Terrace
Kent Town
SA 5067

Contents

1 Introduction 6

1.1 Background 6

1.2 Project location details 6

1.3 Geotechnical Scope of Works (SOW) 7

2 Phase 1: Desktop Study, Site Investigation and Factual Reporting 7

2.1 Geotechnical Desktop Study 8

2.1.1 Published Geology 8

2.1.2 Existing Engineering / Geological Boreholes 9

2.1.3 Geohazards Hazards) 9

2.1.4 Hydrogeology 10

2.1.5 Published Soils Information (Acid Sulfate Soils and Australian Soils Classification) 10

2.2 Geotechnical Site Investigation 12

2.2.1 Site Description 12

2.2.2 Intrusive Investigations 13

2.2.3 Summary of Ground Conditions 14

2.2.4 Groundwater 15

2.3 Laboratory Testing 15

2.3.1 Geotechnical Laboratory Testing 15

2.3.2 Geochemical Laboratory Testing 20

2.3.3 Interpretation of ASS Field Screening and Laboratory Results 22

3 Phase 2: Evaluation and Interpretive Reporting 23

3.1 Geotechnical Design Parameters 23

3.2 Foundations Recommendations 24

3.2.1 Achievable Ultimate Bearing Capacity – Conventional Foundations 24

3.2.2 Piled Foundations 26

3.2.3 Working Platform 28

3.2.4 Solider Pile Wall Retention Systems 28

3.2.5 Retaining Walls 28

3.2.6 Groundwater and Drainage 29
3.3 Earthworks 29
3.3.1 Reuse of Site-won Materials 29
3.3.2 Imported Fill Materials 30
3.3.3 Site Preparation 30
3.3.4 Placement and Compaction of Fill 31
3.4 Pavements 31
3.5 Other Considerations 32
3.5.1 Excavatability 32
3.5.2 Cuts and Batters 32
3.5.3 Stormwater Drainage 33
4 References 33
5 Limitations 34

Tables

Table 1: Summary of Subsurface Profile at borehole GH100

Table 2: Summary of Ground Conditions (General Ground Profile beneath the Site)

Table 3: Thermal Resistivity Test Results

Table 4: Summary of Unconsolidated Undrained Triaxial (UU) Laboratory Test Results

Table 5: Summary of permeability tests – Constant head (triaxial method)

Table 6: Summary of Geotechnical Testing

Table 7: Summary of Chemical Aggressiveness Testing

Table 8: ASS Field Screening and Laboratory Test Results

Table 9: ASS Field Screen Results as indicators of AASS and PASS

Table 10: EPA Guidelines - Criteria for Acid Sulfate Soil Material

Table 11: Preliminary Geotechnical Design Parameters

Table 12: UBC for Suitable Founding Stratum

Table 13: Initial Pile Design Parameters for 600 mm Diameter Piles

Table 14: Earth Pressure Coefficients for Basement Retention Design

Table 15: Extract from DIT Specification: Part R10 – Material Classification

Table 16: Summary of CBR Testing and Estimated Values

Figures

Figure 1: BAM Project Site Location

Figure 2: Extract from 1:1000k Geology Map of Adelaide (Sheet 6628)

Figure 3: Extract from The Earthquake Hazard Zones of South Australia Map, 2012

Figure 4: Extract from GA Portal Acid Sulfate Soils Map Layer

Figure 5: Site Photographs

Appendices

Appendix 1: Geotechnical Investigation Location Plan

Appendix 2: Geotechnical Logs

Appendix 3: Soil Profile Cross Section

Appendix 4: Laboratory Test Certificates - Geotechnical

Appendix 5: Laboratory Test Certificates - Geochemical

ENGEO Document Control:

Report Title	Geotechnical Investigation - Factual and Interpretative Report - Bolivar, South Australia			
Project No.	20651.000.001	**Doc ID**	03	
Client	Renascor Resources Limited	**Client Contact**	William Tregenza	
Distribution (PDF)	1 e-copy Renascor Resources Limited, 1 e-copy ENGEO			
Date	**Revision Details/Status**	**Author**	**Reviewer**	**WP**
03/02/2023	Issued to Client	RAM/HA	SF/TK	JT

1 Introduction

1.1 Background

ENGEO Australia Pty Ltd (ENGEO) was engaged by Renascor Resources Limited (Renascor) to undertake desktop and intrusive geotechnical investigation - factual and interpretative reporting for their Battery Anode Materials (BAM) Project, which involves the development of an Uncoated, Purified Spherical Graphite (UPSG) processing facility, to supply the lithium -ion battery market.

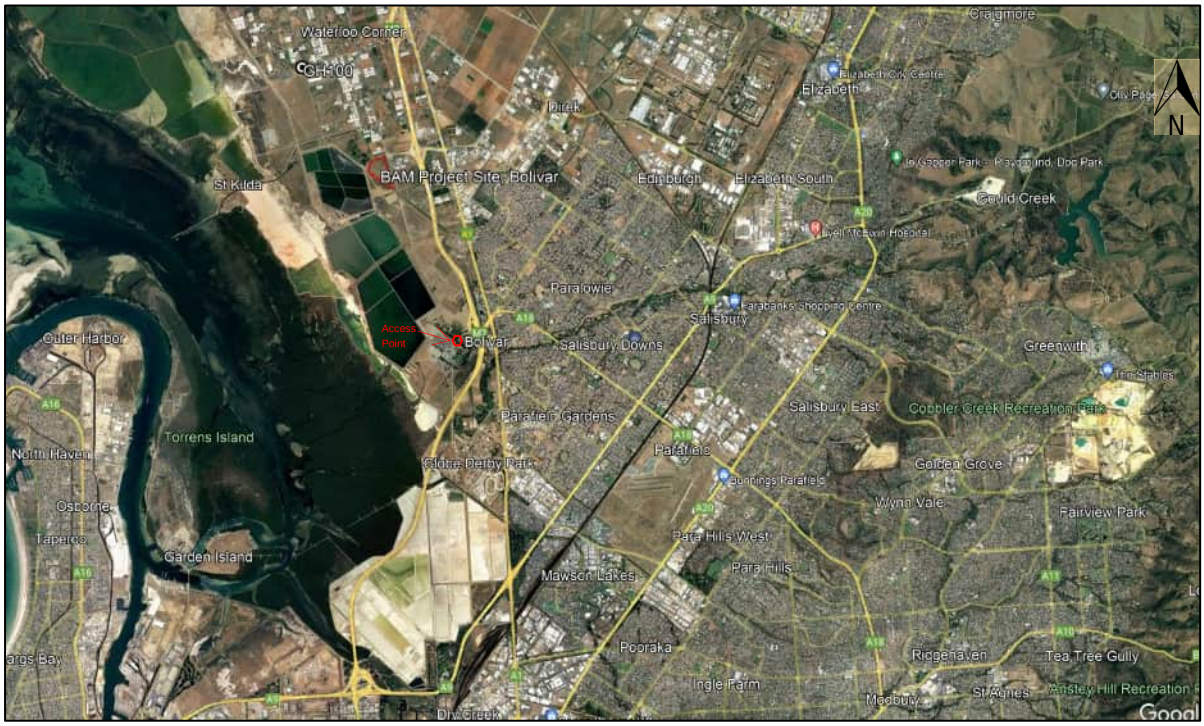
This work has been carried out in general accordance with the provided scope briefing document, (Specification / Scope: Geotechnical Investigation and Reporting, Reference: 12813 3517714:P:rs Revision B, dated June 2022), as prepared by GR Engineering Services (GRES), and with our signed agreement with Renascor, (Ref: P2022.001.446_01), dated 1 July 2022. The work reported presented herein represents the combined Site Investigation Factual Report (Section 2), and Geotechnical Interpretive Report (Section 3).

1.2 Project location details

The BAM Project, UPSG plant and associated infrastructure is proposed to be located at Robinson Rd, Bolivar, South Australia, herein referred to as 'the site', approximately 20 km north of Adelaide, (refer to Figure 1).

Access to the site is currently controlled by SA Water, who operate the adjacent Bolivar Waste-Water Treatment Plant, (WWTP). Site access for the investigative works was gained through the WWTP front gate located approximately 3.3 km south of the Project Site Area. The Site and access point are shown on Figure 1 below.

Figure 1: BAM Project Site Location



Source: Google Earth imagery, (2022)

1.3 Geotechnical Scope of Works (SOW)

Based on the information provided in the scope briefing document, the geotechnical scope of works (SOW) comprises two phases as follows:

- Phase 1 – Geotechnical site investigation and materials testing, including:
  - Desktop study, involving review of relevant and available reports, geological maps, information and datasets relevant to the geology, soil quality and embankment design(s) at the Project site.
  - Intrusive (subsurface) test pitting, borehole(s) and associated *in situ* and laboratory testing.
  - Preparation of a Geotechnical Factual Report including the outcomes of the site investigation and materials testing.
- Phase 2 – Geotechnical Evaluation and Interpretative Report, including:
  - Provision of geotechnical design parameters and recommendations for both shallow and deep foundations (as applicable), retaining structures, and bulk earthworks (BEW), including safe batter slopes, allowable bearing pressures and recommendations on use / reuse of on-site materials for construction.

Please note again, this report represents a combined factual and interpretive geotechnical report.

2 Phase 1: Desktop Study, Site Investigation and Factual Reporting

The provided scope briefing outlined the key areas of investigation and proposed the required geotechnical investigations to be undertaken for the infrastructure elements associated with each of those key areas. The various key areas of investigation the following:

- UPSG Processing Plant.
- Purification Area.
- Water Treatment Facilities.
- Associated Non-processing Infrastructure.
- Access Roads.
- Site Drainage Ponds.
- Electrical HV Switchyard.
- Available extractable site materials suitable for structural fill.

Preliminary proposed site investigation locations were provided in Appendix B of the scope briefing document.

Investigation methods, scale and indicative depths were provided in Section 3.4 of the scope briefing document.

In general, wherever possible ENGEO have undertaken investigative works in accordance with what was proposed within the scope briefing. The outcomes and findings of these investigations are presented in this Section 2 of the combined factual and interpretive geotechnical report.

2.1 Geotechnical Desktop Study

2.1.1 Published Geology

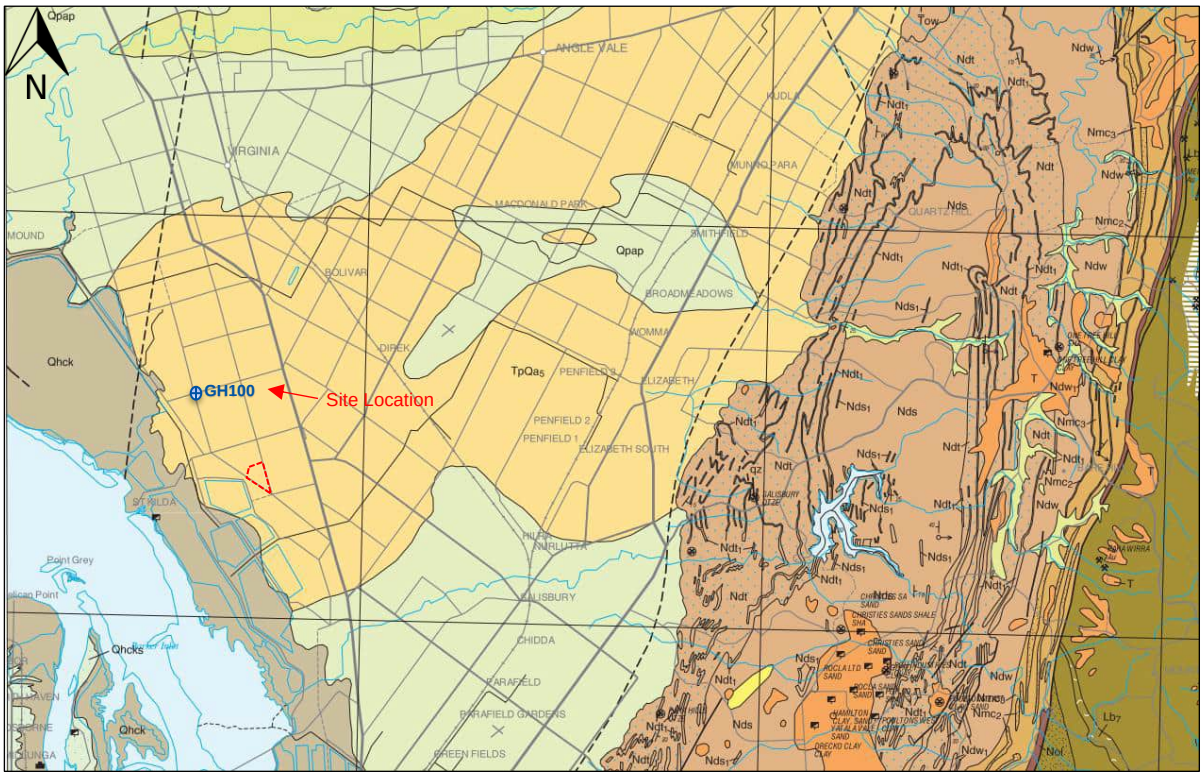
A review of the 1:100,000 Geology Map of Adelaide (Sheet 6628), 2012 published by the Department for Industry, Trade, Resources and Energy indicates that the site is underlain by Pliocene-Pleistocene Alluvial / Fluvial Unit 5 ($TpQa_5$): Hindmarsh Clay, Carisbrooke Sand, Ochre Cove Formation.

The Hindmarsh Clay is described in the Geoscience Australia Stratigraphic Units Database as, “Unconsolidated to semi-consolidated, mottled, mainly red-brown clay and sandy clay with granules and gravels; massive, unsorted alluvial-fan breccia”, (Sheard and Bowman).

The nearest mapped geological boundary is with the Holocene age St Kilda Formation (Qhck), which is located approximately 1.25 km west of the site, (proximal to the St Kilda Tramway Museum). The St Kilda Formation is described as, “Coastal marine sediment: Calcareous, fossiliferous sand and mud of intertidal sand flats, beaches and tidal marshes; organic, gypseous clay of supratidal flats.”

Figure 2 presents an extract from the published 1:100,00 scale geological map.

Figure 2: Extract from 1:1000k Geology Map of Adelaide (Sheet 6628)



Department for Industry, Trade, Resources and Energy, (2012)

2.1.2 Existing Engineering / Geological Boreholes

Review of the online mapping available via the Geoscience Australia Portal (GA Portal), (https://portal.ga.gov.au) indicates there is a relatively nearby borehole GH100, (located approximately 2.5 km northwest of the site), drilled to approximately 10m depth, for engineering purposes, (location indicated on above Figure 2).

The Department of Mines and Energy South Australia, '*Soils, Stratigraphy and Engineering Geology of Near Surface Materials of the Adelaide Plains',* Volumes 94-99 of Report Book 1996, provides a log that describes the subsurface profile encountered in borehole GH100. The GH100 borehole log is summarised in the following Table 1.

Table 1: Summary of Subsurface Profile at borehole GH100

Depth (m BGL)	Material (Generalised)	Geological Unit
0.0 to 0.30	Silty SAND / Loamy SAND, moderate brown	Undifferentiated Quaternary Sediments (Qa) / Red-brown Earth Soil (RB7), developed in estuarine deposits (EMS) of the St Kilda Formation (Qhck)
0.30 to 1.20	Sandy CLAY / Silty CLAY, low to medium plasticity, pale orange-yellow to moderate brown	
1.20 to 2.00	Clayey GRAVEL / Gravelly CLAY, rubbly calcreted clay, pale grey-brown	Glanville Formation (Qpcg)
2.00 to 3.80	Sandy CLAY / Silty CLAY, low to medium Plasticity, carbonate impregnated clays, nodular	
3.80 to 7.00	CLAY, medium to high plasticity, grey-brown to yellow-brown	Hindmarsh Clay Formation (TpQa5)
7.00 to 7.40	Clayey SAND / SAND, grey-brown and yellow-brown, water bearing	
7.00 to 9.80 (EOH)	CLAY, medium to high plasticity, grey-brown and yellow-brown	

Note: Groundwater was encountered at 4.3 m BGL (below ground level) in GH100, and the sandy lens encountered in the Hindmarsh Clay Formation between 7.00 m and 7.40 m BGL was water bearing.

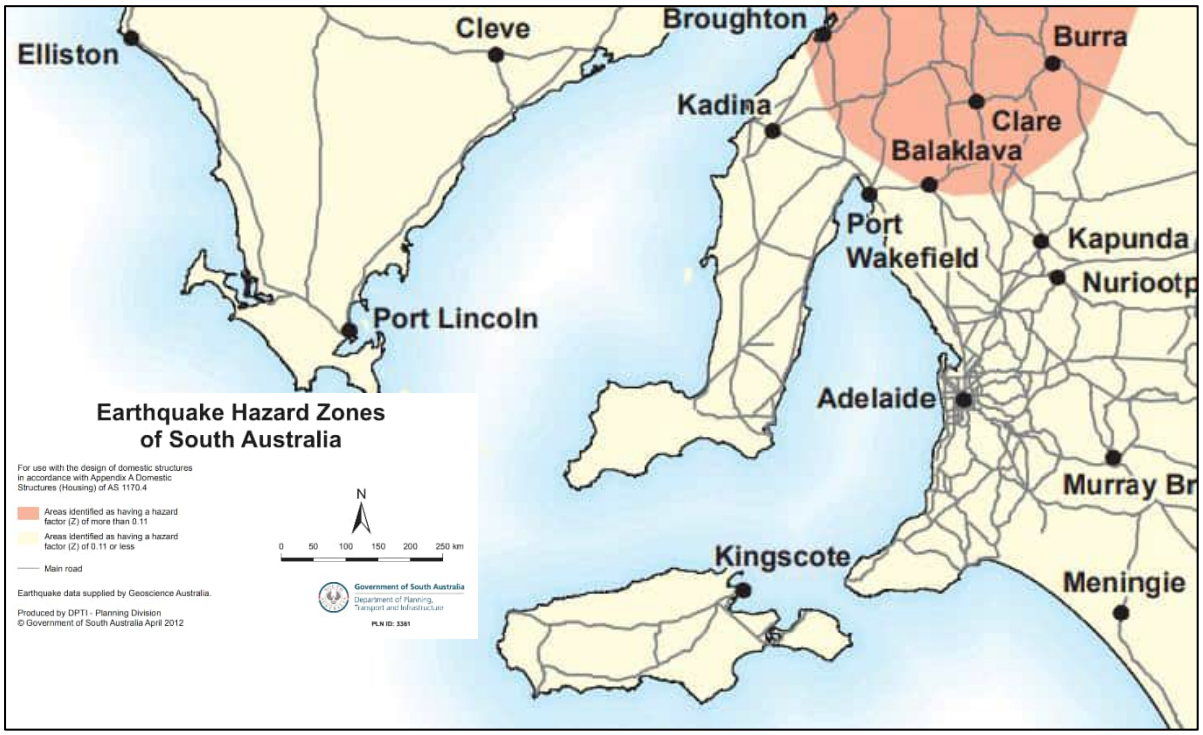
2.1.3 Geohazards Hazards

Earthquake Hazard Factor

The Earthquake Hazard Map of Australia is a critical input to Australian Standard AS1170.4, "Structural design actions Part 4: Earthquake actions in Australia" which outlines actions for seismic design, The Standard, as prepared by Standards Australia. This standard sets out procedures for determining earthquake actions and detailing requirements for structures and components to be used in the design of structures. It also includes requirements for domestic structures. The earthquake actions requiring consideration are based on the level of ground shaking for a given location, as represented on the current earthquake hazard map. The ground shaking is expressed as a hazard factor which is equal to the effective peak ground acceleration (PGA) with an exceedance probability of 1 in 500 years.

The Earthquake Hazard Zones of South Australia map produced by DPTI, 2012 indicates the project area is located within an area identified as having a hazard factor (z) of 0.11 or less. Figure 3 provides an extract of the relevant earthquake hazard zones map.

Figure 3: Extract from The Earthquake Hazard Zones of South Australia Map, 2012



South Australian Department for infrastructure and Transport, 2012.

Other Geohazards

Other geohazards include historical and / or active mine workings or associated features, and landslides. Interrogation of the GA Portal online mapping shows there are no known active or historical mine working in the immediate or nearby project site area, nor is there any landslide risk perceived to the project.

2.1.4 Hydrogeology

The GA Portal online mapping indicates the occurrence of several nearby water wells. However, no borehole logs or subsurface profile were able to be access for existing water wells.

From the Geoscience Australia hydrogeology dataset, potential groundwaters beneath the site are described as “Porous, extensive highly productive aquifers”.

2.1.5 Published Soils Information (Acid Sulfate Soils and Australian Soils Classification)

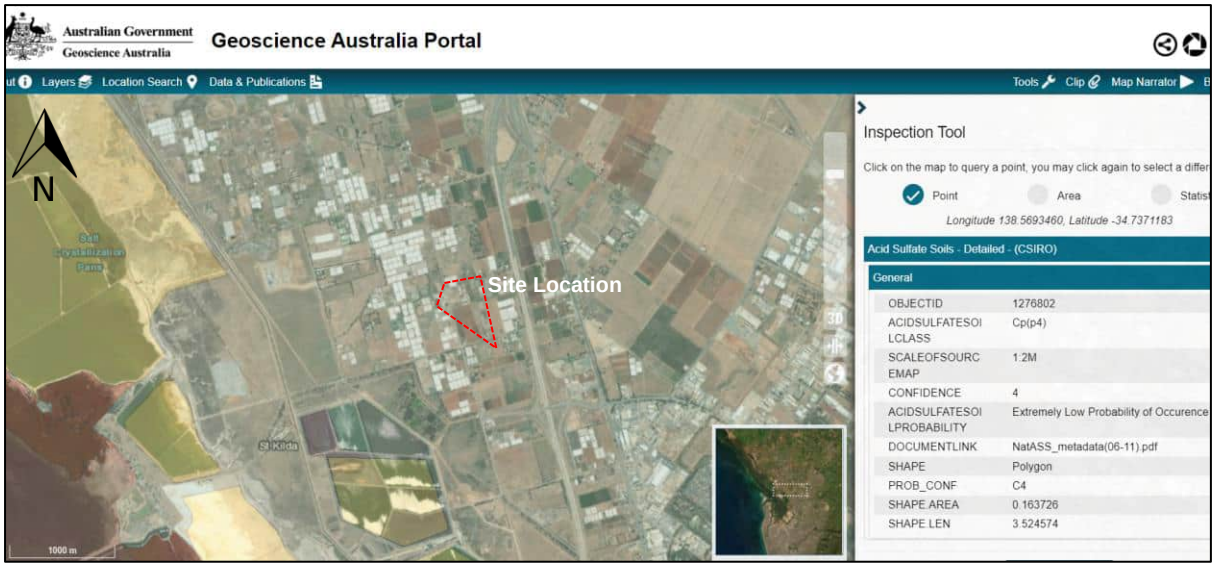
Acid Sulfate Soils (ASS)

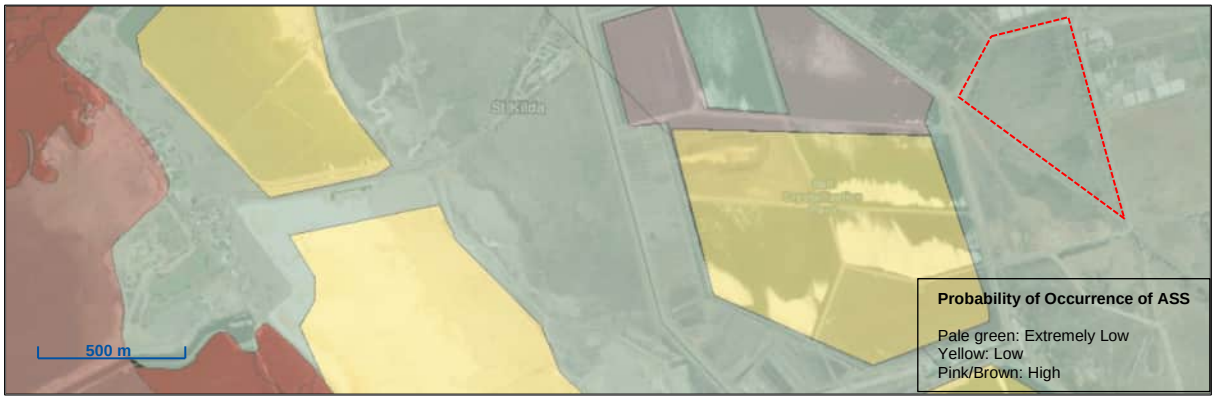
Interrogation of the GA Portal, Acid Sulfate Soils – Detailed – (CSIRO) layer indicates the site is mapped as having an “Extremely Low Probability of Occurrence” of ASS.

Notably, the adjacent site to the west is mapped as having a “High Probability of Occurrence” of ASS.

Figure 4 below provides an extract of the published ASS mapping available on the GA Portal. The CSIRO ASS mapping is also publicly available through the ASRIS – Digital Atlas of Australian Soils at www.asris.csiro.au.

Figure 4: Extract from GA Portal Acid Sulfate Soils Map Layer





Australian Soils Classification (ASC)

Interrogation of the GA Portal, Australian Soils Classification (ASC) layer indicates the site is mapped as containing Calcarosols (CA), which are defined under the CSIRO Australian Soils Classification Scheme, as quoted below:

- "Are either calcareous throughout the solum - or calcareous at least directly below the A1 or Ap horizon, or within a depth of 0.2 m (whichever is shallower). Carbonate accumulations must be judged to be pedogenic (The carbonate is a result of soil-forming processes, in contrast to fragments of calcareous rock such as limestone), i.e., are a result of soil forming processes *in situ* (either current or relict). Soils dominated by non-pedogenic calcareous materials such as fragments of limestone or shells are excluded".

- "Do not have deep sandy profiles that have a *field texture* of sand, loamy sand or clayey sand in 80% or more of the upper 1.0 m".

2.2 Geotechnical Site Investigation

2.2.1 Site Description

At the time of site investigations, the project area was described as relatively flat and moderately well vegetated with grasses, shrubs and small trees, with areas of more dense vegetation and medium sized trees located in the northeast and southeast portions of the site. The south-eastern portion of the site was relatively boggy. Elevations across the site varied between approximately 5 m and 6 m AHD.

A stock fence ran approximately parallel to Robinson Rd, separating the eastern portion of the site. A swale drain was situated on the northern site boundary. SA Waters wastewater lagoons were located generally to the west of the site. A known aboriginal heritage site is located within the north-eastern corner of the site.

The site geotechnical investigation location plan is attached in Appendix 1 of this report. Photographs depicting general site conditions are presented in Figure 5.

Figure 5: Site Photographs

Photo 1: General Site Conditions – view across site looking east.

Photo 2: Boggy Southeast portion of the site.

Photo 3: Northeast portion of the site.

Photo 4: Excavator setting up at TP06.

2.2.2 Intrusive Investigations

Site works for this geotechnical investigation were undertaken in two stages:

- Stage 1 was undertaken on 10/08/2022, and comprised:
    - Excavation of eleven (11) test pits (TP01-TP06, TP17-TP19, and TP21-TP22).
- Stage 2 was undertaken between 14/11/2022 and 25/11/2011, and comprised:
    - Excavation of thirteen (13) test pits (TP07-TP17, TP20, TP23 and TP25).
        - TP24 was not excavated due to cultural heritage permit requirements that restricted access to north-eastern portion of the site.
    - Drilling of four (4) geotechnical boreholes that were drilled to a target depth of 25.0 m bgl.
    - Electrical Resistivity Testing (ERT) within the northwest section of the site, and Thermal Resistivity Testing (TRT) at one test pit location (TP05).

All investigation locations were recorded using a hand-held GPS and the indicative test pit locations are shown on the Geotechnical Investigation Location Plan presented as Appendix 1.

All logging of intrusive subsurface investigations was carried out in accordance with AS1726:2017 Geotechnical site investigations. The test pit and borehole logs are included in Appendix 2. An explanatory note applicable to the terms, symbols and abbreviations used on the logs is included in Appendix 4. A glossary of terms applicable to aspects of this report pertaining to sampling and testing for Acid Sulfate Soils is included in Appendix 5.

Test Pit Methodology

The total twenty-four (24) test pits were excavated to depths BGL ranging from to 1.00 m (TP07) to 3.00 m BGL (TP09), using an 8 - tonne excavator, with a 450 mm toothed bucket.

Disturbed samples of all encountered materials were taken to enable visual and tactile assessment, and to enable laboratory testing wherever required or deemed appropriate.

Photographs of all test pit excavations were taken and are displayed shown on the logs.

In situ testing associated with the test pits comprised Dynamic Cone Penetration (DCP) testing, undertaken adjacent to each test pit locations to depths BGL ranging from 0.6 m (TP16) to 3.0 m (TP02). DCP profiles are shown on the Test Pit Logs in Appendix 2.

Practical refusal was encountered in all the test pits due to the presence of a shallow groundwater table.

For all the test pit excavations, the topsoil was separated from the balance of the spoil, so as to be placed back on top after backfilling, to meet the pre-existing ground surface conditions and levels. All the test pits were backfilled with excavated spoil in compacted layers. This was achieved by tamping with the bucket and rolling with the excavator tracks.

Boreholes Methodology

The total four (4) boreholes were drilled using a truck mounted Mark 5 Investigator drill rig, utilising hollow flight auger and split spoon sampling techniques, all to a target depth BGL of 25 m.

Standard Penetration Testing (SPTs) was undertaken at 1.5 m intervals down hole in all the boreholes. Two (2) undisturbed samples (U50s) were undertaken at selected boreholes/depth as reported in the borehole logs.

Pocket Penetrometer testing was undertaken on samples of excavated materials at regular intervals.

All the boreholes were backfilled with excavated spoil and sealed with a bentonite and grout plug to meet the pre-existing ground surface conditions and prevent surface water ingress.

Electrical and Thermal Resistivity Testing

Electrical Resistivity Testing (ERT) was undertaken at one discrete location nominated by Renascor and *in situ* Thermal Resistivity Testing (TRT) was undertaken at select intervals in TP08 using a TLS-100 Thermal resistivity / conductivity meter, the result is documented in Appendix 2.

2.2.3 Summary of Ground Conditions

The materials encountered in the test pits and boreholes were generally consistent with the published geological mapping and are summarised in Table 2 below.

Table 2: Summary of Ground Conditions (General Ground Profile beneath the Site)

Typical Depth (1) (m bgl)	Material Description(Generalised) (2)	Indicative Strength	Inferred Geological Unit
GL to 0.20	TOPSOIL: Silty SAND.	-	Topsoil
0.20 to 0.70/2.00 (EOH)	Sandy CLAY, low to medium plasticity, pale orange-brown, with lenses of Clayey SAND (3), fine to coarse grained.	Firm to Stiff	Undifferentiated Quaternary Alluvium
0.70/2.00 (4) to 2.00	Clayey GRAVEL / Gravelly CLAY, pale grey-brown, fine to coarse grained, rounded, calcareous, low plasticity clay.	Dense / Stiff	Glanville Formation
2.00 to 3.40/4.00	Sandy CLAY / CLAY, low to medium plasticity, fine to coarse grained sand, with variable proportions of calcareous gravel (calcrete).	Stiff to Very Stiff	Glanville Formation
3.40/4.00 to 5.50/7.80	Sandy CLAY / CLAY, medium to high plasticity, orange-brown mottled grey, with variable proportions of sand and gravel.	Very Stiff to Hard	Hindmarsh Clay Formation
5.50/7.80 to 6.50/11.50	Clayey SAND / SAND / Gravelly SAND, fine to coarse grained sand, grey and orange-brown, fine to coarse grained sub-rounded gravel, low plasticity clay.	Medium Dense	
6.50/11.50 to 19.20/25.00 (5)	CLAY / Sandy CLAY, medium to high plasticity, orange-brown and red mottled grey, with variable proportions of sand and gravel.	Hard	

Typical Depth [1] (m bgl)	Material Description(Generalised) [2]	Indicative Strength	Inferred Geological Unit
19.20/21.70 to 25.00 [6]	SAND / Clayey SAND, fine to coarse grained sand, grey-brown, fine to coarse grained, sub-rounded gravel.	Medium Dense to Dense	Carisbrooke Sand Formation

Notes:

1. Depth below ground surface level (bgl).
2. Reference should be made to individual borehole and test pit logs presented in Appendix 2.
3. Only encountered in TP17.
4. Only encountered in TP03, TP04, TP06, TP07 and TP09.
5. BH03 terminated at a target depth within the Hindmarsh Clay Formation.
6. End of Hole (EOH) at a target depth of 25.0 m bgl.

2.2.4 Groundwater

Groundwater was encountered in all the test pits at depths ranging between 0.60 m (TP13) and 1.80 m BGL (TP19 and TP21).

Additionally, the groundwater was encountered in the borehole locations at depths ranging from 1.50 m (BH01 and BH04) to 2.50 (BH02).

It should be noted that groundwater levels are likely subject to tidal and seasonal variations.

2.3 Laboratory Testing

Laboratory testing was undertaken under the following categories detailed in Sections 2.3.1 and 2.3.2. All Geotechnical and Geochemical certified laboratory test reports are included in Appendix 4 and Appendix 5, respectively.

2.3.1 Geotechnical Laboratory Testing

Geotechnical laboratory testing of selected samples recovered from the borehole investigation was undertaken at SMS Geotechnical Pty Ltd's National Association of Testing Authorities (NATA) accredited laboratory. Testing was generally carried out in accordance with the methods set out in AS 1289-2000 Method of testing soils for engineering purposes, or the relevant American Society for Testing and Materials (ASTM international) Standards.

The following geotechnical laboratory testing was undertaken, (quantities and methods as indicated):

- 1 – Thermal Resistivity with dry back curve (ASTM D5334).
- 2 – Unconsolidated Undrained (UU) tri-axial tests (1289.6.4.2).
- 3 – Remoulded Permeability Tests (AS 1289.6.7.3).
- 15 – Particle Size Distribution (AS1289.3.6.1).
- 15 – Atterberg Limits (AS1289.3.1.2, 3.2.1, 3.3.1, 3.4.1).
- 5 – California Bearing Ratio (CBR) test including modified compaction (AS1289.6.1.1).

- 15 – Standard Compaction Test (AS1289.5.1.1).

The following tables provide a summary of geotechnical test results.

The thermal resistivity results have been summarised in Table 3 below.

Table 3: Thermal Resistivity Test Results

Moisture Content (%)	Compacted Dry Density (t/m^3)	Thermal Conductivity (W/mK)	Thermal Resistivity (mK/W)
0.0	1.73	0.58	1.70
3.4	1.73	0.81	1.24
10.1	1.73	1.05	0.95
16.7	1.73	1.42	0.71

The UU tri-axial and permeability tests are summarised in Tables 4 and 5 below.

Table 4: Summary of Unconsolidated Undrained Triaxial (UU) Laboratory Test Results

Sample ID	Sample Depth (m)	Soil Type	c (kPa)	Φ' (°)
BH01	13.0 to 13.5	Silty CLAY, Medium plasticity	289	-
BH03	14.5 to 15.0	Silty CLAY, Medium plasticity	308	-

Note: c – Undrained Cohesion, Φ' - Effective Friction

Table 5: Summary of permeability tests – Constant head (triaxial method)

Sample [1] (ID)	Sample Depth (m bgl)	Soil Type	Standard Maximum Dry Density (t/m^3)	Optimum Moisture Content (%)	Permeability [2] (m/sec)
TP09	0.8 to 1.2	CLAY, Medium plasticity	1.72	18.5	1.0×10^{-10}
TP12	0.6 to 0.9	CLAY, Medium plasticity	1.73	18.0	3.0×10^{-10}
TP13	0.2 to 0.6	Silty CLAY, Medium plasticity	1.64	21.2	7.0×10^{-10}

Notes:

1. Remoulded samples to a target of 98% SMDD @ OMC

The remainder of the geotechnical testing is summarised in Table 6 below as follows.

Table 6: Summary of Geotechnical Testing

Borehole (ID)	Sample Depth (m bgl)	Soil Type	Moisture Content (%)	Atterberg Limits (%)				Particle Size Distribution (% Passing)			Standard Compaction		Modified Compaction		4-Day Soaked CBR (%)
				LL	PL	PI	LS	19 mm	2.36 mm	0.075 mm	MDD (t/m^3)	OMC (%)	MDD (t/m^3)	OMC (%)	
TP01	0.20 to 0.50	Sandy CLAY	13.3	-	-	-	-	-		-	-	-	1.86	13.0	14
TP01	1.70 to 1.90	Sandy CLAY	22.5	23	15	8	1.0	100	98	49	-	-	-	-	-
BH01	5.50 to 5.95	CLAY	15.4	32	18	14	7.0	98	97	77	-	-	-	-	-
TP02	0.20 to 0.50	Sandy CLAY	20.3	-	-	-	-	-		-	1.68	19.5	-	-	-
TP02	1.60 to 1.90	Sandy CLAY	12.3	25	13	12	4.0	100	99	47	-	-	-	-	-
BH02	11.50 to 11.95	CLAY	16.8	45	18	27	11.5	100	89	70	-	-	-	-	-
TP03	0.20 to 0.50	Sandy CLAY	23.1	-	-	-	-	-		-	1.68	20.0	-	-	-
BH03	2.50 to 2.95	Sandy CLAY	18.6	26	15	11	6.0	100	89	50	-	-	-	-	-
BH03	7.00 to 7.45	SAND	13.3	22	17	5	2.5	94	78	12	-	-	-	-	-
TP04	0.80 to 1.10	Sandy CLAY	12.8	-	-	-	-	-		-	-	-	1.82	13.0	9
BH04	17.50 to 17.95	Sandy CLAY	16.5	31	17	14	7.5	100	100	67	-	-	-	-	-
TP05	0.20 to 0.50	Sandy CLAY	21.8	-	-	-	-	-	-	-	1.76	17.0	-	-	-

Borehole (ID)	Sample Depth (m bgl)	Soil Type	Moisture Content (%)	Atterberg Limits (%)				Particle Size Distribution (% Passing)			Standard Compaction		Modified Compaction		4-Day Soaked CBR (%)
				LL	PL	PI	LS	19 mm	2.36 mm	0.075 mm	MDD (t/m^3)	OMC (%)	MDD (t/m^3)	OMC (%)	
TP05	1.70 to 2.00	Sandy CLAY	26.3	-	-	-	-	-		-	1.85	14.0	-	-	-
TP06	0.20 to 0.50	Sandy CLAY	21.3	36	18	18	9.0	92	75	44	-	-	-	-	-
TP06	0.70 to 1.00	Gravelly CLAY	19.8	30	14	16	7.0	90	64	36	1.83	15.0	-	-	-
TP08	0.30 to 0.60	Sandy CLAY	-	-	-	-	-	-	-	-	-	-	1.65	18.5	-
TP09	0.80 to 1.20	Sandy CLAY	-	-	-	-	-	-	-	-	-	-	1.72	18.5	-
TP12	0.60 to 0.90	Sandy CLAY	-	36	15	21	11.5	100	99	55	-	-	-	-	-
TP13	0.20 to 0.60	Sandy CLAY	-	-	-	-	-	-	-	-	-	-	1.64	21.0	-
TP15	0.20 to 0.60	CLAY	23.6	37	16	21	9.0	98	81	56	-	-	1.90	12.0	20
TP16	0.20 to 0.60	Sandy CLAY	-	-	-	-	-	-	-	-	-	-	1.65	21.0	-
TP17	0.10 to 14.00	Sandy CLAY	17.5	-	-	-	-	-		-	1.82	13.5	-	-	-
TP17	1.70 to 1.90	Clayey SAND	18.8	20	16	4	0.5	100	98	27	-	-	-	-	-
TP18	0.20 to 0.50	Sandy CLAY	14.6	-	-	-	-	-	-	-	-	-	1.87	14.0	12
TP20	1.00 to 1.50	Sandy CLAY	-	-	-	-	-	-	-	-	-	-	1.71	18.0	-

Borehole (ID)	Sample Depth (m bgl)	Soil Type	Moisture Content (%)	Atterberg Limits (%)				Particle Size Distribution (% Passing)			Standard Compaction		Modified Compaction		4-Day Soaked CBR (%)
				LL	PL	PI	LS	19 mm	2.36 mm	0.075 mm	MDD (t/m^3)	OMC (%)	MDD (t/m^3)	OMC (%)	
TP21	0.20 to 0.50	Sandy CLAY	18.5	35	14	21	9.0	94	84	43	1.75	14.0	-	-	-
TP21	1.80 to 2.00	Sandy CLAY	28.6	34	16	18	8.5	100	100	84	-	-	-	-	-
TP23	0.20 to 0.50	Sandy CLAY	21.8	27	15	12	5.0	93	89	43	-	-	2.00	10.5	20

Notes:

"-"not tested

LL – Liquid Limit

PL – Plastic Limit

PI – Plasticity Index

LS – Linear Shrinkage

MDD – Maximum Dry Density

OMC – Optimum Moisture Content Refer to the 'Glossary of Terms Specific to this Report' included in Appendix 4 of this report.

2.3.2 Geochemical Laboratory Testing

The soil geochemistry of selected samples recovered from the borehole investigation was also assessed by analyses conducted at the Eurofins Environmental Testing Australia Pty Ltd, NATA accredited laboratory, quantities and purposes as follows:

- 5 – Chemical aggressiveness tests to assess exposure classification (pH, chloride, sulphate, and resistivity).
- 5 – Qualitative field screenings and quantitative testing to assess the presence / absence of any Actual or Potential Acid Sulfate Soils, (pH_F, pH_{FOX}, SPOCAS).

Chemical Aggressiveness Testing - AS2159 and AS3600

Soils that exhibit low pH values or high concentrations of Sulfate and chloride have the capacity to affect the durability of in-ground structures and services. Section 6 of AS2159-2009 'Piling – Design and Installation' provides information on exposure classification for concrete and steel piles and Section 6 of AS3600 'Concrete structures'.

Table 7 provides a summary of chemical aggressiveness test results. Laboratory test certificates from Eurofins for the laboratory testing are provided in Appendix 5.

Table 7: Summary of Chemical Aggressiveness Testing

Borehole ID	Sample Depth (m bgl)	pH (pH unit)	Sulfate as SO_4^{-2} (mg/kg)	Chloride (mg/kg)	Resistivity (Ω.cm)
BH01	0.70 to 0.80	8.1	420	1100	380
BH01	1.50 to 1.60	7.3	720	2100	870
BH02	2.10 to 2.20	8.0	1600	4600	480
BH03	11.60 to 11.70	7.5	640	1200	1600
BH04	4.80 to 4.90	8.6	680	1600	1200

Guidance on exposure classifications is provided below:

- For concrete and steel piles founded above groundwater (i.e., soil conditions B – AS2159): Mild to Moderate.
- For concrete and steel piles founded in groundwater (i.e., soil conditions B – AS2159): Moderate to Severe.
- For concrete footings (e.g., shallow footings) in contact with the ground, reference has been made to Tables 4.3 and 4.8.1 of AS 3600 and an exposure classification of A2 to B1 is recommended.

Acid Sulfate Soils Testing

Acid Sulfate Soils (ASS) are present in coastal areas of South Australia and can create both environmental and structural durability issues if disturbed and exposed to the atmosphere during earthworks. Coastal / Lowland ASS are associated with areas below RL 5 m (AHD), and particularly with Holocene age estuarine deposits.

Given the proximity of the project site to mapped "High Probability of Occurrence" areas of ASS, and the nearby occurrence of Holocene age Estuarine deposits (the Saint Kilda Formation), mapped approximately 1.5 km to the west, and the low-lying topography, we have undertaken a preliminary assessment of assess whether any Actual or Potential Acid Sulfate Soils (AASS or PASS) are likely present at the site. Laboratory testing to inform this assessment comprised both indicative, qualitative field screening tests and more definitive, quantitative testing, performed on samples for five (5) test locations across the site.

The results of laboratory ASS testing are presented in Table 8 below.

Table 8: ASS Field Screening and Laboratory Test Results

	Sample ID	TP04-ASS1	TP08-ASS2	TP20-ASS3	TP12-ASS4	TP11-ASS5
Indicative (qualitative) screening tests	Depth (m bgl)	0.10 to 0.20	0.40 to 0.50	1.50 to 1.60	1.80 to 1.90	0.80 to 0.90
	pH_F	7.1	9.2	9.2	8.8	9.7
	pH_{FOX}	3.7	9.3	9.5	8.8	9.9
	Δ pH	3.4	0.1	0.3	0	0.2
	Reaction Rate	Extreme	Extreme	Extreme	Extreme	Extreme
Definitive (quantitative) ASS tests	Retained Acidity (S-NAS) (Mol H+/t)	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	Acid Neutralising Capacity (ANCbt) (Mol H+/t)	< 2.0	7700	810	89	3600
	Net Acidity (Including ANC) (Mol H+/t)	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
	% Oxidisable sulphur	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

Refer to the 'Glossary of Terms Specific to this Report' included in Appendix 5 of this report.

The Laboratory sample receipt, Chain of Custody (CoC) and Certificate of Analysis (CoA) for the tests are included in Appendix 5.

2.3.3 Interpretation of ASS Field Screening and Laboratory Results

The following shows the ASS Field Screening Test result criteria, or indicators of AASS and PASS materials, as published in the National Acid Sulfate Soils Guidance: National acid sulfate soils sampling and identification methods manual, Table 5.1, Indicators of ASS materials.

Table 9: ASS Field Screen Results as indicators of AASS and PASS

Soil Type	Field Screening Indicators
AASS	$pH_F < 4$
PASS	$pH_F > 4$ and commonly neutral
	$pH_{FOX} < 4$,
	large unit change from pH_F to pH_{FOX}, (i.e., $\Delta pH > 1$), together with a vigorous or volcanic reaction to peroxide

Note: When soil $pH_F > 4$ but < 5.5 this may indicate some existing acidity (acidic soil) and other indicators should be used to confirm presence or absence of ASS.

Field Screening criteria shown in Table 9 above are applied to the Field Screening results presented in Table 8, then **none** of the tested samples are indicative of AASS. Note also that none of the other characteristics (visual, tactile and olfactory) listed in the National Acid Sulfate Soils Guidance: National acid sulfate soils sampling and identification methods manual, Table 5.1 were evident on-site.

The Field Screening results from only one sample tested, (TP04 0.1-0.2 m), meet the pH_F and pH_{FOX} criteria indicative of PASS. Notably, this sample from location TP04 (0.1-0.2 m) was the uppermost sample taken from the site, and as such was representative of higher - level materials across the site.

The following Table 10 shows the Net Acidity criteria as published in the EPA Guidelines (SA) Site contamination - acid sulfate soil materials, Appendix C – Criteria for Acid Sulfate Soil Material.

Table 10: EPA Guidelines - Criteria for Acid Sulfate Soil Material

Soil or Sediment Texture	Criteria	
	Sulphur trail % oxidisable sulphur (oven dried basis)	Acid trail mol H+/tonne (oven dried basis)
Sands to loamy sands	0.03	18
Sandy loams to light clays	0.06	36
Medium to heavy clays and silty clays	0.10	62

Interpreted in accordance with Appendix C of the EPA Guidelines, the results of the five samples were not indicative of the presence of ASS. Given the Acid Neutralising Capacity of the material present on-site, owing the presence of calcareous material (i.e. gravel and portions of the Glanville Formation), we consider the risk negligible of encountering acid Sulfate soils in natural soils at the site and an acid Sulfate soil management plan will not be required.

3 Phase 2: Evaluation and Interpretive Reporting

General recommendations relating to geotechnical aspects of the site and analysis of the laboratory testing are presented in the following sections. This is based on our understanding that the proposed development at the site comprises the construction of a UPSG Processing Plant, Purification Area, Water Treatment Facilities, Associated Non-processing Infrastructure, Retaining Structures, Access Roads, Site Drainage Pond, and an Electrical HV Switchyard.

3.1 Geotechnical Design Parameters

Preliminary geotechnical design parameters for a generalised sub-surface profile are presented in Table 11 below.

Table 11: Preliminary Geotechnical Design Parameters

Material Type(1) (Consistency / Density)	Typical Layer Depth Interval(1) (m)	Bulk Unit Weight γ (kN/m³)	Undrained Shear Strength Su (kPa)	Effective Friction Angle Φ' (°)	Effective Cohesion c' (kPa)	Poisson's Ratio		Young's Modulus (MPa)	
						Short Term V_u	Long Term v'	Short Term E_u	Long Term E'
TOPSOIL: Silty SAND	GL to 0.20	16	-(2)	-	-	-		-	
Sandy CLAY (Firm to Stiff)	0.20 to 0.70/2.00	18	50 to 100	26	25	0.35	0.25	10	15
Clayey Gravel/Gravelly CLAY(3) (Medium Dense / Stiff)	0.70/2.00 to 2.00	19	50 to 100	36	15	0.3		40	
Sandy CLAY / CLAY (Stiff to Very Stiff)	2.00 to 3.40/4.00	18	100 to 150	26	40 to 50	0.35	0.25	20	35

Material Type[1] (Consistency / Density)	Typical Layer Depth Interval[1] (m)	Bulk Unit Weight γ (kN/m³)	Undrained Shear Strength Su (kPa)	Effective Friction Angle Φ' (°)	Effective Cohesion c' (kPa)	Poisson's Ratio		Young's Modulus (MPa)	
						Short Term V_u	Long Term v'	Short Term E_u	Long Term E'
CLAY / Sandy CLAY (Very Stiff to Hard)	3.40/4.00 to 5.50/7.80	18	150 to 200	28	50 to 75	0.40	0.30	40	30
Clayey SAND / SAND / Gravelly SAND (Medium Dense)	5.50/7.80 to 6.50/11.50	20	-	32	0 to 5	0.30		30	
CLAY / Sandy CLAY (Hard)	6.50/11.50 to 19.20/25.00 (EOH)[4]	18	200	28	75 to 100	0.40	0.30	40	30
SAND / Clayey SAND (Medium Dense to Dense)	19.20/21.70 to 25.00 (EOH)[5]	20	-	34 to 36	0	0.30		40 to 50	

Notes:
1. Reference should be made to individual geotechnical logs presented in Appendix 2.
2. "-" not applicable.
3. May not be encountered across the entire site.
4. BH03 terminated at target depth within the Hindmarsh Clay Formation
5. End of Hole at target depth of 25.0 m bgl.

3.2 Foundations Recommendations

We consider that conventional foundations including pads, strips and rafts founded on natural materials (Alluvial Soils) are suitable for the site. The selection of the specific foundation system and founding depth will depend on the type of the structures and expected loads. If larger loads are expected or structures likely to have low tolerance to settlement a gravel raft (reinforced) or piles should be considered.

3.2.1 Achievable Ultimate Bearing Capacity – Conventional Foundations

Based on the results of our investigation, we consider the use of conventional foundations such as strip, pad, or raft and / or slab on grade suitable for the proposed development.

Consideration could also be given to placing new foundations, placed at current ground level, on at least 1.0 m thick layer of structural fill (all topsoil and any soft / unsuitable material shall be removed prior fill placement) placed on top of the natural material comprising (firm clay) compacted to 98% of the MDD and placed under Level 1 supervision – see Section 3.3.4.

For new foundations placed into either natural soils or a structural fill layer, the following embedment depths and Ultimate Bearing Capacity (UBC) in Table 12 can be used.

Table 12: UBC for Suitable Founding Stratum

Foundation Type	Minimum founding depth (m BGL)	Footing Size	Founding Stratum	Indicative Strength	UBC (KPa)	Modulus of Subgrade Reaction (K) ($KN/m^2/m$)
Isolated Foundation (Pads)	0.45	1.5 x 1.5	CLAY / Sandy CLAY	Firm to Stiff	350	10600
			Structural FILL layer (minimum of 1.0 m thick)	Medium Dense to Dense	600	36600
	0.50	9.0 x 2.0	CLAY / Sandy CLAY	Firm to Stiff	290	8000
			Structural FILL layer (minimum of 1.0 m thick)	Medium Dense to Dense	630	27400
Mat/Raft Foundation	0.60	15.0 x 4.0	CLAY / Sandy CLAY	Firm to Stiff	350	4000
			Structural FILL layer (minimum of 1.0 m thick)	Medium Dense to Dense	820	13700

The footing dimensions, footing depth and loading specifications of UPSG Rotary Kiln Building and Filtration Building – reference: Footing Drawings "12813-Siviour-Foundations-RJS-221017" - have been considered for the estimation of the bearing capacity. The UBC value shall be factored by appropriate reduction factors as per AU Standards.

Based on the UBC recommendations above, we have estimated the elastic settlement for foundations founded in the 1.0 m thick structural fill are likely to range up to 28 mm for Filtration Building. However, the settlement is expected to reach to 43 mm for the Rotary Kiln Building raft foundation founded over the 1.0 m thick structural fill. About 70% of the total settlement is expected to occur during construction. To estimate the expected settlement, a maximum allowable pressure of 200 kPa is considered as preliminary assumption.

Differential settlements for the foundations are dependent upon the stiffness of the foundation system adopted. A preliminary assessment indicates that differential settlements up to approximately half the estimated total settlement could be possible. This assessment should be re-evaluated as design of the foundation system further develops.

The provided recommendations for bearing capacity assume that any loose, disturbed, or softened materials will be stripped from the excavations prior to foundation construction. It is important that the excavation surface is as clean as reasonably practicable prior to pouring concrete. If the soil at the base of the excavation becomes wet and softens, it must be over-excavated until competent soil is encountered and replaced with lean mix concrete or compacted engineered granular fill. It will be necessary to ensure that the soils are not disturbed during excavation, do not dry out, or soften due to the pooling of groundwater, rainfall or surface water inflow. It is recommended that the base of the excavation be graded to drain and surfaced with lean mix concrete immediately following excavation and removal of loose material.

We recommend that all foundations are inspected by a suitably qualified and experienced geotechnical practitioner during excavation to verify that founding conditions are consistent with the recommendations of this report.

3.2.2 Piled Foundations

The following sections provide initial commentary and preliminary parameters to assist with the design of piled foundations. We have undertaken this initial foundation assessment based on the encountered soils' parameters and initial assumptions of likely foundation (piles) dimensions. The initial assessment presented in this report shall be validated and refined during a detailed foundation design.

The provided parameters assume that the piles will be designed and installed in accordance with Australian Standard AS2159-2009. A suitably experienced piling contractor should be consulted in regard to the best piling method. The piling equipment used must be of appropriate size and power to achieve the required embedment depths and pile diameters. The piling contractor should be made aware of available geotechnical information for the site (i.e. expected subsurface conditions and groundwater table depth).

Driven Piles and Screw Piles

Driven piles and screw piles are considered technically viable options.

Bored Piles and CFA Piles

Bored, cast *in situ* piles or Continuous Flight Auger (CFA) piles are considered suitable to be drilled into the inferred Hindmarsh Clay Formation encountered during the investigation. If bored piles are considered by piling contractors, then temporary support such as bentonite or casing will be required below groundwater levels.

CFA piles provide a construction advantage if pile depths extend well below the groundwater table.

We have provided preliminary parameters and commentary below for piles designed in accordance with the Australian Standard for Piling – Design and Installation (AS 2159 – 2009).

AS 2159 – 2009 requires a pile to be proportioned such that the pile design geotechnical strength (Rd,g) is not less than the pile design action effect (Ed). The design geotechnical strength is calculated as the design ultimate geotechnical strength (Rd,ug) multiplied by a geotechnical strength reduction factor (ϕg). Assuming that pile testing is not undertaken at this site, a geotechnical strength reduction factor (ϕg) of 0.50 shall be adopted. If dynamic pile testing is undertaken on at least 5% of the preformed piles, a geotechnical strength reduction factor (ϕg) of 0.70 could be adopted increasing the achievable capacity.

Initial pile design parameters have been calculated based on the materials encountered during the intrusive investigation. These have been summarised in Table 13 below, reference should be made to individual borehole logs when the proposed 25.0 m boreholes are drilled.

Table 13: Initial Pile Design Parameters for 600 mm Diameter Piles

Material Type	Layer Depth Interval (m)	Average Ultimate Skin Friction[1], fms (kPa)	Ultimate End Bearing Resistance, fb (kPa)[2]
TOPSOIL	GL to 0.20	Ignore	N/A
Sandy CLAY (Firm to Stiff)	0.20 to 1.00	Ignore	N/A
	1.00 to 2.00	0 to 25	N/A
Clayey Gravel / Gravelly CLAY[3] (Medium Dense Clayey Gravel or Stiff Gravelly CLAY)	0.70/2.00 to 2.00	25 to 50	N/A
Sandy CLAY / CLAY (Stiff to Very Stiff)	2.00 to 3.40/4.00	15	N/A
CLAY / Sandy CLAY (Very Stiff to Hard) with lenses of	3.40/4.00 to 5.50/7.80	20	1550
Clayey SAND / SAND / Gravelly SAND (Medium Dense)	5.50/7.80 to 6.50/11.50	30	2600
CLAY / Sandy CLAY (Hard)	6.50/11.50 to 19.20/25.00 (EOH)(4)	80	1550
SAND / Clayey SAND (Medium Dense to Dense)	19.20/21.70 to 25.00 (EOH)(5)	95	4800

Notes:

1. For piles in uplift, skin friction should be reduced by a factor of 0.8.
2. Assumes pile is embedded at least 2 pile diameters into this layer and pile length is >4 times diameter.
3. May not be encountered across the entire site.
4. Further geotechnical investigation must be undertaken to confirm these assumptions.

3.2.3 Working Platform

Based on our experience, large CFA and bored piling rigs can apply pressure beneath the tracks during piling up to about 350 kPa. Due to the presence of natural clayey soils close to surface that are prone to soften upon wetting, we recommend that allowance be made for the construction of a working platform (crushed rock material) across the site to protect the surface against changed weather conditions and trafficking.

The required thickness of the piling platform will be dependent on the imposed pressure beneath the tracks and the nature of the exposed subgrade materials.

Following appointment of a piling contractor and provision of the track loads, we can provide advice on procedures for the preparation and placement of a piling platform and the minimum thickness of any platform that may be required.

3.2.4 Solider Pile Wall Retention Systems

Consideration could be given to use of the piles as a long term retaining structure. This could be designed as either a continuous pile wall or soldier pile wall with infill shotcrete panels in between the piles, particularly if the retention systems are to extend beneath the groundwater table.

3.2.5 Retaining Walls

We understand that single cantilever retaining structures are proposed at the site. We have not received any information in regard to the depths and lateral extents of the excavations, however we expect that they will occur within materials close to the surface, i.e. stiff sandy clays and / or medium dense clayey gravels / gravelly clays. We have assumed that the retaining will be constructed bottom up within an excavation (i.e. parameters have been provided for gravity wall design).

The design and construction of a retention system is dependent on the nature of the materials to be retained, the sequence of construction, the nature and extent of adjacent structures and footings, allowable lateral ground movements and associated settlements behind the wall, groundwater conditions and the magnitude of any vertical loads to be supported by the wall.

Lateral earth pressure coefficients for use in retaining wall design have been summarised in Table 14 below. These parameters are applicable for long term (permanent) structures and assume horizontal ground behind the wall. If an inclined slope is proposed behind the wall, or additional surcharge loads from traffic or structures are imposed during or after construction, then these additional loadings should be allowed for in the design. To form these retaining walls, cuts at safe batter angles will be required - presented in Section 3.5.2.

Retaining walls should be designed in accordance with the recommendations of AS4678-2002, ‘Earth Retaining Structures’.

Table 14: Earth Pressure Coefficients for Basement Retention Design

Layer Material Type (Consistency / Density)	Effective Friction Angle Φ' (°)	At-Rest Earth Pressure Coefficient (K_o)	Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)
Sandy CLAY (Firm to Stiff)	26	0.63	0.39	3.62
Clayey Gravel / Clayey Gravel[3] (Medium Dense / Stiff)	36	0.41	0.26	7.11

Notes:

1. This table assumes no head-slope.
2. The interface friction angle between the wall and the soil, δ, is taken as 1 x ϕ for concrete block walls.
3. The interface friction angle against sliding, is taken as 2/3 x ϕ.
4. The skin friction for ground anchors e.g. geosynthetics or metallic strip reinforcements can be taken as 2/3 x ϕ (higher value can be adopted upon manufacturer confirmation.
5. May not be encountered across the entire site.

Retaining structure design should include weep holes to allow drainage of the soil behind the retaining wall. We have assumed that free-draining backfill will be used for construction and that water will be prevented from building up behind the wall. For compacted free draining granular backfill, we recommend adopting an assumed effective friction angle (Φ') of 34°, zero cohesion (c') and unit weight of 20 kN/m^3. If an alternative approach is adopted, we recommend that further advice should be sought.

Compaction plant can increase the lateral earth pressure acting on retaining walls. Hand operated compaction equipment is recommended within 2.0 m of any retaining walls to minimise compaction pressures.

3.2.6 Groundwater and Drainage

Given the presence of shallow groundwater ranging from 0.6 to 2.5 m BGL encountered during the investigation, consideration should be given to the proximity of groundwater to the base of the excavation. Compaction of soils below groundwater will not be achievable without dewatering. When compacting soil in close proximity to the groundwater level (i.e. within about 1.0 m), non-vibratory compaction equipment is recommended to prevent groundwater from being drawn up.

We recommend provision of subfloor drainage in a form of perimeter drain to collect groundwater seepage from strip drains located behind retaining wall. Any groundwater collected in the subsurface drainage system should be directed to a sump for collection and off-site disposal. The relevant statutory authority shall be consulted regarding regulations for off-site disposal of groundwater.

3.3 Earthworks

3.3.1 Reuse of Site-won Materials

Table 3.1 of The Department of Infrastructure and Transport (DIT) specification, *Part R10 Construction of Earthworks*, outlines the selection criteria for engineered fill. This selection criteria are summarised in Table 15 below.

Table 15: Extract from DIT Specification: Part R10 – Material Classification

Classification		A	B	C	General Fill (GF)
Material Type		Sand-clay, Sand, Rubble, Quarry or Pit overburden or by-product	Sand-clay, Sand, Rubble Quarry or Pit overburden or by-product	Sand-clay Sand, Clay, Rubble, Quarry or Pit overburden or by-product	Refer to Contract Specific Requirements
Max. Particle Size (mm)		75	106	150	150
Particle Size Distribution (% passing)	75 mm	100	-	-	Refer to Contract Specific Requirements
	37.5 mm	80-100	80-100	80-100	
	0.075 mm	0-25	0-35	0-35	
Max. Plasticity Index		12	15	-	
Max. Linear Shrinkage		6	7	-	

Based on the results of the laboratory testing undertaken to date (presented in Section 2.3), the material encountered during the investigation within the top layers generally comprised of cohesive clayey materials. This cohesive material generally had a fines proportion (% passing 0.075 mm) greater than 35% and a Plasticity Index that ranged from 8% to 21%. Due to the high content of fines, these materials are not suitable for use as structural fill. However, the material can be used as engineered fill (bulk earthworks) providing that appropriate fill placement, compaction and validation is carried out in accordance with Section 3.3.4. The presence of potential acid Sulfate soils in this material should also be considered.

3.3.2 Imported Fill Materials

In the event that imported engineered and / or structural fill is required during construction of access roads and building platforms, attention will need to be paid to the permeability and reactivity of the imported material. This imported fill material shall be free of organic matter and deleterious materials (i.e. salvaged material, asphaltic concrete or concrete rubble). The geotechnical properties of imported fill materials shall be in accordance with '*Classification A'* presented in Table 15 above.

3.3.3 Site Preparation

If shallow footings are to be placed on top of a layer of structural fill, the following site preparation steps will need to be followed in order to reduce the risk for settlements and provide a reliable foundation for building footing systems:

- Excavate existing materials to the required depth, based on expected loads of the proposed infrastructure (up to a maximum of 1.0 m BGL), from an area extending a minimum of 2.0 m laterally beyond the footprint of the proposed infrastructure.

- Care should be taken to separate and stockpile the topsoil from the natural cohesive materials. In addition, the presence of potential acid Sulfate soils in the excavated material should be considered when stockpiling materials.
- Undertake a proof roll of the exposed surface, removing any weak or soft material and replacing with compacted structural fill.
- Backfill the excavation using suitable imported structural fill to the proposed underside of the footing in accordance with the recommendations provided in Section 3.3.4. It is likely that some moisture conditioning will be required prior to compacting these materials.

3.3.4 Placement and Compaction of Fill

Any fill should be placed in horizontal layers, no greater than 300 mm loose thickness. Each layer should be compacted by approved compaction equipment, carefully controlled to ensure an even compaction over the full area and depth of each layer.

The level of compaction achieved in all placed fill and below the base of slabs and footings should be commensurate with a minimum dry density ratio of 98% relative to the Standard Maximum Dry Density, in accordance with AS 1289 5.1.1.

Consideration should be given to the proximity of groundwater to the base of the excavation. Compaction of soils below groundwater will not be achievable without dewatering. When compacting soil in close proximity to the groundwater level (i.e. within about 1 m), non-vibratory compaction equipment is recommended to prevent groundwater from being drawn up.

It is recommended that earthworks, including subgrade preparation and bulk fill placement, be supervised by suitably experienced geotechnical personnel, in accordance with AS3798-2007 *(Guidelines for earthworks for commercial and residential developments)*. Level 1 supervision as defined in AS3798 is recommended where subgrades / fill are required to support building / structure loads.

3.4 Pavements

We understand that pavements are currently proposed at the site. We have considered a number of methods to assess the design CBR for the site. These are summarised below.

Soaked CBR values were reported for five (5) samples and are ranging between 9% (TP 04) and 20% (TP15 & TP23). The samples were remoulded to a dry density ratio of approx. 95% compared with Modified Compaction (AS1289.5.2.1), with an applied surcharge of 4.5 kg. The reported CBR values, sample depth and the soil type description are summarised in Table 16.

We have also calculated Estimated CBRs based on the method presented in DPTI TP133. This method is applicable for materials with at least 75% passing the 2.36 mm sieve, and the Estimated CBRs calculated with this method can be considered to be equivalent to a four-day soaked CBR remoulded to a density ratio of 95% compared with Modified Compaction (AS1289.5.2.1). Based on this method we have estimated CBRs ranging from 11% (TP21 0.20-0.50 m) for medium plasticity sandy clay material. Basedon this method we have calculated estimated CBRs presented in Table 16.

Table 16: Summary of CBR Testing and Estimated Values

Evaluation Method	Sample ID	Sample Depth (m BGL)	Soil Type	Moisture Content (%)	Modified Compaction		
					OMC (%)	MDD (t/m^3)	CBR (%)
Tested	TP01	0.2 – 0.5	Sandy CLAY	13.3	13.0	1.86	14
	TP04	0.8 – 1.1	Silty / Sandy CLAY	12.8	13.0	1.82	9
	TP15	0.2 – 0.6	CLAY, medium plasticity	12.3	12.0	1.90	20
	TP18	0.2 – 0.5	Sandy CLAY	14.6	14.0	1.87	12
	TP23	0.2 – 0.5	Sandy CLAY, low plasticity	10.6	10.5	2.00	20
Estimated	TP02	1.6 – 1.9	Sandy CLAY, medium plasticity	21.3	-	-	13
	TP06	0.2 – 0.5	Sandy CLAY, low plasticity	21.3	-	-	12
	TP17	1.7 – 1.9	Clayey SAND	18.8	-	-	17
	TP21	0.2 – 0.5	Sandy CLAY, medium plasticity	18.5	-	-	11

Notes: OMC – Optimum Moisture Content, MDD – Maximum Dry Density, CBR – Californian Bearing Ratio at 2.5 mm.

On this basis we recommend a conservative CBR value of 5% for Sandy CLAYS and 10% for Clayey SAND for the pavement design. If the subgrade is reworked and compacted a higher CBR can be achieved.

3.5 Other Considerations

3.5.1 Excavatability

Drilling resistance encountered in soil strength materials in the borehole was typically described as Easy Penetration (EP) in natural materials i.e. Sandy CLAY and Clayey GRAVEL. On this basis we expect that the materials encountered on-site could be excavated using conventional earthmoving machinery (i.e. excavators and dozers) as per the recommendations in Section 3.5.2 below. However, selection of plant and equipment will depend on the contractor's proposed methodology and reference should be made to the logs provided in Appendix 2.

3.5.2 Cuts and Batters

For temporary excavations up to 1.0 m we recommend adopting batter slopes no steeper than 2H: 1V (27°) in TOPSOIL and 1H: 1V (45°) in the Sandy CLAYS and Clayey GRAVEL. For long term stability of batter slopes, we recommend adopting batter slopes no steeper than 2H: 1V (27°) in TOPSOIL and 1.5H: 1V (33°) in Sandy CLAYS and Clayey GRAVEL. For deeper excavations further assessment by a Geotechnical Engineer will be required.

We recommend that loads are excluded from the area extending back from the excavation crest for a distance equal to the excavation depth. Further assessment would be required to justify adoption of steeper slope angles. Excavation stability should consider issues such as the excavation geometry, subsurface conditions, groundwater levels, surcharge loads, construction methodology and the consequence of instability.

All cuts and batters should be in line with the SafeWork Code of Practice Guidelines for Excavation Work (October 2018).

3.5.3 Stormwater Drainage

Stormwater management is expected to be an important factor during the construction. Care should be taken during construction to prevent water from washing out of the faces of the cuts and batters and ponding in the base of any open excavation. The ponding of water could result in softening of the soils, collapse and additional post construction settlement or soil movements.

4 References

Australia Standard AS 2870-2011 “Residential Slab Footings”, Standards Australia/

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Safe Work Australia, Excavation Work – Code of Practice, October 2018.

Tyan A.E. (1973), “Ground Vibrations: Damaging effects to Buildings: Australian Road Research Board

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Das, B. M. Principles of foundation engineering (8th ed.).

5 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Renascor Resources Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the General Conditions of Contract for Engagement of Consultants.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on 1800 136 436 if you require any further information.

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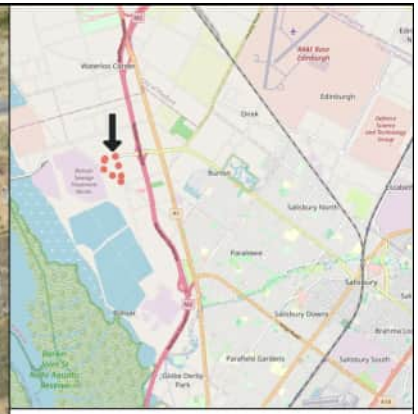
APPENDIX 1:

Geotechnical Investigation Location Plan



Legend

- Site Boundary
- Test Pit Locations
- Borehole Locations
- Cultural Heritage Exclusion Zone
- Electrical Resistivity Testing

0 50 m 100 m

Aerial imagery: Government for South Australia

ENGEO

Produced by **Datanest.earth**

Title: Investigation Location Plan		
Client: Renascor Resources		Figure No: 1 Size: A4
Project: Bolivar	Drawn: RAM	
Date: 14-09-2022	Checked: CL	
Proj No: 20651	Scale: 1:4500	Version: 01

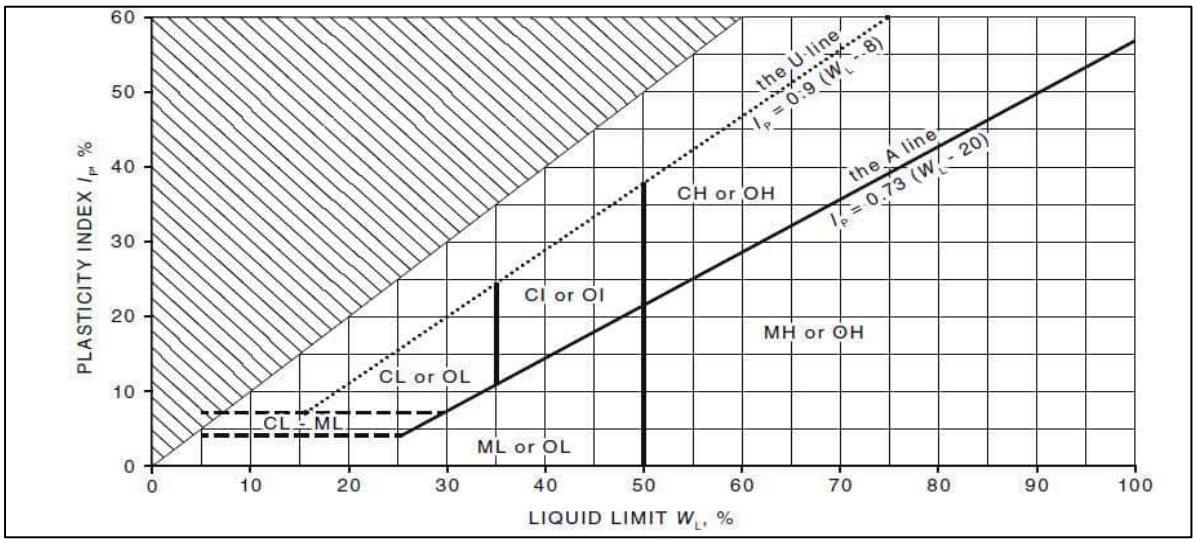
APPENDIX 2:
Geotechnical Logs

SYMBOLS AND ABBREVIATIONS USED ON GEOTECHNICAL LOGS

Abbreviation	Description	Abbreviation	Description
METHOD (SOIL DRILLING)		METHOD (ROCK DRILLING); core diameter (mm)	
NDD	Non Destructive Drilling	RR	Rock Roller
HA	Hand Auger	DDC	Diamond Drill Coring
HSA	Hollow Stem Auger	NMLC	Conventional 51.9 mm
SSA	Solid Stem Auger	NQ	Double Tube Wireline
VB	Steel “V” Auger Bit	NQ3	Triple Tube Wireline 45.1
TC	Tungsten Carbide Auger	HQ	Double Tube Wireline
WB	Wash Boring	HQ3	Triple Tube Wireline 61.1
AC	Aircore Soil Drilling	SON	Sonic Rock Drilling
METHOD (EXCAVATOR)		PENETRATION / RESISTANCE	
BB	Bladed Bucket	EP	Easy / Low Resistance
TB	Toothed Bucket	MP	Moderate Resistance
SUPPORT		DP	Difficult / High
CAS	Casing (Nominal)	PR	Practical Refusal
MUD	Drilling Mud Used	SAMPLES	
CAT	Casing Advancement Tool	ASS	Acid Sulfate Soil Sample
GROUNDWATER		B	Bulk
▽	At Depth Encountered	D	Disturbed
▼ 31/12/2022	At Depth Measured BGL	U50, U75, U100	Undisturbed 50, 75, 100
GNO	Not Observable	ES	Environmental Sample
GNE	Not Encountered	WS	Water Sample
IN SITU TESTS		*IN SITU* TESTS	
SPT	Standard Penetration	DCP	Dynamic Cone Penetrometer
N	SPT Penetration	PP	Pocket Penetrometer
rw	Rod Weight Only (SPT)	FSV	Field Shear Vane
hb	Hammer Bounce (SPT)	PID	Photoionisation Detector
ATV	Acoustic Televiewer	PM	Pressure Meter
OTV	Optical Televiewer	COT	Core Orientation Tool

Abbreviation	Description	Abbreviation	Description
SOIL PARTICLE SIZE RANGES (mm)		RELATIVE DENSITY (coarse grained, non-cohesive soils)	
Bo	Boulders (> 200)	VL	Very Loose
Co	Cobbles (63 – 200)	L	Loose
cGr	Coarse Gravel (19 – 63)	MD	Medium Dense
mGr	Medium Gravel (6.7 – 19)	D	Dense
fGr	Fine Gravel (2.36 – 6.7)	VD	Very Dense
cSa	Coarse Sand (0.6 – 2.36)	CONSISTENCY (fine grained, cohesive soils)	
mSa	Medium Sand (0.21 – 0.6)	VS	Very Soft
fSa	Fine Sand (0.075 – 0.21)	S	Soft
Si	Silt (0.002 – 0.075)	F	Firm
Cly	Clay (< 0.002)	St	Stiff
MOISTURE CONDITION (coarse grained, non-cohesive)		VSt	Very Stiff
M	Moist	H	Hard
D	Dry	Fr	Friable
W	Wet	PLASTICITY (Silts) Liquid Limit Range	
MOISTURE CONDITION (fine grained, cohesive soils)		Low Plasticity Silts	≤ 50
(M), w < PL	Moist, dry of plastic limit	High Plasticity Silts	>50
(M), w ≈ PL	Moist, near plastic limit	PLASTICITY (Clays) Liquid Limit Range	
(M), w > PL	Moist, wet of plastic limit	Low Plasticity Clays	≤ 35
(W), w ≈ LL	Wet, near liquid limit	Medium Plasticity Clays	> 35 and ≤ 50
(W), w > LL	Wet, wet of liquid limit	High Plasticity Clays	> 50
SOIL GROUP SYMBOL (Coarse Grained Soils)		SOIL GROUP SYMBOL (Fine Grained Soils)	
GW	Clean Gravel, Well Graded	ML	Inorganic Low Plasticity Silt
GP	Clean Gravel, Poorly Graded	CL	Inorganic Low Plasticity Clay
GM	Silty, Sandy Gravel	CI	Inorganic Med Plasticity Clay
GC	Clayey, sandy Gravel	OL	Organic Silt
SW	Clean Sand, Well Graded	MH	Inorganic Silt
SP	Clean Sand, Poorly Graded	CH	Inorganic High Plasticity Clay
SM	Sand Silt Mixtures	OH	Organic High Plasticity Clay
SC	Sand Clay Mixtures	Pt	Peat

Modified Casagrande Chart for Classifying Silts and Clays



Abbreviation	Description	Abbreviation	Description
ROCK DRILLING PARAMETERS		ROCK GRAIN SIZE (mm)	
TCR	Total Core Recovery	Coarse	>2
RQD	Rock Quality Designation	Medium	0.06 to 2
RMU	Rock Mass Unit	Fine	<0.06
WEATHERING / ALTERATION GRADE		INTACT ROCK STRENGTH ($Is_{(50)}$) range (MPa)	
RS	Residual Soil	VL	0.03 to 0.1
XW / XA	Extremely Weathered	L	0.1 to 0.3
HW / HA	Highly Weathered /	M	0.3 to 1
MW / MA	Moderately Weathered /	H	1 to 3
SW / SA	Slightly Weathered /	VH	3 to 10
FR	Fresh	EH	> 10
ROCK FABRICS		ROCK FABRIC (BED) SPACING (mm)	
LAM	Lamination	Thinly LAM	<6
BED	Bedding	Thickly LAM	6 to 20
FOL	Foliation / Cleavage	Very Thinly BED	20 to 60
LN	Lineation	Thinly BED	60 to 200
FLB	Flow Banding	Medium BED	200 to 600
		Thickly BED	600 to 2000
		Very Thickly BED	> 2000

Abbreviation	Description	Abbreviation	Description
ROCK DEFECTS		DEFECT SPACING range (mm)	
J, Js	Joint, Joints	EC	Extremely Close (< 20)
SS	Sheared Surface	VC	Very Close (20 to 60)
SZ	Sheared Zone	C	Close (60 to 200)
Ss	Sheared Seam	M	Medium (200 to 600)
Cs	Crushed Seam	W	Wide (600 to 2000)
Is	Infilled Seam (Generally)	VW	Very Wide (> 2000)
Xs	Extremely Weathered	DEFECT SURFACE ROUGHNESS	
BP	Bedding Parting	Vro	Very rough
LP	Lamination Parting	Ro	Rough
FP	Foliation / Cleavage	Sm	Smooth
IF	Induced Fracture	Po	Polished
DEFECT APERTURE		Sl	Slickensided
OP	Open	DEFECT INFILL	
FL	Filled	Cn	Clean
TI	Tight	Std	Stained
HD	Healed (cemented)	Vr	Veneer
		Ct	Coating
ANGLE OF INCIDENCE (to the horizontal)		Vn	Vein
0° to 15°	Sub horizontal		
15° to 30°	Gentle	INSTRUMENTATION	
30° to 45°	Moderate	SPP	Standpipe Piezometer
45° to 60°	Steep	VWP	Vibrating Wire Piezometer
60° to 75°	Very Steep	INC	Inclinometer
75° to 90°	Sub vertical	EXT	Extensometer

BOREHOLE: BH01

SHEET: 1 OF 3

CLIENT:	Renascor Resources	DRILL RIG:	Investigator Mk5
PROJECT:	BAM Project	CONTRACTOR:	Beyond Drillling
LOCATION:	Bolivar	LOGGED:	DP DATE: 17/11/22
JOB NO:	20651.000.001	CHECKED:	RAM DATE: 5/12/22

COORDS: 277300.0 m 6153667.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	EP	17/11/22 09:30	0	0.20				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M		
								CI	Sandy CLAY medium plasticity, orange red brown, fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel	w < PL		0.20-3.00 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)
			1		ES 0.70-0.80 m SPT 1.00-1.45 m 1, 2, 3 N=5 PP 1.20 m =220 kPa ES 1.50-1.60 m					w ~ PL		
				1.70				CL	Sandy CLAY low plasticity, grey brown, fine to coarse grained sand, with lenses of clayey sand	w > PL	St	
			2		SPT 2.50-2.95 m 4, 5, 5 N=10 PP 2.70 m =225 kPa PP 2.90 m =225 kPa							
			3	3.00				CI	Gravelly CLAY medium plasticity, orange brown, fine to coarse grained, sub-rounded to sub-angular calcareous gravel, with fine to coarse grained sand			3.00-3.40 m: Glanville Formation
				3.40				CH	CLAY high plasticity, orange brown, with fine to coarse grained sand, trace fine to coarse grained, sub-rounded, calcareous gravel			3.40-21.70 m: Hindmarsh Clay Formation
	MP				PP 3.50 m =450 kPa PP 3.80 m =400 kPa SPT 4.00-4.45 m 5, 8, 9 N=17							
			4	4.50				CL	CLAY low plasticity, mottled orange-brown and grey, with fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel			
			5		PP 4.80 m =410 kPa PP 5.20 m =410 kPa PP 5.40 m =430 kPa SPT 5.50-5.95 m 3, 5, 8 N=13 PP 5.60 m =450 kPa					w < PL	VSt	
			6	6.00	PP 5.90 m =450 kPa PP 6.20 m =420 kPa PP 6.50 m =420 kPa			CI-CH	Sandy CLAY medium to high plasticity, mottled orange-brown and grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded, calcareous gravel			
			7		SPT 7.00-7.45 m 5, 6, 10 N=16 PP 7.00 m =400 kPa							
				7.80				SC	Clayey SAND fine to coarse grained, mottled orange-brown and grey, medium plasticity clay, trace fine to coarse grained, sub-rounded to sub-angular gravel	M	MD	
			8	8.50	SPT 8.50-8.95 m 6, 8, 9 N=17 PP 8.50 m =200 kPa			CI-CH	Sandy CLAY medium to high plasticity, orange brown and grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular gravel	w < PL	VSt	
			9		PP 9.30 m =300 kPa PP 9.50 m =300 kPa PP 9.80 m =200 kPa							
			10	10.00								

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH01

SHEET: 2 OF 3

CLIENT: Renascor Resources
PROJECT: BAM Project
LOCATION: Bolivar
JOB NO: 20651.000.001

COORDS: 277300.0 m 6153667.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

DRILL RIG: Investigator Mk5
CONTRACTOR: Beyond Drillling
LOGGED: DP DATE: 17/11/22
CHECKED: RAM DATE: 5/12/22

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	MP		10		SPT 10.00-10.45 m 8, 12, 18 N=30 PP 10.20 m =420 kPa PP 10.40 m =420 kPa PP 10.80 m =450 kPa PP 11.20 m =450 kPa PP 11.40 m =450 kPa SPT 11.50-11.95 m 7, 14, 14 N=28			CH	CLAY high plasticity, orange brown and grey, with fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular calcareous gravel			3.40-21.70 m: Hindmarsh Clay Formation
			11									
			12	12.00	PP 12.20 m =600 kPa PP 12.50 m =400 kPa PP 12.60 m =450 kPa PP 12.80 m =600 kPa PP 12.90 m =600 kPa			CI	Gravelly CLAY medium plasticity, mottled orange brown and pale grey, fine to coarse grained, sub-rounded to rounded calcareous gravel			
			13	12.90	SPT 13.50-13.95 m 9, 14, 16 N=30 PP 13.50 m =600 kPa PP 13.80 m =600 kPa U50 14.00-14.50 m SPT 14.50-14.95 m 9, 16, 26 N=42			CH	CLAY high plasticity, mottled orange brown and pale grey, with fine to coarse grained sand, trace fine to coarse grained, sub-rounded to rounded, calcareous gravel			
			14	14.00				CI-CH	Sandy CLAY medium to high plasticity, mottled orange brown and pale grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to rounded, calcareous gravel	w < PL	H	
			15									
			16	16.00	SPT 16.00-16.45 m 8, 15, 20 N=35			CH	CLAY high plasticity, mottled orange brown and pale grey, with fine to medium coarse sand			
				16.50				CH	Sandy CLAY high plasticity, mottled orange-brown and grey, fine to medium grained sand, with fine to coarse grained, sub-rounded to rounded gravel			
			17	17.50	SPT 17.50-17.95 m 10, 18, 22 N=40 PP 17.80 m =500 kPa PP 17.90 m =500 kPa			CH	CLAY high plasticity, orange brown and grey, trace fine to coarse grained sand			
			18	18.00				CI-CH	Sandy Gravelly CLAY medium to high plasticity, orange brown and grey, fine to coarse grained, sub-rounded to rounded gravel, fine to coarse grained sand			
			19	19.00	SPT 19.00-19.45 m 8, 14, 19 N=33 PP 19.30 m =500 kPa PP 19.40 m =500 kPa			CI-CH	Sandy CLAY medium to high plasticity, orange brown and grey, fine to coarse grained sand, with fine to coarse grained, sub-rounded to rounded gravel			
				19.45					No Recovery (19.45 - 20.50 m)			
			20									

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH01

SHEET: 3 OF 3

CLIENT: Renascor Resources
PROJECT: BAM Project
LOCATION: Bolivar
JOB NO: 20651.000.001

COORDS: 277300.0 m 6153667.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

DRILL RIG: Investigator Mk5
CONTRACTOR: Beyond Drillling
LOGGED: DP DATE: 17/11/22
CHECKED: RAM DATE: 5/12/22

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	MP	▽	20						No Recovery (19.45 - 20.50 m)			3.40-21.70 m: Hindmarsh Clay Formation
				20.50	SPT 20.50-20.95 m 6, 11, 17 N=28			CI	Sandy CLAY medium plasticity, mottled orange-brown and grey, fine to coarse grained sand	w < PL	H	
			21									
				21.70				SC	Clayey SAND fine to coarse grained, orange brown and grey, low plasticity clay, trace fine to coarse grained, sub-rounded gravel			21.70-25.00 m: Carisbrooke Sand Formation
			22	22.00	SPT 22.00-22.45 m 4, 8, 18 N=26			SP	SAND fine to coarse grained, grey, with low plasticity clay			
			23							W	MD	
					SPT 23.50-23.95 m 7, 10, 12 N=22							
			24									
			25						END OF BOREHOLE @ 25.00 m TARGET DEPTH GROUNDWATER ENCOUNTERED @ 1.50 m DEPTH BACKFILLED			
			26									
			27									
			28									
			29									
			30									

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH02

SHEET: 1 OF 3

CLIENT: Renascor Resources
PROJECT: BAM Project
LOCATION: Bolivar
JOB NO: 20651.000.001

COORDS: 277502.0 m 6153527.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

DRILL RIG: Investigator Mk5
CONTRACTOR: Beyond Drillling
LOGGED: DP DATE: 23/11/22
CHECKED: RAM DATE: 5/12/22

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
			0	0.20				CI	TOPSOIL: Sandy CLAY medium plasticity, dark grey, fine to coarse grained sand, trace rootlets	M		
	EP							CI	Gravelly Sandy CLAY medium plasticity, orange brown, fine to medium grained sand, fine to coarse grained, sub-rounded to sub-angular calcareous gravel, with fine to coarse grained, sub-rounded gravel		St	0.20-3.90 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)
			1	1.00	SPT 1.00-1.45 m 2, 3, 4 N=7 PP 1.40 m =280 kPa			CI	Sandy CLAY medium plasticity, mottled orange-brown, fine to medium grained sand	w < PL		
			2	2.20	BH02-E04 ES 2.10-2.20 m SPT 2.50-2.95 m 3, 5, 6 N=11			CL-CI	Sandy CLAY low to medium plasticity, grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded, calcareous gravel	w ~ PL		
		21/11/22 09:30	3	3.00	PP 2.95 m =375 kPa				red brown, increased sand content		VSt	
			4	3.90	SPT 4.00-4.45 m 4, 6, 8 N=14 PP 4.45 m =375 kPa			CI-CH	CLAY medium to high plasticity, mottled orange, brown, grey, with fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel	w < PL		3.90-19.00 m: Hindmarsh Clay Formation
HSA			5									
	MP		6	5.50	SPT 5.50-5.95 m 1, 7, 10 N=17			SP	SAND fine to coarse grained, pale grey orange brown, with low plasticity clay	M	MD	
				6.00				GP	Gravelly SAND fine to coarse grained, orange brown, fine to coarse grained, sub-rounded to sub-angular gravel, with low plasticity clay			
			7	6.40	PP 6.50 m >600 kPa PP 6.70 m >600 kPa SPT 7.00-7.45 m 4, 9, 12 N=21 PP 7.00 m >600 kPa			CH	CLAY high plasticity, mottled brown grey orange, trace fine to coarse grained, sub-rounded to sub-angular gravel, trace fine to coarse grained sand			
			8	8.00	SPT 8.50-8.95 m 5, 9, 12 N=21 PP 8.50 m =480 kPa				with fine to coarse grained, sub-rounded to sub-angular calcareous gravel	w < PL	H	
			9	9.20	PP 9.50 m =475 kPa			CI-CH	Sandy CLAY medium to high plasticity, orange, brown, grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular calcareous gravel			
			10									

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BOREHOLE: BH02

SHEET: 2 OF 3

CLIENT: Renascor Resources
PROJECT: BAM Project
LOCATION: Bolivar
JOB NO: 20651.000.001

COORDS: 277502.0 m 6153527.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

DRILL RIG: Investigator Mk5
CONTRACTOR: Beyond Drillling
LOGGED: DP DATE: 23/11/22
CHECKED: RAM DATE: 5/12/22

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	MP	▷	10		PP 10.00 m =475 kPa			CI-CH	Sandy CLAY medium to high plasticity, orange, brown, grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular calcareous gravel	w < PL	H	3.90-19.00 m: Hindmarsh Clay Formation
			11		SPT 11.00-11.45 m 5, 8, 13 N=21							
				11.50	PP 11.40 m >600 kPa SPT 11.50-11.95 m 8, 15, 17 N=32 PP 11.50 m =480 kPa			CI	CLAY medium plasticity, orange, brown, grey, with fine to coarse grained sand, trace fine to medium grained, sub-rounded gravel			
			12	12.20				GC	Clayey GRAVEL fine to coarse grained, sub-rounded to sub-angular, red brown grey, low plasticity clay	M	MD	
				12.50				CI				
								CI-CH	Sandy Gravelly CLAY medium plasticity, orange mottled brown grey, fine to coarse grained, sub-rounded to sub-angular calcareous gravel, fine to coarse grained sand	w < PL	H	
			13		PP 12.90 m >600 kPa SPT 13.00-13.45 m 13, 14, 15 N=29 PP 13.30 m >600 kPa				Sandy CLAY medium to high plasticity, orange mottled brown grey, fine to coarse grained sand, with fine to coarse grained, sub-rounded to sub-angular calcareous gravel			
				13.50					No Recovery (13.50 - 14.50 m)			
			14									
				14.50	SPT 14.50-14.95 m 11, 22, 24 N=46			CH	Sandy CLAY high plasticity, mottled orange, brown, grey, fine to coarse grained sand, with fine to coarse grained, sub-rounded calcareous gravel			
			15	15.20				CH	CLAY high plasticity, mottled orange, brown, grey, trace fine to coarse grained, sub-rounded calcareous gravel, with fine to coarse grained sand			
			16		SPT 16.00-16.45 m 7, 7, 12 N=19					w < PL	H	
			17	17.50	SPT 17.50-17.95 m 5, 9, 14 N=23			CH	Sandy CLAY high plasticity, mottled orange, brown, grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded calcareous gravel			
			18									
		▷	19	19.00	SPT 19.00-19.45 m 7, 12, 10 N=22			SC	Clayey SAND fine to coarse grained, grey, low plasticity clay	W	VSt	19.00-25.00 m: Carisbrooke Sand Formation
				19.20				CI	Sandy CLAY medium plasticity, mottled orange, brown, grey, fine to coarse grained sand	w ~ PL		
				19.45					No Recovery (19.45 - 20.50 m)			
			20									

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BOREHOLE: BH02

SHEET: 3 OF 3

CLIENT: Renascor Resources
PROJECT: BAM Project
LOCATION: Bolivar
JOB NO: 20651.000.001

COORDS: 277502.0 m 6153527.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

DRILL RIG: Investigator Mk5
CONTRACTOR: Beyond Drillling
LOGGED: DP DATE: 23/11/22
CHECKED: RAM DATE: 5/12/22

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	MP		20						No Recovery (19.45 - 20.50 m)			19.00-25.00 m: Carisbrooke Sand Formation
				20.50	SPT 20.50-20.95 m 8, 12, 11 N=23			SP	SAND fine to coarse grained, brown grey, trace low plasticity clay			
			21	21.00					brown	M	MD	
			22	22.00					No Recovery (22.00 - 23.00 m)			
			23	23.00				SP	SAND fine to coarse grained, brown, with low plasticity clay			
				23.80	SPT 23.50-23.95 m 3, 14, 17 N=31							
			24	24.00					with fine to coarse grained, sub-rounded to sub-angular calcareous gravel; reduced gravel content	M	D	
			25						END OF BOREHOLE @ 25.00 m TARGET DEPTH GROUNDWATER ENCOUNTERED @ 2.50 m DEPTH BACKFILLED			
			26									
			27									
			28									
			29									
			30									

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH03

SHEET: 1 OF 3

CLIENT:	Renascor Resources	DRILL RIG:	Investigator Mk5
PROJECT:	BAM Project	CONTRACTOR:	Beyond Drillling
LOCATION:	Bolivar	LOGGED:	DP DATE: 15/11/22
JOB NO:	20651.000.001	CHECKED:	RAM DATE: 5/12/22

COORDS: 277157.0 m 6153547.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	EP	15/11/22 09:30	0	0.20				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M		
								CI	Sandy CLAY medium plasticity, orange red brown, fine to coarse grained sand	w < PL	F	0.20-4.00 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)
			1		SPT 1.00-1.45 m 1, 2, 2 N=4 PP 1.20 m =50 kPa PP 1.50 m =75 kPa						St	
			2	2.10	PP 1.90 m =150 kPa					w ~ PL		
				2.30				SC	Clayey SAND fine to coarse grained, red and brown, low plasticity clay, trace fine to coarse grained, sub-rounded gravel	W	MD	
					PP 2.30 m =200 kPa SPT 2.50-2.95 m 3, 3, 3 N=6			CI	Sandy CLAY medium plasticity, mottled orange brown, fine to coarse grained sand	w < PL	St - VS	
			3	3.00					No Recovery (3.00 - 4.00 m)			
			4	4.00	SPT 4.00-4.45 m 2, 3, 5 N=8			CI	Sandy Gravelly CLAY medium plasticity, orange brown, fine to coarse grained, rounded to sub-rounded gravel, fine to coarse grained sand	w < PL	VSt	4.00-25.00 m: Hindmarsh Clay Formation
			5	5.20				CI	Sandy CLAY medium plasticity, orange brown, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular gravel			
					SPT 5.50-5.95 m 0(HW), 2, 5 N=7							
				5.90				SP	SAND fine to coarse grained, orange brown grey, trace fine to coarse grained, sub-rounded to sub-angular gravel, trace low plasticity clay	M	MD	
			6	6.30				SP	No Recovery (6.00 - 6.30 m) SAND fine to coarse grained, orange brown grey, with fine to coarse grained, sub- angular to sub-rounded gravel, with low plasticity clay	M	MD	
	MP		7		SPT 7.00-7.45 m 8, 7, 10 N=17							
				7.45					No Recovery (7.45 - 8.50 m)			
			8	8.50	SPT 8.50-8.95 m 10, 17, 20 N=37			SP	Gravelly SAND fine to coarse grained, orange brown grey, fine to coarse grained, sub- angular to sub-rounded gravel, trace low plasticity clay	M	D	
			9	9.00					No Recovery (9.00 - 10.00 m)			
			10	10.00								

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH03

CLIENT:	Renascor Resources	DRILL RIG:	Investigator Mk5
PROJECT:	BAM Project	CONTRACTOR:	Beyond Drillling
LOCATION:	Bolivar	LOGGED:	DP DATE: 15/11/22
JOB NO:	20651.000.001	CHECKED:	RAM DATE: 5/12/22

COORDS: 277157.0 m 6153547.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	MP	▷	10	10.45	SPT 10.00-10.45 m 13, 15, 20 N=35			SP	Gravelly SAND fine to coarse grained, orange brown grey, fine to coarse grained, sub- angular to sub-rounded gravel	M	D	4.00-25.00 m: Hindmarsh Clay Formation
			11	11.50					No Recovery (10.45 - 11.50 m)			
			12	12.00	SPT 11.50-11.95 m 12, 15, 20 N=35 PP 11.80 m =600 kPa			CH	CLAY high plasticity, mottled orange-brown and grey, trace fine to coarse grained, sub-angular to sub-rounded gravel, trace fine to coarse grained sand			
								CI-CH	CLAY medium to high plasticity, mottled red orange-brown and grey, with fine to coarse grained sand, with fine to coarse grained, sub-angular gravel			
			13		SPT 13.00-13.45 m 5, 5, 7 N=12 PP 13.20 m =300 kPa PP 13.40 m =300 kPa PP 13.60 m =300 kPa PP 13.80 m =450 kPa PP 14.00 m =450 kPa PP 14.10 m =300 kPa PP 14.40 m =250 kPa U50 14.50-15.00 m					w < PL	VSt - H	
			14									
			15	15.20	SPT 15.00-15.45 m 22, 27, 29 N=56 PP 15.30 m =300 kPa PP 15.50 m =350 kPa PP 15.80 m =450 kPa PP 16.20 m =450 kPa			GC	Clayey GRAVEL fine to medium grained, rounded, orange brown and grey, low plasticity clay, with fine to coarse grained sand	M	MD	
								CI-CH	CLAY medium to high plasticity, orange brown and grey, with fine to coarse grained sand, trace fine to coarse grained, rounded gravel			
			16	16.50	PP 16.50 m =350 kPa PP 16.80 m =350 kPa			CI-CH	Sandy CLAY medium to high plasticity, orange brown and grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel		VSt - H	
			17	17.00	PP 17.10 m =450 kPa PP 17.40 m =400 kPa SPT 17.50-17.95 m 22, 32, 20 N=52 PP 17.60 m =450 kPa PP 17.80 m =400 kPa			CH	CLAY high plasticity, orange brown red, trace fine to coarse grained sand			
			18	18.00				SC	Clayey SAND fine to coarse grained, orange brown, low plasticity clay, trace fine to coarse grained, sub-rounded gravel	M	MD	
			19	18.80	SPT 19.00-19.45 m 7, 12, 18 N=30			CH	CLAY high plasticity, orange brown grey, with fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel	w < PL	H	
			20									

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH03

SHEET: 3 OF 3

CLIENT: Renascor Resources
PROJECT: BAM Project
LOCATION: Bolivar
JOB NO: 20651.000.001

COORDS: 277157.0 m 6153547.0 m MGA2020 Z54
INCLINATION: -90°
HOLE DEPTH: 25.00 m

DRILL RIG: Investigator Mk5
CONTRACTOR: Beyond Drillling
LOGGED: DP DATE: 15/11/22
CHECKED: RAM DATE: 5/12/22

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	MP		20					CH	CLAY high plasticity, orange brown grey, with fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel			4.00-25.00 m: Hindmarsh Clay Formation
					SPT 20.50-20.95 m 6, 12, 15 N=27							
			21									
			22		SPT 22.00-22.45 m 8, 15, 17 N=32							
				22.50				CI-CH	Sandy CLAY medium to high plasticity, orange brown and grey, fine to coarse grained sand, trace fine to medium grained, sub-rounded to sub-angular gravel	w < PL	H	
			23									
			24									
			25						END OF BOREHOLE @ 25.00 m TARGET DEPTH GROUNDWATER ENCOUNTERED @ 2.20 m DEPTH BACKFILLED			
			26									
			27									
			28									
			29									
			30									

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH04

SHEET: 1 OF 3

CLIENT:	Renascor Resources	COORDS: 277417.0 m 6153430.0 m MGA2020 Z54	DRILL RIG: Investigator Mk5
PROJECT:	BAM Project	SURFACE RL: DATUM:	CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	INCLINATION: -90°	LOGGED: DP DATE: 22/11/22
JOB NO:	20651.000.001	HOLE DEPTH: 25.00 m	CHECKED: RAM DATE: 5/12/22

Drilling | **Sampling** | **Field Material Description**

METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
SSA			0	0.20				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M		
				0.80				CI	Sandy CLAY medium plasticity, orange brown, fine to coarse grained sand, with fine to coarse grained, sub-rounded gravel	w < PL		0.20-4.00 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)
	EP	22/11/22 09:30	1		SPT 1.00-1.45 m 1, 2, 3 N=5			CL-CI	Sandy CLAY low to medium plasticity, mottled orange-brown and grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular gravel	w ~ PL	St	
			2	2.50								
			3		SPT 2.50-2.95 m 3, 3, 3 N=6 PP 2.90 m =300 kPa			CI	Sandy CLAY medium plasticity, brown, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular gravel			
			4	4.00	SPT 4.00-4.45 m 5, 7, 7 N=14 PP 4.50 m =390 kPa BH04-E05 ES 4.80-4.90 m			CI-CH	CLAY medium to high plasticity, mottled orange brown, with fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular calcareous gravel		VSt	4.00-20.50 m: Hindmarsh Clay Formation
HSA	MP		5	5.50	SPT 5.50-5.95 m 4, 8, 11 N=19 PP 5.50 m >600 kPa			CH	CLAY high plasticity, mottled brown grey, trace fine to medium grained sand	w < PL		
			6	6.00				CI	Sandy CLAY medium plasticity, mottled orange-brown and grey, fine to coarse grained sand, with fine to coarse grained, sub-rounded to sub-angular calcareous gravel			
				6.70				CI	Gravelly CLAY medium plasticity, mottled orange-brown and grey, fine to coarse grained, sub-rounded to sub-angular calcareous gravel			
			7	7.50	PP 6.90 m =450 kPa SPT 7.00-7.45 m 4, 7, 8 N=15 PP 7.50 m =550 kPa			CI	Sandy CLAY medium plasticity, mottled orange-brown and grey, fine to coarse grained sand, with fine to coarse grained, sub-rounded to sub-angular calcareous gravel		VSt - H	
			8	8.00					lens of Clayey GRAVEL			
					SPT 8.50-8.95 m 6, 9, 12 N=21			CI	Sandy CLAY medium plasticity, mottled orange-brown and grey, fine to coarse grained sand, with fine to coarse grained, sub-rounded to sub-angular calcareous gravel			
			9									
			10									

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH04

SHEET: 2 OF 3

CLIENT:	Renascor Resources	COORDS: 277417.0 m 6153430.0 m MGA2020 Z54	DRILL RIG: Investigator Mk5
PROJECT:	BAM Project	SURFACE RL: DATUM:	CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	INCLINATION: -90°	LOGGED: DP DATE: 22/11/22
JOB NO:	20651.000.001	HOLE DEPTH: 25.00 m	CHECKED: RAM DATE: 5/12/22

Drilling

METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL
HSA	MP		10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20	11.00, 11.90, 12.50, 12.70, 13.00, 13.50, 14.00, 15.90, 16.20, 16.50, 17.50, 18.00, 19.50

Sampling / Field Material Description

SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PP 9.90 m =400 kPa SPT 10.00-10.45 m 9, 17, 22 N=39 PP 10.00 m =380 kPa			CI	Sandy CLAY medium plasticity, mottled orange-brown and grey, fine to coarse grained sand, with fine to coarse grained, sub-rounded to sub-angular calcareous gravel	w < PL	H	4.00-20.50 m: Hindmarsh Clay Formation
			CH	CLAY high plasticity, mottled orange-brown and grey, with fine to coarse grained, sub-rounded to sub-angular calcareous gravel, with fine to coarse grained sand			
SPT 11.50-11.95 m 5, 9, 13 N=22 PP 11.80 m >600 kPa			GC	Clayey GRAVEL fine to coarse grained, sub-rounded to sub-angular, mottled orange-brown and grey black, low plasticity clay	M	D	
				No Recovery (12.00 - 12.50 m)			
			GC	Clayey GRAVEL fine to coarse grained, sub-rounded to sub-angular, orange brown and grey, low plasticity clay, trace fine to coarse grained sand	M	D	
			CI		w < PL		
SPT 13.00-13.45 m 8, 20, 25 N=45			CH	Gravelly CLAY medium plasticity, orange brown and grey, fine to coarse grained, sub-rounded to sub-angular calcareous gravel, with fine to coarse grained sand		H	
PP 13.50 m >600 kPa			CI	CLAY high plasticity, orange brown and grey, trace fine to coarse grained sand		VSt	
			CH	Sandy CLAY medium plasticity, orange brown and grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular calcareous gravel			
SPT 14.50-14.95 m 5, 7, 11 N=18 PP 14.90 m >600 kPa				CLAY high plasticity, orange brown and grey, trace fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel		H	
			SC	Clayey SAND fine to coarse grained, orange brown and grey, medium plasticity clay	M	MD	
SPT 16.00-16.45 m 4, 11, 15 N=26			CH	No Recovery (16.00 - 16.20 m)	w < PL	VSt	
			SC	Sandy CLAY high plasticity, orange brown and grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular calcareous gravel, with calcareous nodules			
				Clayey SAND fine to coarse grained, orange brown and grey, medium plasticity clay	M	MD	
SPT 17.50-17.95 m 5, 7, 10 N=17			CL	Sandy CLAY low plasticity, orange brown and grey, fine to coarse grained sand	w < PL	VSt	
PP 18.10 m =450 kPa PP 18.50 m =480 kPa PP 18.90 m =450 kPa SPT 19.00-19.45 m 7, 8, 11 N=19			CI	Sandy CLAY medium plasticity, orange brown and grey, fine to coarse grained sand			
PP 19.50 m =550 kPa				No Recovery (19.50 - 20.50 m)			

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

BOREHOLE: BH04

SHEET: 3 OF 3

CLIENT:	Renascor Resources	COORDS: 277417.0 m 6153430.0 m MGA2020 Z54	DRILL RIG: Investigator Mk5
PROJECT:	BAM Project	SURFACE RL: DATUM:	CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	INCLINATION: -90°	LOGGED: DP DATE: 22/11/22
JOB NO:	20651.000.001	HOLE DEPTH: 25.00 m	CHECKED: RAM DATE: 5/12/22

Drilling					Sampling		Field Material Description					
METHOD / SUPPORT	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HSA	MP	▽	20	20.50					No Recovery (19.50 - 20.50 m)			4.00-20.50 m: Hindmarsh Clay Formation
					SPT 20.50-20.95 m 4, 9, 15 N=24			SC	Clayey SAND fine to coarse grained, orange brown and grey, low plasticity clay	W	MD	20.50-25.00 m: Carisbrooke Sand Formation
			21	21.00					No Recovery (21.00 - 22.00 m)			
			22	22.00	SPT 22.00-22.45 m 5, 18, 26 N=44			SC	Clayey SAND fine to coarse grained, grey, low plasticity clay	W	D	
				22.40								
				22.50				SP	Gravelly SAND fine to coarse grained, pale orange grey, fine to coarse grained, sub-rounded to sub-angular gravel			
			23						No Recovery (22.50 - 23.50 m)			
				23.50	SPT 23.50-23.95 m 12, 20, 25 N=45			SP	SAND fine to coarse grained, brown, trace fine to coarse grained, sub-rounded gravel			
			24		SPT 24.50-24.95 m 14, 22, 24 N=46					W	D	
			25						END OF BOREHOLE @ 25.00 m TARGET DEPTH GROUNDWATER ENCOUNTERED @ 1.50 m DEPTH BACKFILLED			
			26									
			27									
			28									
			29									
			30									

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED FULL PAGE 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:24 10.03.00.09 Datgel Tools

TEST PIT: TP01

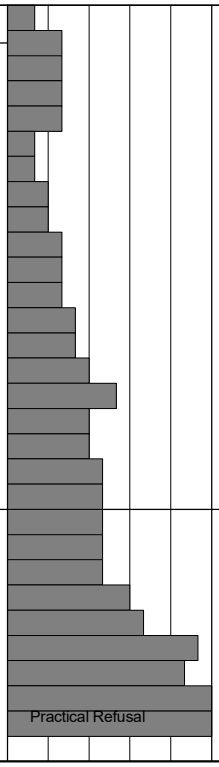
SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277208.2 m 6153660.2 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: RAM DATE: 10/8/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: SFF DATE: 22/8/22

Excavation | **Sampling** | **Field Material Description**

METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
TB	EP		0.0	0.15				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M		
			0.5		TP01-B01 0.20-0.50 m			CL-CI	Sandy CLAY low to medium plasticity, red-orange brown, fine to coarse grained sand	w < PL	St	0.15-2.00 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)
			1.0							w ~ PL		
		10/08/22 09:30	1.5	1.70	TP01-B02 1.70-1.90 m			CL	Sandy CLAY low plasticity, brown, fine to coarse grained sand, with lenses of clayey sand	w > PL	VSt	
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.70 m DEPTH BACKFILLED			
			2.5									
			3.0									

DCP TEST (AS1289.6.3.2) Blows per 100 mm



Photographs

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:58 10.03.00.09 Datgel Tools

TEST PIT: TP02

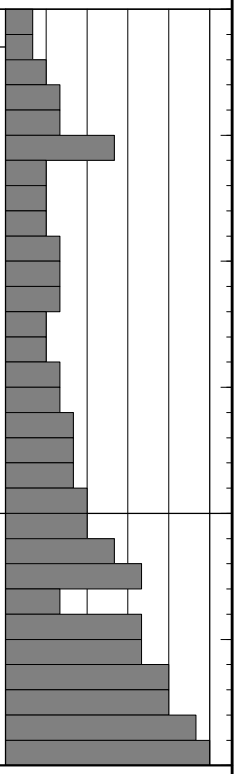
SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277198.1 m 6153601.1 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: RAM DATE: 10/8/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: SFF DATE: 22/8/22

Excavation | **Sampling** | **Field Material Description**

METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
TB	EP	10/08/22 14:00	0.0	0.15				SP	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	D		
			0.5		TP02-B01 0.20-0.50 m			CI	Sandy CLAY medium plasticity, red and orange brown, fine to coarse grained sand	w < PL	St	0.15-2.00 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)
			1.0							w ~ PL		
			1.5	1.60	TP02-B02 1.60-1.90 m			CL	Sandy CLAY low plasticity, grey- brown, fine to coarse grained sand, with lenses of sandy clay	w > PL		
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.70 m DEPTH BACKFILLED			
			2.5									
			3.0									

DCP TEST (AS1289.6.3.2) Blows per 100 mm



Photographs

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:59 10.03.00.09 Datgel Tools

TEST PIT: TP03

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277199.0 m 6153520.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: RAM DATE: 10/8/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP		0.0	0.15				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
			0.5		TP03-B01 0.20-0.50 m			CI-CH	Sandy CLAY medium to high plasticity, orange and red brown, fine to coarse grained sand, trace fine to coarse grained, rounded gravel	w < PL	F - St	0.15-2.00 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)	
			1.0								St		
			1.5	1.60						w ~ PL	St - VSt		Practical Refusal
		10/08/22 14:30			TP03-B02 1.70-1.90 m			CL	Gravelly CLAY low plasticity, pale grey brown, fine to coarse grained, rounded, calcareous gravel, with fine to coarse grained sand	w > PL	H	1.60-2.00 m: Glanville Formation	
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.70 m DEPTH BACKFILLED				
			2.5										
			3.0										

Photographs

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:59 10.03.00.09 Datgel Tools

TEST PIT: TP04

CLIENT:	Renascor Resources	COORDS: 277289.2 m 6153475.8 m MGA2020 Z54	SHEET: 1 OF 1
PROJECT:	BAM Project		MACHINE: 8t Excavator
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	CONTRACTOR: Beyond Drillling
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	LOGGED: RAM DATE: 10/8/22
			CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP	10/08/22 15:45	0.0	0.20	TP04-ASS1 0.10-0.20 m TP04-B01 0.20-0.50 m			SM	TOPSOIL: Silty SAND fine to coarse grained, brown, tarce rootlets	M			
			0.5	0.80				CI	Sandy CLAY medium plasticity, red brown, fine to coarse grained sand, trace fine to coarse grained, rounded gravel	w < PL	St	0.20-0.80 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)	
			1.0		TP04-B02 0.80-1.10 m			GC / CL	Clayey GRAVEL / Gravelly CLAY fine to coarse grained, rounded, calcareous, low plasticity clay, trace fine to coarse grained sand	M	MD	0.80-2.00 m: Glanville Formation	
			1.5							W	D		Practical Refusal
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.20 m DEPTH BACKFILLED				
			2.5										
			3.0										

Photographs

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:59 10.03.00.09 Datgel Tools

TEST PIT: TP05

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277304.8 m 6153591.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: RAM DATE: 10/8/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm	
TB	EP	10/08/22 13:30	0.0	0.15				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M				
					TP05-B01 0.20-0.50 m			CI	Sandy CLAY medium plasticity, orange brown to red, fine to coarse grained sand, trace fine to coarse grained, rounded gravel	w < PL	St	0.15-2.00 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)		
			0.5											
			1.0							w ~ PL				
			1.5	1.70										
					TP05-B02 1.70-2.00 m			CL	Sandy CLAY low plasticity, grey brown, fine to coarse grained sand, trace lenses of clayey sand	w > PL	VSt			
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.70 m DEPTH BACKFILLED				Practical Refusal	
			2.5											
			3.0											

DCP TEST (AS1289.6.3.2) Blows per 100 mm: 0 3 6 9 12 15

Photographs

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TEST PIT: TP06

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277298.5 m 6153528.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 1.80 m	LOGGED: RAM DATE: 10/8/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP	10/08/22 15:00	0.0	0.20				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
			0.5	0.70	TP06-B01 0.20-0.50 m			CI	Sandy CLAY medium plasticity, brown to red, fine to coarse grained sand, with fine to coarse grained, rounded gravel	w < PL	St	0.20-0.70 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)	
			1.0		TP06-B02 0.70-1.00 m			GC / CL	Clayey GRAVEL / Gravelly CLAY fine to coarse grained, rounded, pale grey brown, low plasticity clay, with fine to coarse grained sand	W	D	0.70-1.80 m: Glanville Formation	Practical Refusal
			1.5										
			2.0						TEST PIT DISCONTINUED @ 1.80 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.20 m DEPTH BACKFILLED				
			2.5										
			3.0										

Photographs

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TEST PIT: TP07

CLIENT:	Renascor Resources	COORDS: 277392.8 m 6153539.8 m MGA2020 Z54	SHEET: 1 OF 1
PROJECT:	BAM Project		MACHINE: 8t Excavator
LOCATION:	Bolivar	PIT DEPTH: 1.00 m	CONTRACTOR: Beyond Drillling
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	LOGGED: DP DATE: 28/11/22
			CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP	28/11/22 08:00	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
				0.20	TP07-B01 0.20-0.50 m			CI	Sandy CLAY medium plasticity, red brown, fine to coarse grained sand	w < PL	St	0.20-0.75 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)	PR
			0.5	0.80	TP07-B02 0.75-1.00 m			GC / CL	Clayey GRAVEL / Gravelly CLAY fine to coarse grained, rounded, calcareous, red brown, low plasticity clay, with fine to coarse grained sand	W	D	0.75-1.00 m: Glanville Formation	
			1.0						TEST PIT DISCONTINUED @ 1.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 0.90 m DEPTH BACKFILLED				
			1.5										
			2.0										
			2.5										
			3.0										

Photographs

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TEST PIT: TP08

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277397.0 m 6153489.0 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.30 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP	28/11/22 08:15	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
				0.30	TP08-B01 0.30-0.60 m TP08-ASS2 0.40-0.50 m			CI	Sandy CLAY medium plasticity, red, brown, fine to coarse grained sand, with fine to coarse grained, sub-rounded gravel	w < PL w ~ PL	St	0.30-0.90 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS) 0.30 m: Thermal Resistivity = 2.044 mK/W	
			0.5										
				0.90				CL-CI	Gravelly Sandy CLAY low to medium plasticity, orange brown mottled grey, fine to coarse grained sand, fine to coarse grained, sub-rounded gravel			0.90-2.30 m: Glanville Formation	Practical Refusal
			1.0		TP08-B02 1.00-1.30 m								
			1.5							w > PL	H		
			2.0										
			2.5						TEST PIT DISCONTINUED @ 2.30 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 0.90 m DEPTH BACKFILLED				
			3.0										

Photographs

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TEST PIT: TP09

CLIENT:	Renascor Resources	COORDS: 277380.6 m 6153397.8 m MGA2020 Z54	SHEET: 1 OF 1
PROJECT:	BAM Project		MACHINE: 8t Excavator
LOCATION:	Bolivar	PIT DEPTH: 3.00 m	CONTRACTOR: Beyond Drillling
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	LOGGED: DP DATE: 28/11/22
			CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)	
TB	EP	28/11/22 08:30	0.0	0.20				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M				
			0.5	0.80	TP09-B01 0.20-0.60 m			CI	Sandy CLAY medium plasticity, orange brown, fine to coarse grained sand, with fine to coarse grained, sub-rounded to rounded gravel	w < PL / w ~ PL	St	0.20-0.80 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)		
			1.0		TP09-B02 0.80-1.20 m			GC / CL	Clayey GRAVEL / Gravelly CLAY fine to coarse grained, rounded, calcareous, red brown, low plasticity clay, with fine to coarse grained sand	W	MD / D	0.80-3.00 m: Glanville Formation	Practical Refusal	
			1.5											
			2.0											
			2.5						TEST PIT DISCONTINUED @ 3.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 0.80 m DEPTH BACKFILLED					
			3.0											

Photographs

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TEST PIT: TP10

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277436.0 m 6153378.0 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)	
TB	EP	28/11/22 08:45	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M				
				0.20				CI	Sandy CLAY medium plasticity, orange brown, fine to coarse grained sand	w < PL w ~ PL	St	0.20-1.50 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)		
			0.5											
				0.90	TP10-B01 0.90-1.20 m			CL-CI	Sandy CLAY low to medium plasticity, orange brown, fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel	w > PL				
			1.0											
											VSt			
				1.50										
			1.5		TP10-B02 1.50-1.90 m			SP	Gravelly SAND fine to coarse grained, mottled pale brown orange and grey, fine to coarse grained, sub-rounded to sub-angular, calcareous gravel	W	D	1.50-2.00 m: Glanville Formation	Practical Refusal	
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 0.70 m DEPTH BACKFILLED					
			2.5											
			3.0											

Photographs

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TEST PIT: TP11

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277480.1 m 6153407.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation | **Sampling** | **Field Material Description**

METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP	28/11/22 09:00	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
				0.30	TP11-B01 0.20-0.60 m			CI	Sandy CLAY medium plasticity, orange brown, fine to coarse grained sand, with fine to coarse grained, sub-rounded to sub-angular gravel	w < PL w ~ PL	St	0.30-2.00 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)	
			0.5		HV 0.50 m s_v=130 kPa								
				0.80	TP11-ASS5 0.80-0.90 m TP11-B02 0.90-1.10 m			CL-CI	Sandy CLAY low to medium plasticity, mottled orange grey and brown, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular gravel	w > PL	VSt - H		Practical Refusal
			1.0										
			1.5										
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 0.70 m DEPTH BACKFILLED				
			2.5										
			3.0										

Photographs

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TEST PIT: TP12

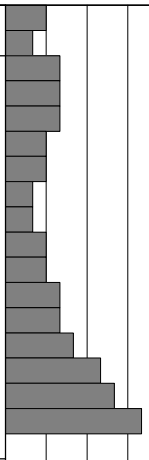
SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277489.0 m 6153457.0 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.30 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation | **Sampling** | **Field Material Description**

METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
TB	EP	28/11/22 09:15	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M		
				0.20	TP12-B01 0.20-0.60 m			CI-CH	Sandy CLAY medium to high plasticity, orange brown, fine to coarse grained sand, with fine to coarse grained, sub-rounded gravel	w < PL		0.20-1.80 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)
			0.5	0.60	TP12-B02 0.60-0.90 m			CL-CI	Sandy CLAY low to medium plasticity, orange brown, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular gravel	w ~ PL	St	
			1.0							w > PL		
			1.5								VSt	
				1.80	TP12-ASS4 1.80-1.90 m			SC	Clayey SAND fine to coarse grained, pale brown grey, low plasticity clay	M	D	1.80-2.30 m: Glanville Formation
			2.0									
			2.5						TEST PIT DISCONTINUED @ 2.30 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 0.70 m DEPTH BACKFILLED			
			3.0									

DCP TEST (AS1289.6.3.2) Blows per 100 mm



Photographs

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TEST PIT: TP13

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277592.0 m 6153295.0 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.80 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)	
TB	EP	28/11/22 09:30	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M				
				0.20	TP013-B01 0.20-0.60 m			Cl	Gravelly CLAY medium plasticity, orange brown, fine to coarse grained, sub-rounded to rounded, calcareous gravel	w < PL	St	0.20-2.80 m: Glanville Formation		
			0.5							w ~ PL	VSt			
				0.90	TP13-B02 0.90-1.20 m			Cl	Sandy CLAY medium plasticity, grey brown, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular gravel				Practical Refusal	
			1.0											
			1.5							w > PL	H			
			2.0											
			2.5						TEST PIT DISCONTINUED @ 2.80 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 0.60 m DEPTH BACKFILLED					
			3.0											

Photographs

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TEST PIT: TP14

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277574.0 m 6153344.0 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP	28/11/22 09:45	0.0	0.20				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
				0.50	TP14-B01 0.20-0.50 m			CI	Gravelly CLAY medium plasticity, orange brown, fine to coarse grained, sub-rounded to rounded gravel	w < PL	St	0.20-2.00 m: Glanville Formation	
			0.5		TP14-B02 0.50-0.90 m			SP	Gravelly SAND fine to coarse grained, orange brown, fine to coarse grained, sub-rounded to rounded gravel	M	MD		
			1.0							W	D		Practical Refusal
			1.5										
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 0.7 m DEPTH BACKFILLED				
			2.5										
			3.0										

Photographs

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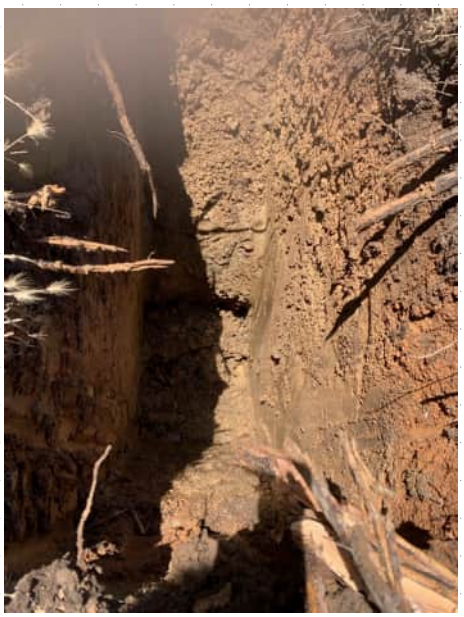
TEST PIT: TP15

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277581.4 m 6153399.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP	28/11/22 10:00	0.0	0.20				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
			0.5		TP15-B01 0.20-0.60 m			CI	CLAY medium plasticity, pale brown, with fine to coarse grained sand, with fine to coarse grained, sub-rounded gravel	w < PL	St	0.20-2.00 m: Glanville Formation	
			1.0	1.20						w ~ PL			Practical Refusal
			1.5		TP15-B02 1.20-1.50 m			SC	Clayey SAND fine to coarse grained, mottled orange grey and brown, low plasticity clay	W	D		
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.20 m DEPTH BACKFILLED				
			2.5										
			3.0										

Photographs



This log must be read in conjuction with accompanying symbols and abbreviations used on Geotechnical Logs.
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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:59 10.03.00.09 Datgel Tools

TEST PIT: TP16

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277640.3 m 6153204.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.40 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)	
TB	EP	28/11/22 10:15	0.0					SM	Silty SAND fine to coarse grained, brown, trace rootlets	M				
				0.20	TP16-B01 0.20-0.60 m			Cl	Sandy CLAY medium plasticity, red orange brown, fine to coarse grained sand, with fine to coarse grained, sub-rounded to rounded gravel		St	0.20-2.40 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)	Practical Refusal	
			0.5	0.50					brown	w < PL	H			
			1.0											
			1.5	1.70					mottled orange grey and brown	w ~ PL				
			2.0							w > PL				
			2.5						TEST PIT DISCONTINUED @ 2.40 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.70 m DEPTH BACKFILLED					
			3.0											

Photographs

This log must be read in conjuction with accompanying symbols and abbreviations used on Geotechnical Logs.
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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:59 10.03.00.09 Datgel Tools

TEST PIT: TP17

CLIENT:	Renascor Resources	COORDS: 277248.8 m 6153682.8 m MGA2020 Z54	SHEET: 1 OF 1
PROJECT:	BAM Project		MACHINE: 8t Excavator
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	CONTRACTOR: Beyond Drillling
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	LOGGED: RAM DATE: 10/8/22
			CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm	
TB	EP		0.0	0.10				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M				
					TP17-B01 0.10-0.40 m			CI	Sandy CLAY medium plasticity, red and orange brown, fine to coarse grained sand, trace fine to coarse grained, rounded gravel	w < PL	St	0.10-1.70 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)		
			0.5											
			1.0											
			1.5							w ~ PL	VSt			
		10/08/22 10:15		1.70	TP17-B02 1.70-1.90 m			SC	Clayey SAND fine to coarse grained, brown, low plasticity clay	W	MD - D	1.70-2.00 m: Glanville Formation		
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.70 m DEPTH BACKFILLED					
			2.5										Practical Refusal	
			3.0											

DCP TEST (AS1289.6.3.2) Blows per 100 mm: 0 3 6 9 12 15

Photographs

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:59 10.03.00.09 Datgel Tools

TEST PIT: TP18

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277552.3 m 6153336.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: RAM DATE: 10/8/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP		0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
				0.20	TP18-B01 0.20-0.50 m			CI-CH	Sandy CLAY medium to high plasticity, orange brown, fine to coarse grained sand, trace fine to coarse grained, rounded gravel	w < PL	St	0.20-2.00 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)	
			0.5										
			1.0							w ~ PL			
			1.5	1.60							VSt		
		10/08/22 10:30			TP18-B02 1.60-1.90 m			CL	Sandy CLAY low plasticity, grey brown, fine to coasre grained sand, trace lenses of clayey sand	w > PL	H		
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.60 m DEPTH BACKFILLED				Practical Refusal
			2.5										
			3.0										

Photographs

This log must be read in conjuction with accompanying symbols and abbreviations used on Geotechnical Logs.
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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:59 10.03.00.09 Datgel Tools

TEST PIT: TP19

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277581.4 m 6153399.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.10 m	LOGGED: RAM DATE: 10/8/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm
TB	EP	10/08/22 13:00	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
				0.20	TP19-B01 0.20-0.50 m			CI	Sandy CLAY medium plasticity, orange and red brown, fine to coarse grained sand, trace fine to coarse grained, rounded gravel	w < PL	St	0.20-2.10 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)	
			0.5										
			1.0							w ~ PL			
			1.5								VSt		
				1.70	TP19-B02 1.70-2.00 m			CL	Sandy CLAY low plasticity, grey brown, fine to coarse grained sand, with lenses of clayey sand	w > PL	VSt - H		
			2.0										
									TEST PIT DISCONTINUED @ 2.10 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.80 m DEPTH BACKFILLED				
			2.5										
			3.0										

DCP TEST (AS1289.6.3.2) Blows per 100 mm: 0 3 6 9 12 15

Practical Refusal

Photographs

This log must be read in conjuction with accompanying symbols and abbreviations used on Geotechnical Logs.
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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 12:59 10.03.00.09 Datgel Tools

TEST PIT: TP20

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277478.0 m 6153576.0 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 1.90 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm
TB	EP	28/11/22 10:30	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
				0.20	TP20-B01 0.20-0.60 m			CI	Sandy Gravelly CLAY medium plasticity, orange brown, fine to coarse grained, sub-rounded to sub-angular gravel, fine to coarse grained sand	w < PL	St	0.20-1.90 m: Glanville Formation	
			0.5							w ~ PL	VSt		
			1.0	1.00	TP20-B02 1.00-1.50 m			CI	Sandy CLAY medium plasticity, mottled orange-brown, fine to coarse grained sand	w > PL	H		
			1.5		TP20-ASS3 1.50-1.60 m								
			2.0						TEST PIT DISCONTINUED @ 1.90 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.00 m DEPTH BACKFILLED				
			2.5										
			3.0										

DCP TEST (AS1289.6.3.2) Blows per 100 mm: 0 3 6 9 12 15

Photographs

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:00 10.03.00.09 Datgel Tools

TEST PIT: TP21

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277369.0 m 6153712.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.20 m	LOGGED: RAM DATE: 10/8/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP		0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown	D			
				0.20	TP21-B01 0.20-0.50 m			CI	Sandy CLAY medium plasticity, red and brown, fine to coarse grained sand, trace fine to coarse grained, rounded gravel	w < PL	St	0.20-2.00 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)	
			0.5										
			1.0								VSt		
			1.5							w ~ PL	St - VSt		
				1.80									
		10/08/22 12:00	2.0		TP21-B02 1.80-2.00 m			CL	Sandy CLAY low plasticity, grey brown, fine to coarse grained sand, trace lenses of clayey sand	w > PL	VSt		
			2.5						TEST PIT DISCONTINUED @ 2.20 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.80 m DEPTH BACKFILLED				Practical Refusal
			3.0										

Photographs

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:00 10.03.00.09 Datgel Tools

TEST PIT: TP22

CLIENT:	Renascor Resources	COORDS: 277282.1 m 6153703.8 m MGA2020 Z54	SHEET: 1 OF 1
PROJECT:	BAM Project		MACHINE: 8t Excavator
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	CONTRACTOR: Beyond Drillling
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	LOGGED: RAM DATE: 10/8/22
			CHECKED: SFF DATE: 22/8/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm	
TB	EP	10/08/22 11:00	0.0	0.15				SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M				
			0.5		TP22-B01 0.20-0.50 m			CI	Sandy CLAY medium plasticity, pale orange brown and red brown, fine to coarse grained sand, trace fine to coarse grained, rounded gravel	w < PL	St	0.15-2.00 m: Undifferentiated Quaternary Sediments (Qa), developed in estuarine deposits (EMS)		
			1.0							w ~ PL	VSt			
			1.5	1.70	TP22-B02 1.70-2.00 m			CL	Sandy CLAY low plasticity, brown and grey, fine to coarse grained sand, with lenses of clayey sand	w > PL				
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.70 m DEPTH BACKFILLED				Practical Refusal	
			2.5											
			3.0											

DCP TEST (AS1289.6.3.2) Blows per 100 mm: 0 3 6 9 12 15

Photographs

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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:00 10.03.00.09 Datgel Tools

TEST PIT: TP23

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277520.1 m 6153614.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description						
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)
TB	EP	28/11/22 11:00	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M			
				0.20	TP23-B01 0.20-0.50 m			CL	Sandy CLAY low plasticity, orange brown, fine to coarse grained sand, trace fine to coarse grained, sub-rounded gravel	w < PL	St	0.20-2.00 m: Glanville Formation	Practical Refusal
			0.5										
			1.0	1.10	TP23-B02 1.10-1.40 m			CI	Sandy CLAY medium plasticity, mottled orange brown and grey, fine to coarse grained sand, trace fine to coarse grained, sub-rounded to sub-angular gravel	w ~ PL w > PL	H		
			1.5										
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.10 m DEPTH BACKFILLED				
			2.5										
			3.0										

Photographs

This log must be read in conjuction with accompanying symbols and abbreviations used on Geotechnical Logs.
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ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:00 10.03.00.09 Datgel Tools

TEST PIT: TP25

SHEET: 1 OF 1

CLIENT:	Renascor Resources	COORDS: 277525.2 m 6153520.8 m MGA2020 Z54	MACHINE: 8t Excavator
PROJECT:	BAM Project		CONTRACTOR: Beyond Drillling
LOCATION:	Bolivar	PIT DEPTH: 2.00 m	LOGGED: DP DATE: 28/11/22
JOB NO:	20651.000.001	BUCKET TYPE: 450mm Toothed	CHECKED: RAM DATE: 5/12/22

Excavation					Sampling		Field Material Description							
METHOD / SUPPORT	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm (0 3 6 9 12 15)	
TB	EP	28/11/22	0.0					SM	TOPSOIL: Silty SAND fine to coarse grained, brown, trace rootlets	M				
				0.25	TP25-B01 0.25-0.50 m			CI	Sandy CLAY medium plasticity, orange brown, fine to coarse grained sand, with fine to coarse grained, sub-rounded gravel	w < PL	St	0.25-2.00 m: Undifferentiated Quaternary Sediments(Qa), developed in estuarine deposits (EMS)		
			0.5											
			1.0	1.00					mottled orange brown and grey, trace fine to coarse grained, sub-rounded gravel					
										w ~ PL	VSt - H		Practical Refusal	
			1.5							w > PL				
			2.0						TEST PIT DISCONTINUED @ 2.00 m PRACTICAL REFUSAL GROUNDWATER ENCOUNTERED @ 1.50 m DEPTH BACKFILLED					
			2.5											
			3.0											

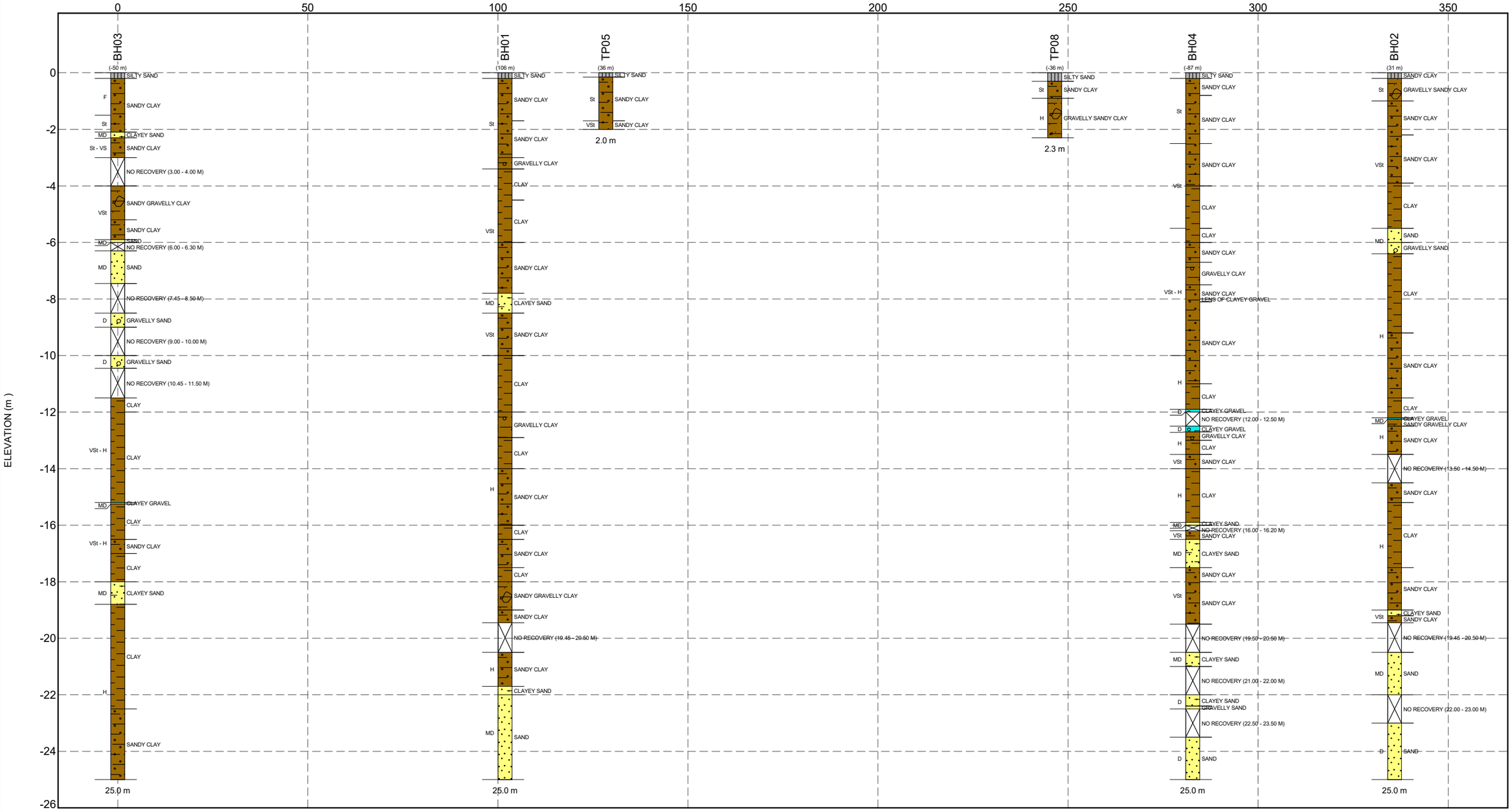
Photographs

This log must be read in conjuction with accompanying symbols and abbreviations used on Geotechnical Logs.
It has been prepared for geotechnical purposes only.

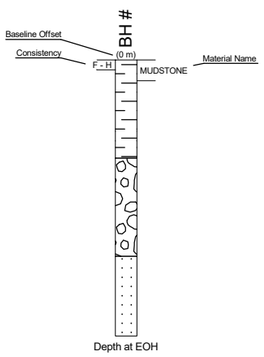
ENGEO 2.00.2.2 LIB.GLB Log ENGEO NON-CORED WITH SKETCH 20651 GINT.GPJ <<DrawingFile>> 16/12/2022 13:00 10.03.00.09 Datgel Tools

APPENDIX 3:

Soil Profile Cross Section



POST LEGEND



MATERIAL GRAPHIC

- TOPSOIL
- CLAY
- VOID
- Clayey GRAVEL
- Sandy CLAY
- Clayey SAND
- SAND
- Gravelly CLAY
- Sandy Gravelly CLAY
- Gravelly SAND

H 1:1045

0 10 20 30 40 50m

V 1:141

0 1 2 3 4 5m

Coord.System: Zone MGA2020 Z54 Height Datum:

CLIENT
Renascor Resources

CONSULTANT
ENGEO

YYYY-MM-DD	2023-01-23
PREPARED	HS
DESIGN	
REVIEW	CL
APPROVED	CL

PROJECT
BAM Project
Bolivar

TITLE
Inferred Subsurface Section A-A'

PROJECT No.	CONTROL	Rev.	FIGURE
20651.000.001			1

ENGEO 2.00.2.2 LIB:GLB Fence FENCE A3L NO PLAN 20651 GINT.GPJ <<DrawingFile>> 23/01/2023 15:22 10.03.00.09 Datgel Tools

APPENDIX 4:

Laboratory Test Certificates - Geotechnical

SMS Geotechnical Pty. Ltd.
Unit 9/21 Beafield Road
Para Hills West, South Australia 5096
Ph. (08) 8258 7498
www.smsgeotechnical.com.au

Report No: MAT:1-2229489
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229489'.

Material Test Report

Client: ENGEO
PO Box 79, Mitcham SA 5062

Project No: SMS1.22067

Project: Submitted Samples

Location: BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

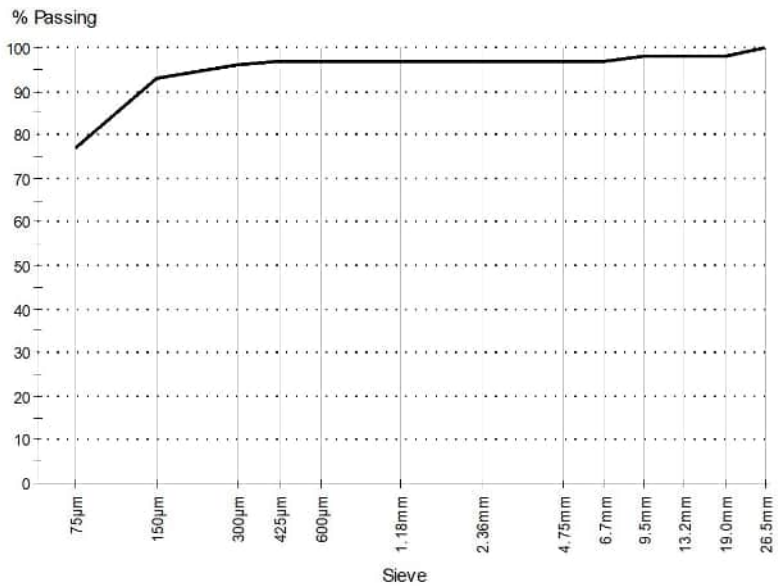
Sample ID	1-2229489
Sample Location	BH01
Depth	5.50 - 5.95m
Sampling Method	Submitted by client
Specification	-
Material Description	(CL) CLAY, low plasticity, brown/grey, with fine to coarse sand, trace of fine to coarse gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	15.4	
Date Tested		7/12/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	7.0	
Mould Length (mm)		250	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 8/12/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	98	
13.2mm	98	
9.5mm	98	
6.7mm	97	
4.75mm	97	
2.36mm	97	
1.18mm	97	
600µm	97	
425µm	97	
300µm	96	
150µm	93	
75µm	77	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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SMS Geotechnical Pty. Ltd.
Unit 9/21 Beafield Road
Para Hills West, South Australia 5096
Ph. (08) 8258 7498
www.smsgeotechnical.com.au

Report No: MAT:1-2229489
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229489'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	32	
Plastic Limit (%)	AS 1289.3.2.1	18	
Plasticity Index (%)	AS 1289.3.3.1	14	
Date Tested		10/12/2022	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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SMS Geotechnical Pty. Ltd.
Unit 9/21 Beafield Road
Para Hills West, South Australia 5096
Ph. (08) 8258 7498
www.smsgeotechnical.com.au

Report No: MAT:1-2229490
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229490'.

Material Test Report

Client: ENGEO
PO Box 79, Mitcham SA 5062

Project No: SMS1.22067

Project: Submitted Samples

Location: BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

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Sample Details

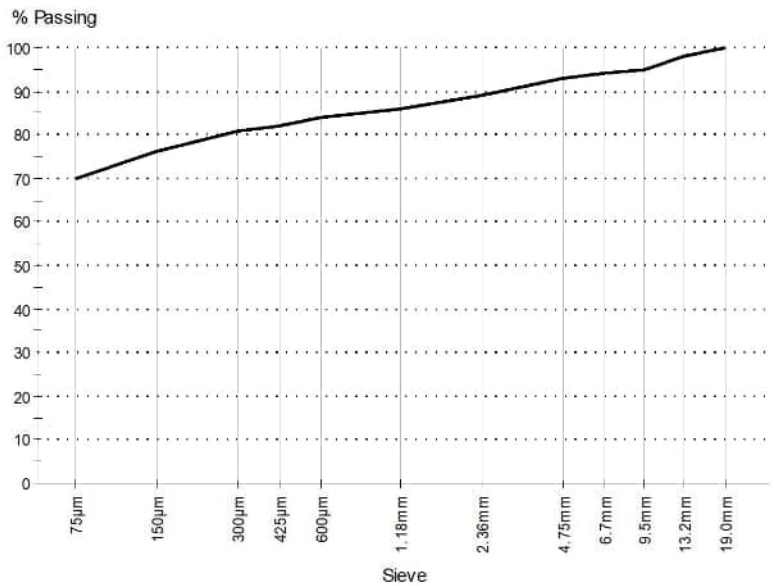
Sample ID	1-2229490
Sample Location	BH02
Depth	11.50 - 11.95m
Sampling Method	Submitted by client
Specification	-
Material Description	(CI) CLAY, medium plasticity, brown, with fine to coarse sand, trace of fine to medium gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.8	
Date Tested		7/12/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	11.5	
Mould Length (mm)		250	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 8/12/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	98	
9.5mm	95	
6.7mm	94	
4.75mm	93	
2.36mm	89	
1.18mm	86	
600µm	84	
425µm	82	
300µm	81	
150µm	76	
75µm	70	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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Report No: MAT:1-2229490
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229490'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	45	
Plastic Limit (%)	AS 1289.3.2.1	18	
Plasticity Index (%)	AS 1289.3.3.1	27	
Date Tested		10/12/2022	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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Report No: MAT:1-2229487
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229487'.

Material Test Report

Client: ENGEO
PO Box 79, Mitcham SA 5062

Project No: SMS1.22067

Project: Submitted Samples

Location: BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

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Sample Details

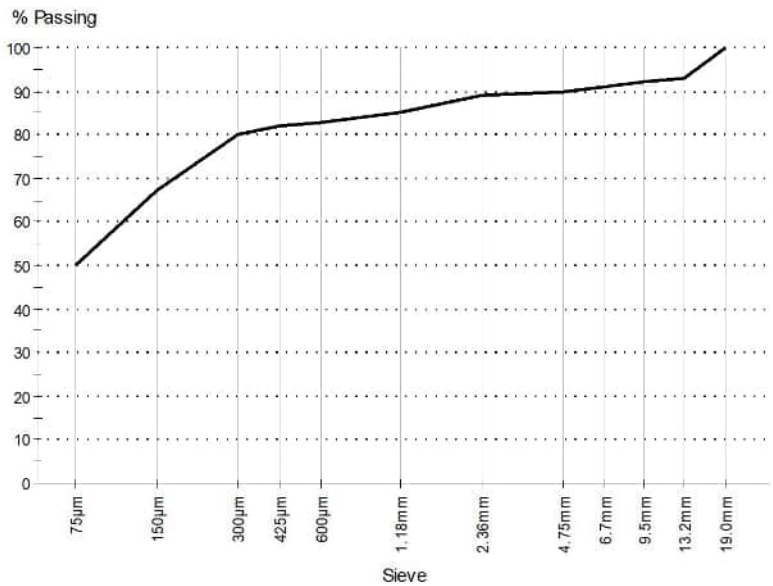
Sample ID	1-2229487
Sample Location	BH03
Depth	2.50 - 2.95m
Sampling Method	Submitted by client
Specification	-
Material Description	(CL) Sandy CLAY, low plasticity, pale brown, approx. 50% fine to coarse sand, with fine to medium gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.6	
Date Tested		6/12/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	6.0	
Mould Length (mm)		150	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 8/12/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	93	
9.5mm	92	
6.7mm	91	
4.75mm	90	
2.36mm	89	
1.18mm	85	
600µm	83	
425µm	82	
300µm	80	
150µm	67	
75µm	50	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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Report No: MAT:1-2229487
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229487'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

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Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	26	
Plastic Limit (%)	AS 1289.3.2.1	15	
Plasticity Index (%)	AS 1289.3.3.1	11	
Date Tested		10/12/2022	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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Report No: MAT:1-2229488
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229488'.

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

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Sample Details

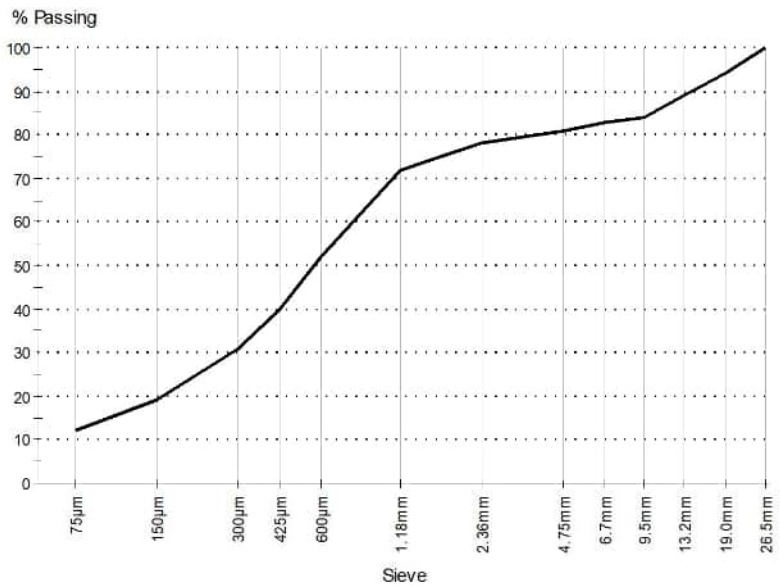
Sample ID	1-2229488
Sample Location	BH03
Depth	7.00 - 7.45m
Sampling Method	Submitted by client
Specification	-
Material Description	(SP) SAND, fine to coarse grained, pale brown, with low plasticity fines, with fine to coarse gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	13.3	
Date Tested		7/12/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	2.5	
Mould Length (mm)		250	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 8/12/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	94	
13.2mm	89	
9.5mm	84	
6.7mm	83	
4.75mm	81	
2.36mm	78	
1.18mm	72	
600µm	52	
425µm	40	
300µm	31	
150µm	19	
75µm	12	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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Report No: MAT:1-2229488
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229488'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

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The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

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Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	22	
Plastic Limit (%)	AS 1289.3.2.1	17	
Plasticity Index (%)	AS 1289.3.3.1	5	
Date Tested		10/12/2022	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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Report No: MAT:1-2229491
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229491'.

Material Test Report

Client: ENGEO
PO Box 79, Mitcham SA 5062

Project No: SMS1.22067

Project: Submitted Samples

Location: BAM Project, Boliver - 20651.000.001 - TR002

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NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

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Sample Details

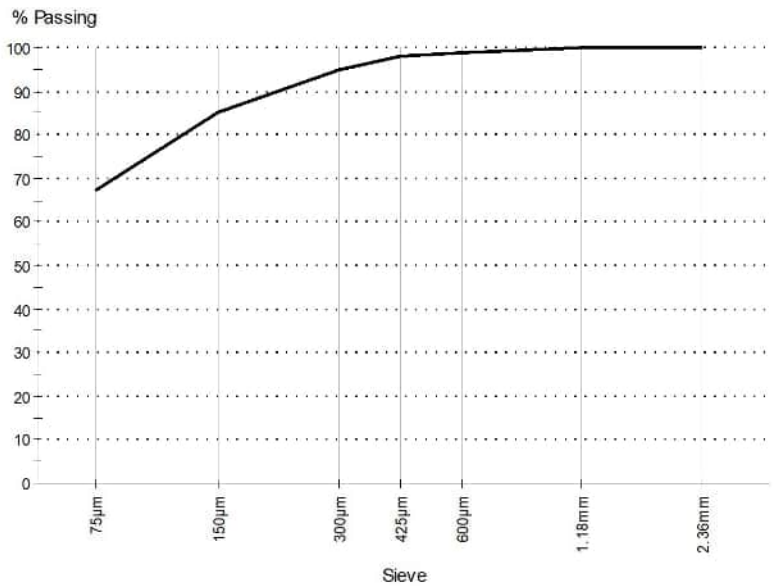
Sample ID	1-2229491
Sample Location	BH04
Depth	17.50 - 17.95m
Sampling Method	Submitted by client
Specification	-
Material Description	(CL) Sandy CLAY, low plasticity, brown, approx. 35% fine to coarse sand

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.5	
Date Tested		7/12/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	7.5	
Mould Length (mm)		250	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 7/12/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
2.36mm	100	
1.18mm	100	
600µm	99	
425µm	98	
300µm	95	
150µm	85	
75µm	67	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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Report No: MAT:1-2229491
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229491'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
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NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

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Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	31	
Plastic Limit (%)	AS 1289.3.2.1	17	
Plasticity Index (%)	AS 1289.3.3.1	14	
Date Tested		10/12/2022	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content added

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Material Test Report

Report No: MAT:1-2220454
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220454'.

Client: ENGEO
PO Box 79, Mitcham SA 5062

Project No: SMS1.22067

Project: Submitted Samples

Location: BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

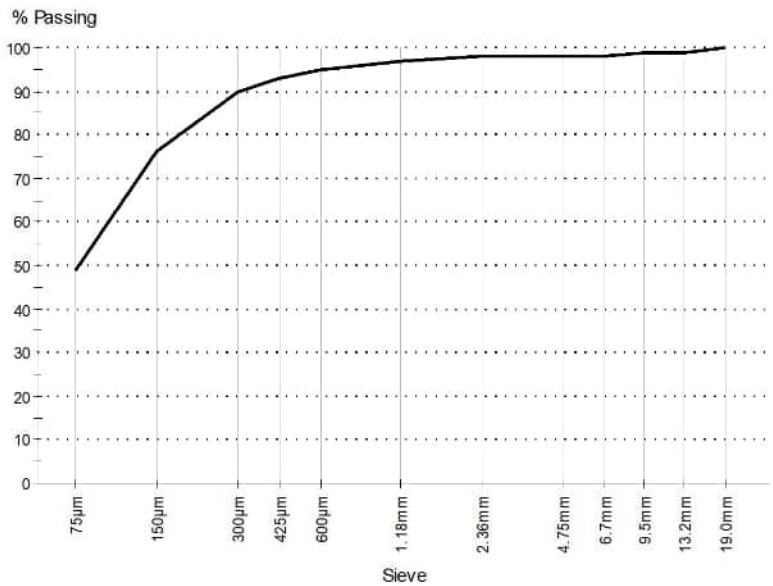
Sample ID	1-2220454
Sample Location	TP#01 - B02
Depth	1.70m - 1.90m
Sampling Method	Submitted by client
Specification	-
Material Description	(CL) Sandy CLAY, low plasticity, brown, approx. 50% fine to coarse sand, trace of fine to medium gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	22.5	
Date Tested		13/09/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	1.0	
Mould Length (mm)		250	
Crumbling		No	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 25/08/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	99	
9.5mm	99	
6.7mm	98	
4.75mm	98	
2.36mm	98	
1.18mm	97	
600µm	95	
425µm	93	
300µm	90	
150µm	76	
75µm	49	

Comments

REASON FOR AMENDMENT: Additional test added to report as requested by client

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Report No: MAT:1-2220454
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220454'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	23	
Plastic Limit (%)	AS 1289.3.2.1	15	
Plasticity Index (%)	AS 1289.3.3.1	8	
Date Tested		26/08/2022	

Comments

REASON FOR AMENDMENT: Additional test added to report as requested by client

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Report No: MAT:1-2220456
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

NATA Accredited Laboratory Number:19225

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 8/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

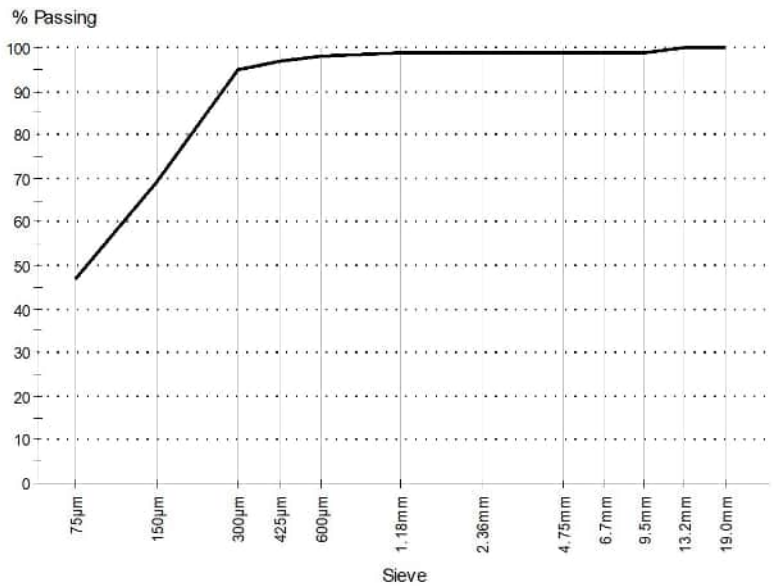
Sample ID	1-2220456
Sample Location	TP#02 - B02
Depth	1.60m - 1.90m
Sampling Method	Submitted by client
Specification	-
Material Description	(CL) Sandy CLAY, low plasticity, brown, approx. 50% fine to coarse sand, trace of fine to medium gravel

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	4.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 25/08/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	100	
9.5mm	99	
6.7mm	99	
4.75mm	99	
2.36mm	99	
1.18mm	99	
600µm	98	
425µm	97	
300µm	95	
150µm	69	
75µm	47	

Comments

N/A

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Report No: MAT:1-2220456
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 8/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Liquid Limit (%)	AS 1289.3.1.2	25	
Plastic Limit (%)	AS 1289.3.2.1	13	
Plasticity Index (%)	AS 1289.3.3.1	12	
Date Tested		26/08/2022	

Comments

N/A

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Report No: MAT:1-2220475
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220475'.

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

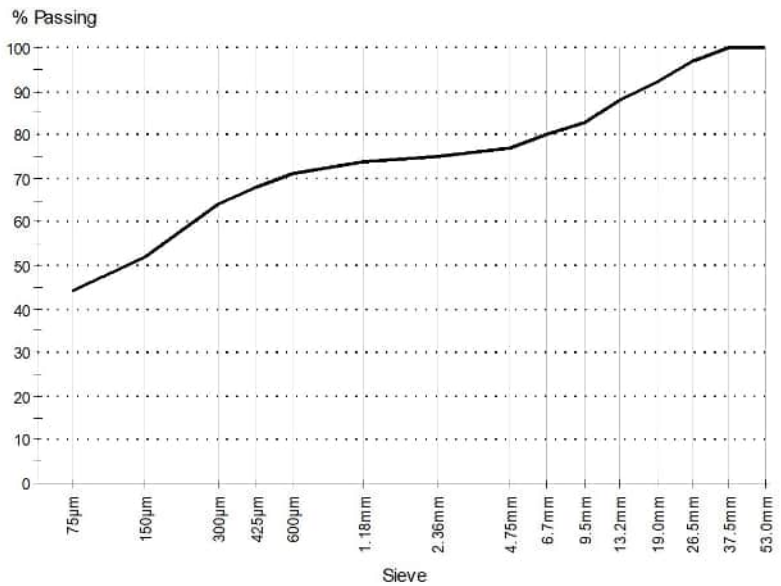
Sample ID	1-2220475
Sample Location	TP#06 - B01
Depth	0.20m - 0.50m
Sampling Method	Submitted by client
Specification	-
Material Description	(CI) Sandy CLAY, medium plasticity, red/brown, approx. 30% fine to coarse sand, with fine to coarse gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	21.3	
Date Tested		19/08/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	9.0	
Mould Length (mm)		250	
Crumbling		No	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 25/08/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
53.0mm	100	
37.5mm	100	
26.5mm	97	
19.0mm	92	
13.2mm	88	
9.5mm	83	
6.7mm	80	
4.75mm	77	
2.36mm	75	
1.18mm	74	
600µm	71	
425µm	68	
300µm	64	
150µm	52	
75µm	44	

Comments

REASON FOR AMENDMENT: Additional test added to report as requested by client

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Report No: MAT:1-2220475
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220475'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	36	
Plastic Limit (%)	AS 1289.3.2.1	18	
Plasticity Index (%)	AS 1289.3.3.1	18	
Date Tested		29/08/2022	

Comments

REASON FOR AMENDMENT: Additional test added to report as requested by client

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Report No: MAT:1-2220476
Issue No: 3
This report replaces all previous issues of report no 'MAT:1-2220476'.

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

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Sample Details

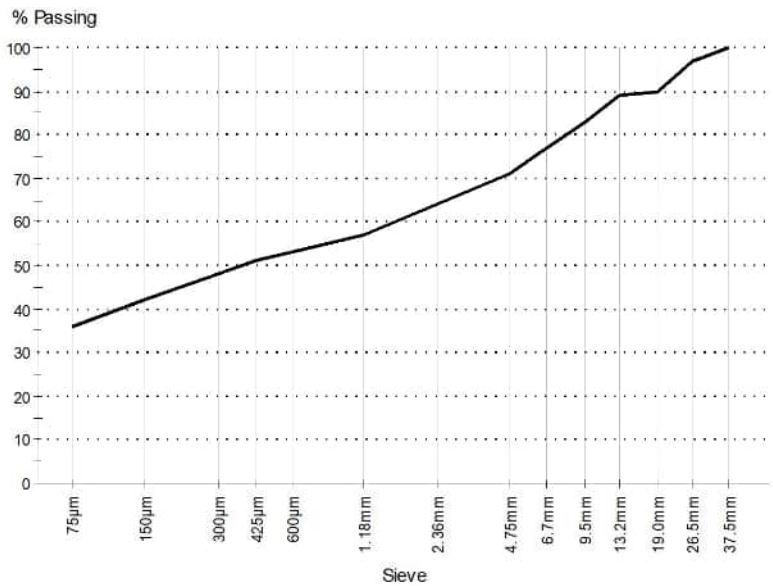
Sample ID	1-2220476
Sample Location	TP#06 - B02
Depth	0.70m - 1.00m
Sampling Method	Submitted by client
Specification	-
Material Description	(CL) Gravelly CLAY, low plasticity, brown, approx. 35% fine to coarse gravel, with fine to coarse sand

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	19.8	
Date Tested		19/08/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	7.0	
Mould Length (mm)		251	
Crumbling		No	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 25/08/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
37.5mm	100	
26.5mm	97	
19.0mm	90	
13.2mm	89	
9.5mm	83	
6.7mm	77	
4.75mm	71	
2.36mm	64	
1.18mm	57	
600µm	53	
425µm	51	
300µm	48	
150µm	42	
75µm	36	

Comments

REASON FOR AMENDMENT: Additional test added to report as requested by client

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Report No: MAT:1-2220476
Issue No: 3
This report replaces all previous issues of report no 'MAT:1-2220476'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	30	
Plastic Limit (%)	AS 1289.3.2.1	14	
Plasticity Index (%)	AS 1289.3.3.1	16	
Date Tested		29/08/2022	
Standard MDD (t/m³)	AS 1289.5.1.1	**1.83**	
Standard OMC (%)		**15.0**	
Retained Sieve (mm)		19	
Oversize Material (%)		0	
Curing Time (h)		52	
LL Method		AS 1289.3.1.2	
Date Tested		26/08/2022	

Comments

REASON FOR AMENDMENT: Additional test added to report as requested by client

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Report No: MAT:1-2229495
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 12/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

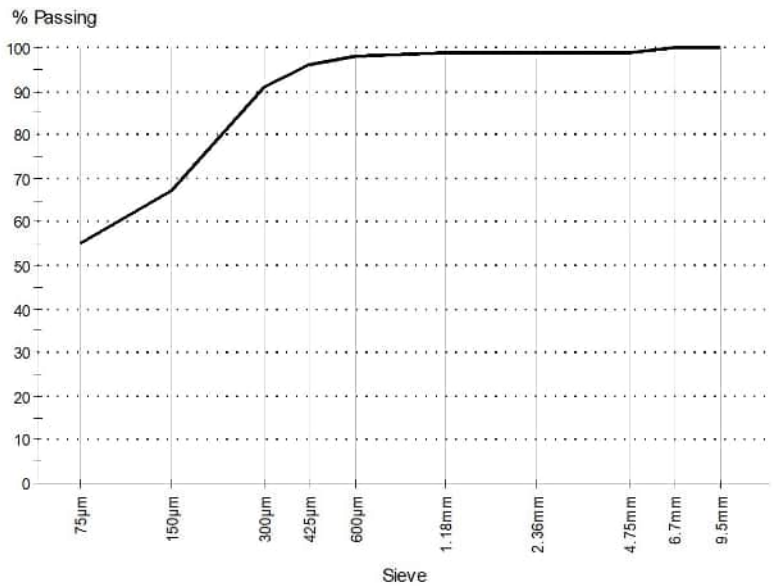
Sample ID	1-2229495
Sample Location	TP#12-B02
Depth	0.60 - 0.90m
Sampling Method	Submitted by client
Specification	-
Material Description	(CI) Sandy CLAY, medium plasticity, brown, approx. 45% fine to coarse sand, trace of fine to medium gravel

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	11.5	
Mould Length (mm)		150	
Crumbling		No	
Curling		Yes	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 5/12/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	
6.7mm	100	
4.75mm	99	
2.36mm	99	
1.18mm	99	
600µm	98	
425µm	96	
300µm	91	
150µm	67	
75µm	55	

Comments

N/A

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Report No: MAT:1-2229495
Issue No: 1

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 12/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	36	
Plastic Limit (%)	AS 1289.3.2.1	15	
Plasticity Index (%)	AS 1289.3.3.1	21	
Date Tested		1/12/2022	

Comments

N/A

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Report No: MAT:1-2229492
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229492'.

Material Test Report

Client: ENGEO
PO Box 79, Mitcham SA 5062

Project No: SMS1.22067

Project: Submitted Samples

Location: BAM Project, Boliver - 20651.000.001 - TR002

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The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

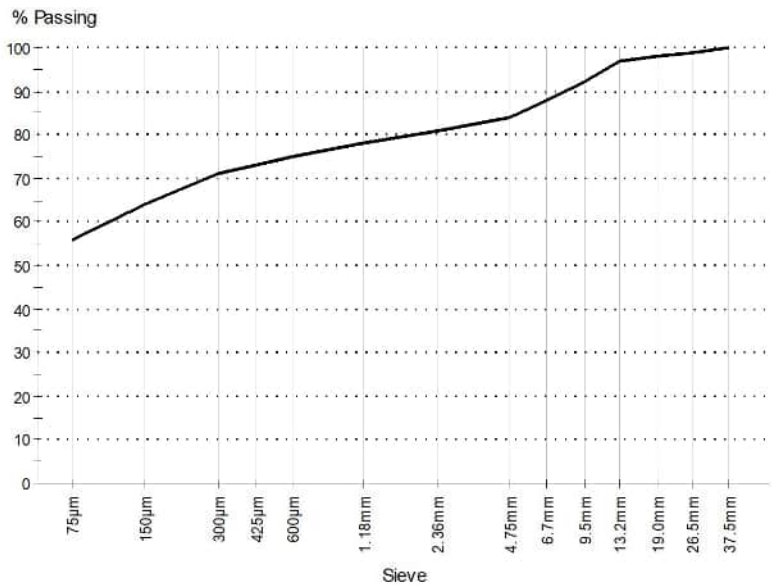
Sample ID	1-2229492
Sample Location	TP#15-B01
Depth	0.20 - 0.60m
Sampling Method	Submitted by client
Specification	-
Material Description	(CI) CLAY, medium plasticity, pale brown, with fine to coarse sand, with fine to coarse gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	23.6	
Date Tested		1/12/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	9.0	
Mould Length (mm)		251	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 8/12/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
37.5mm	100	
26.5mm	99	
19.0mm	98	
13.2mm	97	
9.5mm	92	
6.7mm	88	
4.75mm	84	
2.36mm	81	
1.18mm	78	
600µm	75	
425µm	73	
300µm	71	
150µm	64	
75µm	56	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content corrected

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Report No: MAT:1-2229492
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229492'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

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Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	37	
Plastic Limit (%)	AS 1289.3.2.1	16	
Plasticity Index (%)	AS 1289.3.3.1	21	
Date Tested		10/12/2022	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content corrected

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Report No: MAT:1-2220478
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220478'.

Material Test Report

Client: ENGEO
PO Box 79, Mitcham SA 5062

Project No: SMS1.22067

Project: Submitted Samples

Location: BAM Project - Bolivar - 20651.000.001

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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

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Sample Details

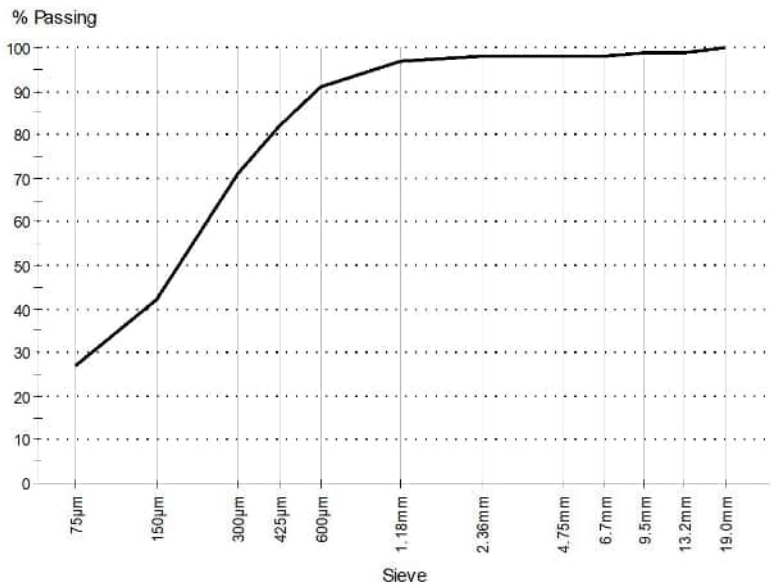
Sample ID	1-2220478
Sample Location	TP#17 - B02
Depth	1.70m - 1.90m
Sampling Method	Submitted by client
Specification	-
Material Description	(SC) Clayey SAND, fine to coarse grained, brown, approx. 25% low plasticity fines, trace of fine to medium gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.8	
Date Tested		24/08/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	0.5	
Mould Length (mm)		250	
Crumbling		No	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 25/08/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	99	
9.5mm	99	
6.7mm	98	
4.75mm	98	
2.36mm	98	
1.18mm	97	
600µm	91	
425µm	82	
300µm	71	
150µm	42	
75µm	27	

Comments

REASON FOR AMENDMENT: Additional test added to report as requested by client

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Report No: MAT:1-2220478
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220478'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	20	
Plastic Limit (%)	AS 1289.3.2.1	16	
Plasticity Index (%)	AS 1289.3.3.1	4	
Date Tested		26/08/2022	

Comments

REASON FOR AMENDMENT: Additional test added to report as requested by client

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Report No: MAT:1-2220490
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
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NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 15/09/2022

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Sample Details

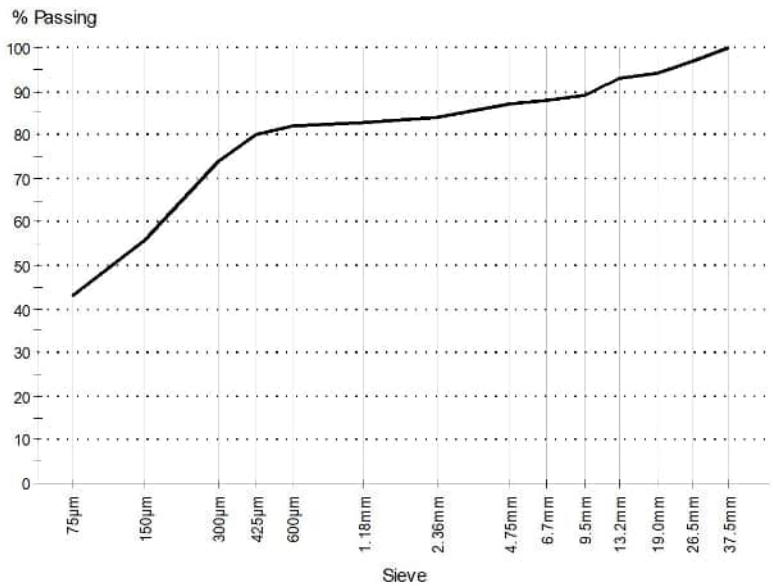
Sample ID	1-2220490
Sample Location	TP#21 - B01
Sampling Method	Submitted by client
Specification	-
Material Description	(CI) Sandy CLAY, medium plasticity, brown, approx. 40% fine to coarse sand, with fine to coarse gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.5	
Date Tested		23/08/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	9.0	
Mould Length (mm)		124	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 30/08/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
37.5mm	100	
26.5mm	97	
19.0mm	94	
13.2mm	93	
9.5mm	89	
6.7mm	88	
4.75mm	87	
2.36mm	84	
1.18mm	83	
600µm	82	
425µm	80	
300µm	74	
150µm	56	
75µm	43	

Comments

N/A

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Report No: MAT:1-2220490
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 15/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	35	
Plastic Limit (%)	AS 1289.3.2.1	14	
Plasticity Index (%)	AS 1289.3.3.1	21	
Date Tested		31/08/2022	

Comments

N/A

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Report No: MAT:1-2229493
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229493'.

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

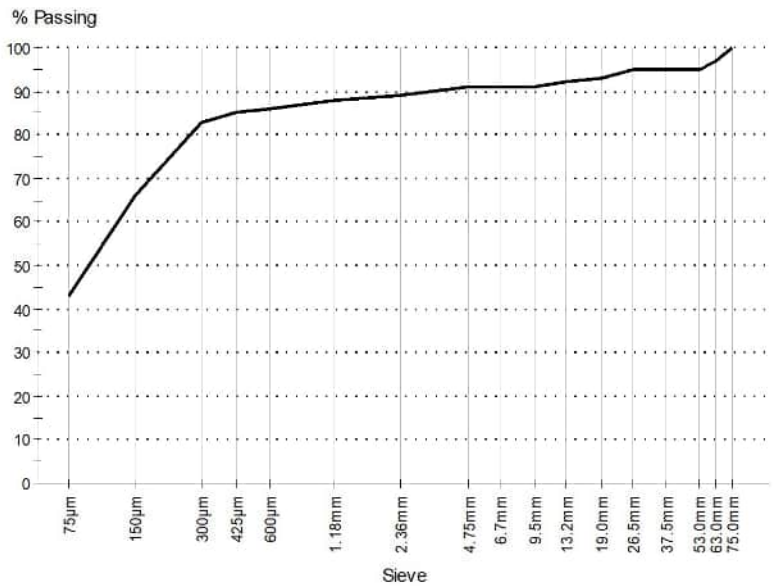
Sample ID	1-2229493
Sample Location	TP#23-B01
Depth	0.20 - 0.50m
Sampling Method	Submitted by client
Specification	-
Material Description	(CL) Sandy CLAY, low plasticity, brown, approx. 55% fine to coarse sand, trace of fine to coarse gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	21.8	
Date Tested		1/12/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	5.0	
Mould Length (mm)		251	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 9/12/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
75.0mm	100	
63.0mm	97	
53.0mm	95	
37.5mm	95	
26.5mm	95	
19.0mm	93	
13.2mm	92	
9.5mm	91	
6.7mm	91	
4.75mm	91	
2.36mm	89	
1.18mm	88	
600µm	86	
425µm	85	
300µm	83	
150µm	66	
75µm	43	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content corrected

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Report No: MAT:1-2229493
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2229493'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 20/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	27	
Plastic Limit (%)	AS 1289.3.2.1	15	
Plasticity Index (%)	AS 1289.3.3.1	12	
Date Tested		10/12/2022	

Comments

REASON FOR AMENDMENT: Typographical error amended - moisture content corrected

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Report No: MAT:1-2220493
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 15/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

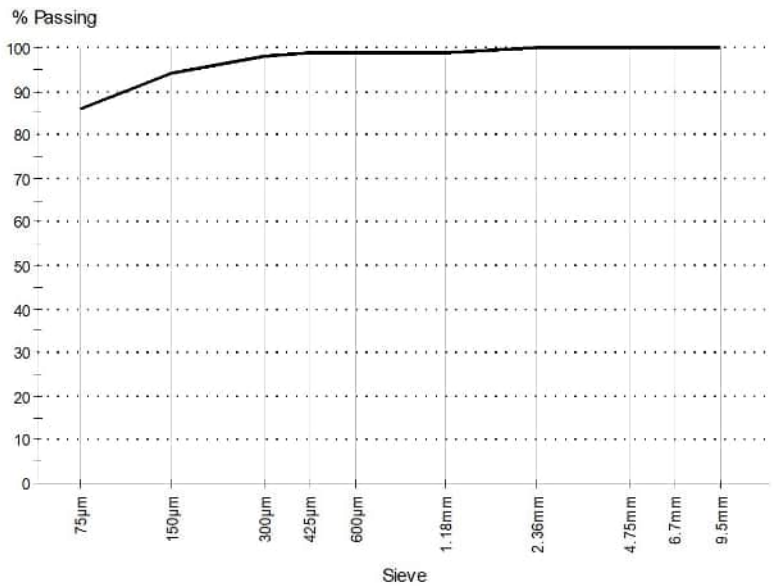
Sample ID	1-2220493
Sample Location	TP#21 - B02
Sampling Method	Submitted by client
Specification	-
Material Description	(CL) CLAY, low plasticity, brown, with fine to coarse sand

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	28.6	
Date Tested		20/08/2022	
Sample History	AS 1289.1.1	Air-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	8.5	
Mould Length (mm)		150	

Particle Size Distribution

AS 1289.3.6.1



Date Tested: 30/08/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	99	
600µm	99	
425µm	99	
300µm	98	
150µm	94	
75µm	84	

Comments

N/A

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Report No: MAT:1-2220493
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 15/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Other Test Results

Description	Method	Result	Limits
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.2	34	
Plastic Limit (%)	AS 1289.3.2.1	16	
Plasticity Index (%)	AS 1289.3.3.1	18	
Date Tested		31/08/2022	

Comments

N/A

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Report No: MAT:1-2220455
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

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Sample Details

Sample ID	1-2220455
Sample Location	TP#02 - B01
Depth	0.20m - 0.50m
Sampling Method	Submitted by client
Specification	-
Material Description	Silty Sandy CLAY, brown

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	20.3	
Date Tested		29/08/2022	
Standard MDD (t/m³)	AS 1289.5.1.1	**1.68**	
Standard OMC (%)		**19.5**	
Retained Sieve (mm)		19	
Oversize Material (%)		0	
Curing Time (h)		72	
Date Tested		29/08/2022	

Comments

N/A

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Report No: MAT:1-2220457
Issue No: 1

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 8/09/2022

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Sample Details

Sample ID	1-2220457
Sample Location	TP#03 - B01
Depth	0.20m - 0.50m
Sampling Method	Submitted by client
Specification	-
Material Description	Silty Sandy CLAY, brown

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	23.1	
Date Tested		29/08/2022	
Standard MDD (t/m³)	AS 1289.5.1.1	**1.68**	
Standard OMC (%)		**20.0**	
Retained Sieve (mm)		19	
Oversize Material (%)		0	
Curing Time (h)		72	
Date Tested		29/08/2022	

Comments

N/A

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Report No: MAT:1-2220473
Issue No: 1

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

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Sample Details

Sample ID	1-2220473
Sample Location	TP#05 - B01
Depth	0.20m - 0.50m
Sampling Method	Submitted by client
Specification	-
Material Description	

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	21.8	
Date Tested		30/08/2022	
Standard MDD (t/m³)	AS 1289.5.1.1	**1.76**	
Standard OMC (%)		**17.0**	
Retained Sieve (mm)		19	
Oversize Material (%)		1	
Curing Time (h)		96	
LL Method		Visual / Tactile Assessment	
Date Tested		30/08/2022	

Comments

N/A

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Report No: MAT:1-2220474
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220474'.

Material Test Report

Client: ENGEO
PO Box 79, Mitcham SA 5062

Project No: SMS1.22067

Project: Submitted Samples

Location: BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

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Sample Details

Sample ID	1-2220474
Sample Location	TP#05 - B02
Depth	1.70m - 2.00m
Sampling Method	Submitted by client
Specification	-
Material Description	Sandy CLAY, brown, with Gravel

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	26.3	
Date Tested		23/08/2022	
Standard MDD (t/m³)	AS 1289.5.1.1	**1.85**	
Standard OMC (%)		**14.0**	
Retained Sieve (mm)		19	
Oversize Material (%)		6	

Particle Size Distribution

Comments

REASON FOR AMENDMENT: Additional test added to report

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Report No: MAT:1-2220474
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220474'.

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

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Other Test Results

Description	Method	Result	Limits
Curing Time (h)		192	
LL Method		Visual / Tactile Assessment	
Date Tested		31/08/2022	

Comments

REASON FOR AMENDMENT: Additional test added to report

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Report No: MAT:1-2229496
Issue No: 1

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 7/12/2022

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Sample Details

Sample ID	1-2229496
Sample Location	TP#08-B01
Depth	0.30 - 0.60m
Sampling Method	Submitted by client
Specification	-
Material Description	Sandy CLAY, brown

Test Results

Description	Method	Result	Limits
Standard MDD (t/m³)	AS 1289.5.1.1	**1.65**	
Standard OMC (%)		**18.5**	
Retained Sieve (mm)		19	
Oversize Material (%)		0	
Curing Time (h)		100	
LL Method		Visual / Tactile Assessment	
Date Tested		5/12/2022	

Comments

N/A

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Report No: MAT:1-2229497
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 7/12/2022

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Sample Details

Sample ID	1-2229497
Sample Location	TP#09-B02
Depth	0.80 - 1.20m
Sampling Method	Submitted by client
Specification	-
Material Description	Sandy CLAY, brown, with gravel

Test Results

Description	Method	Result	Limits
Standard MDD (t/m³)	AS 1289.5.1.1	**1.72**	
Standard OMC (%)		**18.5**	
Retained Sieve (mm)		19	
Oversize Material (%)		0	
Curing Time (h)		120	
LL Method		Visual / Tactile Assessment	
Date Tested		6/12/2022	

Comments

N/A

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Report No: MAT:1-2229498
Issue No: 1

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 7/12/2022

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Sample Details

Sample ID	1-2229498
Sample Location	TP#13-B01
Depth	0.20 - 0.60m
Sampling Method	Submitted by client
Specification	-
Material Description	Sandy CLAY, brown

Test Results

Description	Method	Result	Limits
Standard MDD (t/m³)	AS 1289.5.1.1	**1.64**	
Standard OMC (%)		**21.0**	
Retained Sieve (mm)		19	
Oversize Material (%)		1	
Curing Time (h)		124	
LL Method		Visual / Tactile Assessment	
Date Tested		5/12/2022	

Comments

N/A

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Report No: MAT:1-2229499
Issue No: 1

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 12/12/2022

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Sample Details

Sample ID	1-2229499
Sample Location	TP#16-B01
Depth	0.20 - 0.60m
Sampling Method	Submitted by client
Specification	-
Material Description	Silty Sandy CLAY, brown

Test Results

Description	Method	Result	Limits
Standard MDD (t/m³)	AS 1289.5.1.1	**1.65**	
Standard OMC (%)		**21.0**	
Retained Sieve (mm)		19	
Oversize Material (%)		0	
Curing Time (h)		95	
LL Method		Visual / Tactile Assessment	
Date Tested		5/12/2022	

Comments

N/A

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Report No: MAT:1-2220477
Issue No: 2
This report replaces all previous issues of report no 'MAT:1-2220477'.

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

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The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 13/09/2022

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Sample Details

Sample ID	1-2220477
Sample Location	TP#17 - B01
Depth	0.10m - 0.40m
Sampling Method	Submitted by client
Specification	-
Material Description	Silty Sandy CLAY, brown

Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	17.5	
Date Tested		23/08/2022	
Standard MDD (t/m³)	AS 1289.5.1.1	**1.82**	
Standard OMC (%)		**13.5**	
Retained Sieve (mm)		19	
Oversize Material (%)		3	
Curing Time (h)		96	
LL Method		Visual / Tactile Assessment	
Date Tested		23/08/2022	

Comments

REASON FOR AMENDMENT: Additional test added to report

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Report No: MAT:1-2229502
Issue No: 1

Material Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 7/12/2022

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Sample Details

Sample ID	1-2229502
Sample Location	TP#20-B02
Depth	1.00 - 1.50m
Sampling Method	Submitted by client
Specification	-
Material Description	Sandy CLAY, brown

Test Results

Description	Method	Result	Limits
Standard MDD (t/m³)	AS 1289.5.1.1	**1.71**	
Standard OMC (%)		**18.0**	
Retained Sieve (mm)		19	
Oversize Material (%)		10	
Curing Time (h)		94	
LL Method		Visual / Tactile Assessment	
Date Tested		5/12/2022	

Comments

N/A

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Report No: MAT:1-2220492
Issue No: 1

Material Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 14/09/2022

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Sample Details

Sample ID	1-2220492
Sample Location	TP#21 - B01
Sampling Method	Submitted by client
Specification	-
Material Description	Sandy CLAY, brown

Test Results

Description	Method	Result	Limits
Standard MDD (t/m³)	AS 1289.5.1.1	**1.75**	
Standard OMC (%)		**14.0**	
Retained Sieve (mm)		19	
Oversize Material (%)		0	
Curing Time (h)		74	
LL Method		Visual / Tactile Assessment	
Date Tested		14/09/2022	

Comments

N/A

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Report No: CBR:1-2220453
Issue No: 1

California Bearing Ratio Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
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NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 13/09/2022

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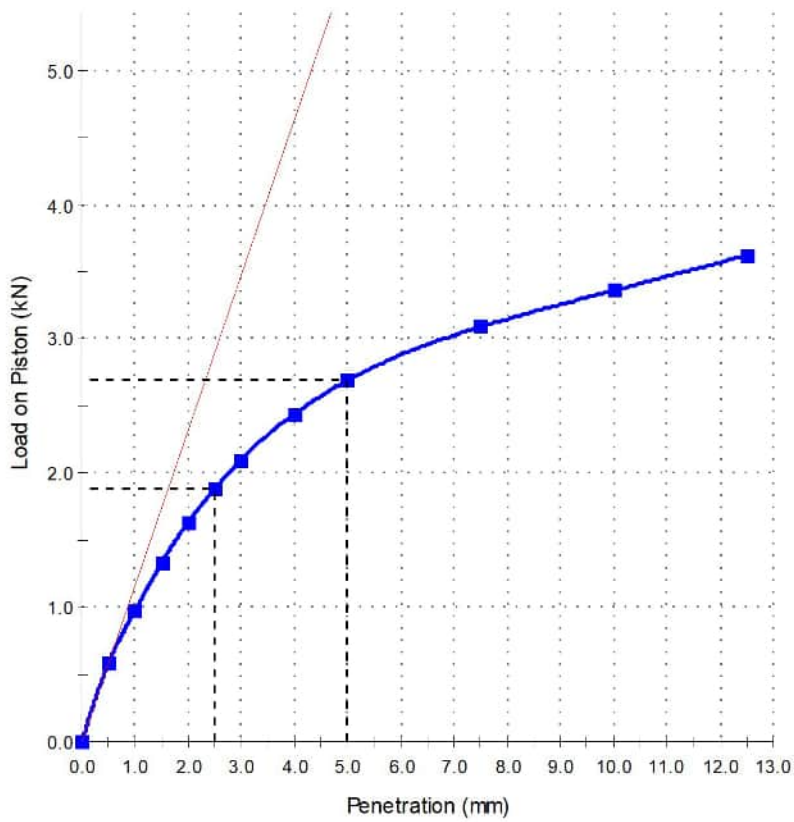
Sample Details

Sample ID:	1-2220453		
Sample Location:	TP#01 - B01		
Depth:	0.20m - 0.50m		
Material Description:	Sandy CLAY, brown		
Sampling Method:	Submitted by client	**Date Tested:**	12/09/2022

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR at 2.5mm (%):	**14**
Dry Density before Soaking (t/m³):	1.76
Density Ratio before Soaking (%):	95.0
Moisture Content before Soaking (%):	13.3
Moisture Ratio before Soaking (%):	102.0
Dry Density after Soaking (t/m³):	1.74
Density Ratio after Soaking (%):	93.5
Swell (%):	1.5
Moisture Content of Top 30mm (%):	19.8
Compaction Hammer Used:	Modified
	AS 1289.5.2.1
MDD (t/m³):	1.86
OMC (%):	13.0
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	220
Plasticity Determination Method:	Visual/Tactile

Comments

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Report No: CBR:1-2220472
Issue No: 1

California Bearing Ratio Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 13/09/2022

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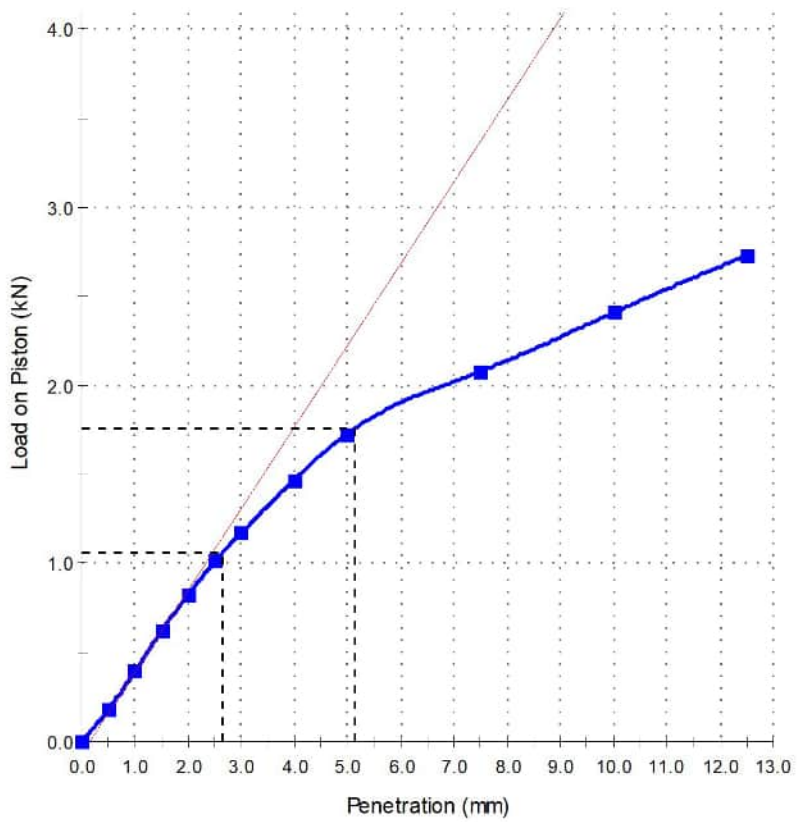
Sample Details

Sample ID:	1-2220472		
Sample Location:	TP#04 - B02		
Depth:	0.80m - 1.10m		
Material Description:	Silty Sandy CLAY, brown		
Sampling Method:	Submitted by client	**Date Tested:**	12/09/2022

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR at 5.0mm (%):	**9**
Dry Density before Soaking (t/m³):	1.73
Density Ratio before Soaking (%):	95.5
Moisture Content before Soaking (%):	12.8
Moisture Ratio before Soaking (%):	99.0
Dry Density after Soaking (t/m³):	1.69
Density Ratio after Soaking (%):	93.0
Swell (%):	2.0
Moisture Content of Top 30mm (%):	23.4
Compaction Hammer Used:	Modified
	AS 1289.5.2.1
MDD (t/m³):	1.82
OMC (%):	13.0
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	144
Plasticity Determination Method:	Visual/Tactile

Comments

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Report No: CBR:1-2220486
Issue No: 1

California Bearing Ratio Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 15/09/2022

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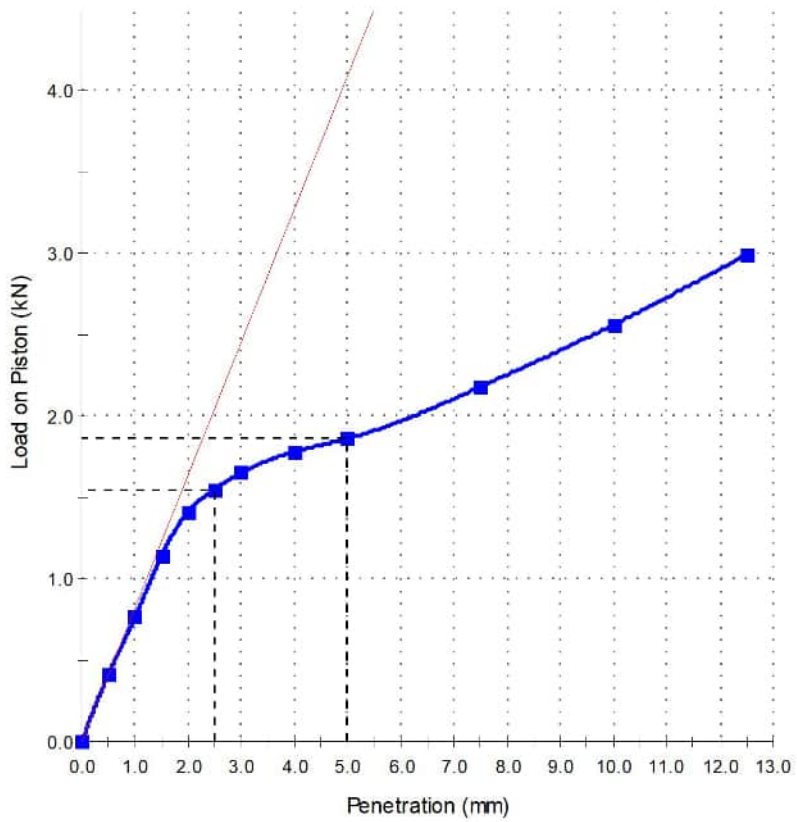
Sample Details

Sample ID: 1-2220486
Sample Location: TP#18 - B01
Material Description: Sandy CLAY, brown
Sampling Method: Submitted by client **Date Tested:** 14/09/2022

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR at 2.5mm (%):	**12**
Dry Density before Soaking (t/m³):	1.83
Density Ratio before Soaking (%):	97.5
Moisture Content before Soaking (%):	14.6
Moisture Ratio before Soaking (%):	103.5
Dry Density after Soaking (t/m³):	1.82
Density Ratio after Soaking (%):	97.0
Swell (%):	0.5
Moisture Content of Top 30mm (%):	21.8
Compaction Hammer Used:	Modified
	AS 1289.5.2.1
MDD (t/m³):	1.87
OMC (%):	14.0
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	66
Plasticity Determination Method:	Visual/Tactile

Comments

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Report No: CBR:1-2229492
Issue No: 1

California Bearing Ratio Test Report

Client:	ENGEO
	PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

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NATA Accredited Laboratory Number:19225

Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 14/12/2022

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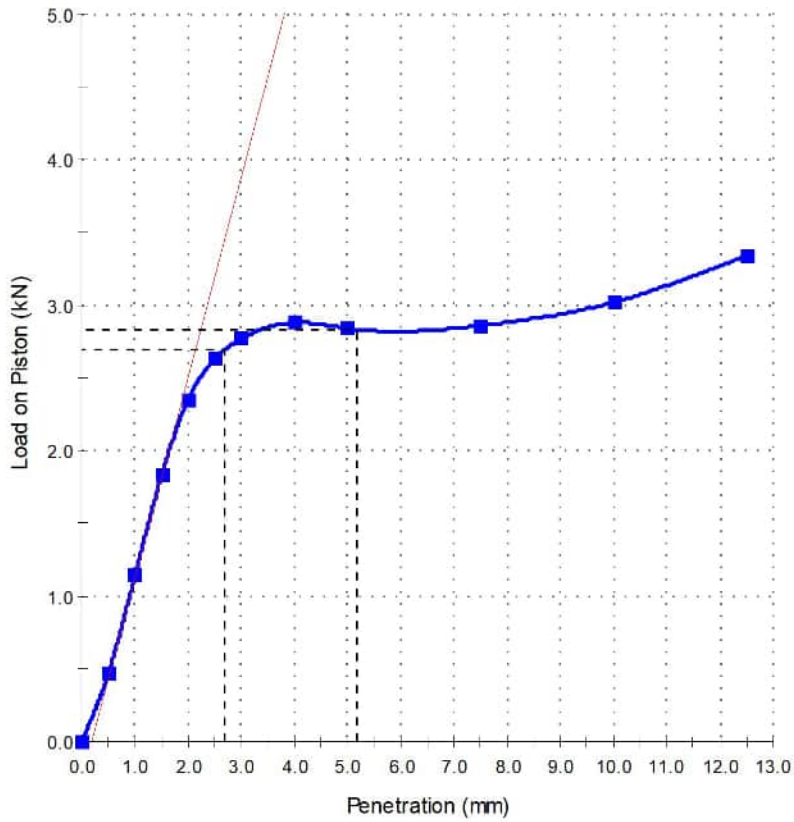
Sample Details

Sample ID: 1-2229492
Sample Location: TP#15-B01
Depth: 0.20 - 0.60m
Material Description: (CI) CLAY, medium plasticity, pale brown, with fine to coarse sand, with fine to coarse gravel
Sampling Method: Submitted by client **Date Tested:** 13/12/2022

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR at 2.5mm (%):	**20**
Dry Density before Soaking (t/m³):	1.80
Density Ratio before Soaking (%):	94.5
Moisture Content before Soaking (%):	12.3
Moisture Ratio before Soaking (%):	103.5
Dry Density after Soaking (t/m³):	1.77
Density Ratio after Soaking (%):	93.5
Swell (%):	1.0
Moisture Content of Top 30mm (%):	19.0
Compaction Hammer Used:	Modified
	AS 1289.5.2.1
MDD (t/m³):	1.90
OMC (%):	12.0
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	29
Plasticity Determination Method:	Visual/Tactile

Comments

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SMS Geotechnical Pty. Ltd.
Unit 9/21 Beafield Road
Para Hills West, South Australia 5096
Ph. (08) 8258 7498
www.smsgeotechnical.com.au

Report No: CBR:1-2229493
Issue No: 1

California Bearing Ratio Test Report

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project, Boliver - 20651.000.001 - TR002

Accredited for compliance with ISO/IEC 17025-Testing
The results in this report relate only to the items/samples that were tested.

NATA Accredited Laboratory Number:19225

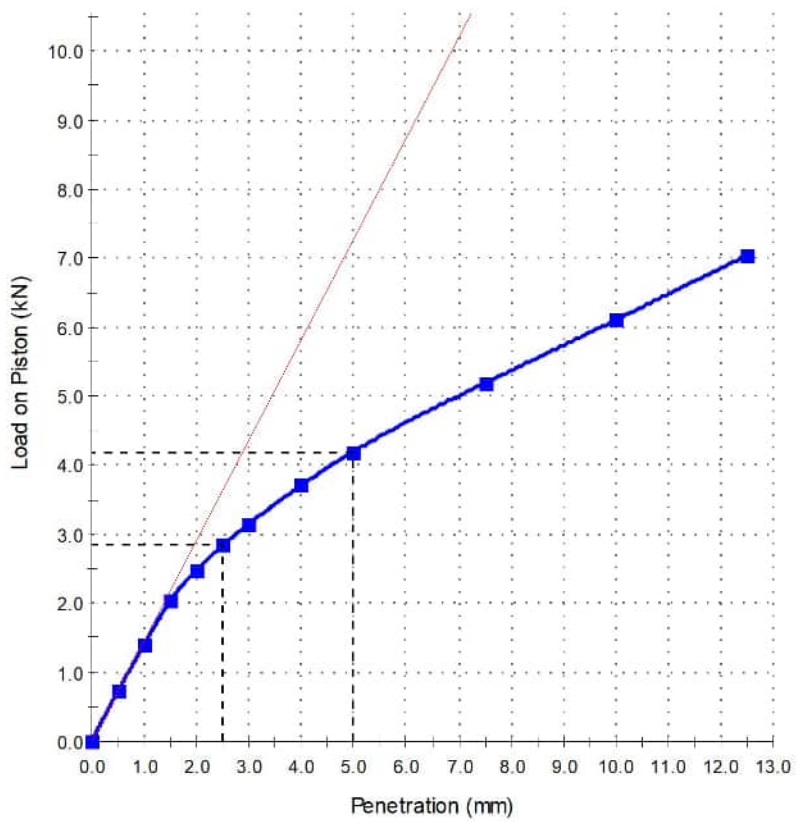
Approved Signatory: Michael Sella-Gianot
(Specialty Testing Coordinator)
Date of Issue: 15/12/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID: 1-2229493
Sample Location: TP#23-B01
Depth: 0.20 - 0.50m
Material Description: (CL) Sandy CLAY, low plasticity, brown, approx. 55% fine to coarse sand, trace of fine to coarse gravel
Sampling Method: Submitted by client **Date Tested:** 13/12/2022

Load vs Penetration



Test Results

AS 1289.6.1.1

CBR at 2.5mm (%):	**20**
Dry Density before Soaking (t/m³):	1.90
Density Ratio before Soaking (%):	95.0
Moisture Content before Soaking (%):	10.6
Moisture Ratio before Soaking (%):	100.0
Dry Density after Soaking (t/m³):	1.88
Density Ratio after Soaking (%):	94.0
Swell (%):	1.0
Moisture Content of Top 30mm (%):	15.5
Compaction Hammer Used:	Modified AS 1289.5.2.1
MDD (t/m³):	2.00
OMC (%):	10.5
Surcharge Mass (kg):	4.50
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	5
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	45
Plasticity Determination Method:	Visual/Tactile

Comments

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SMS Geotechnical Pty. Ltd.
Unit 9/21 Beafield Road
Para Hills West, South Australia 5096
Ph. (08) 8258 7498
www.smsgeotechnical.com.au

Report No.: TH:1-2220473
Issue No.: 1

Thermal Resistivity Report ASTM D5334

Client:	ENGEO PO Box 79, Mitcham SA 5062
Project No:	SMS1.22067
Project:	Submitted Samples
Location:	BAM Project - Bolivar - 20651.000.001

NATA Accredited Laboratory Number: 19225

Accredited for compliance with ISO/IEC 17025-Testing

The results in this report relate only to the items/samples that were tested.

Approved Signatory: Simon Nelson
(Specialty Testing Manager)
Date of Issue: 15/09/2022

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

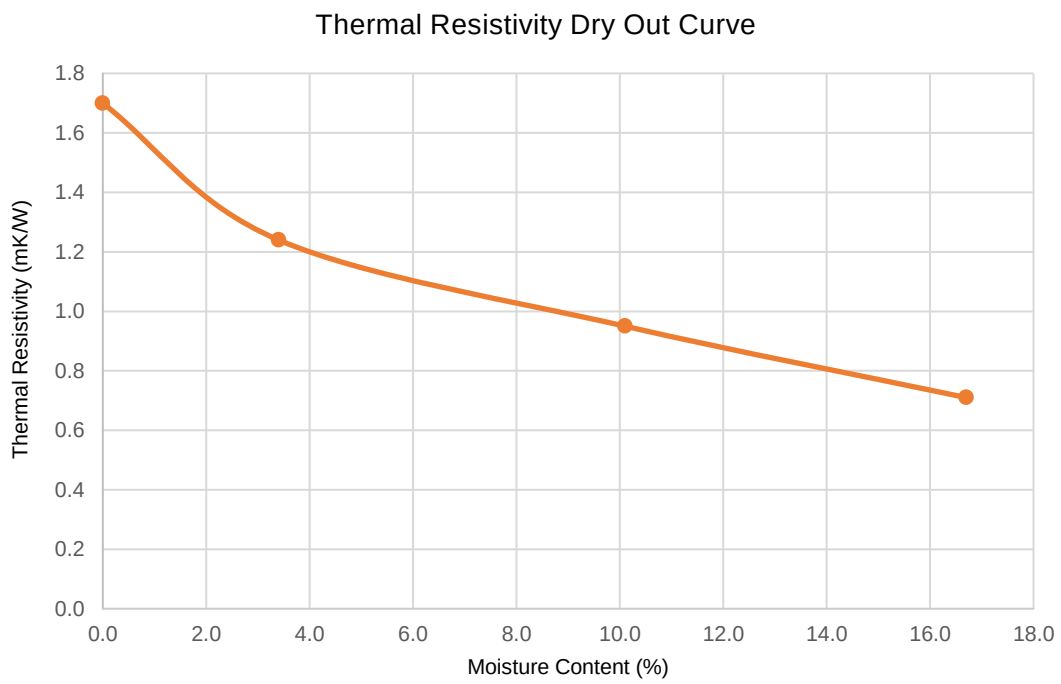
Sample Details

Sample ID:	1-2220473	**Material:**	Sandy CLAY
Location:	TP#05 - B01	**Material Description:**	brown
Depth:	0.20m - 0.50m	**Sampling Method:**	Submitted by client
Date Sampled:		**Date Moulded:**	5/09/2022

Test Results

Compaction Method (AS1289):	5.1.1
Maximum Dry Density (t/m^3):	1.76
Optimum Moisture Content (%):	16.8

Moisture Content (%)	Compacted Dry Density (t/m^3)	Thermal Conductivity (W/mK)	Thermal Resistivity (mK/W)
0.0	1.73	0.58	1.70
3.4	1.73	0.81	1.24
10.1	1.73	1.05	0.95
16.7	1.73	1.42	0.71



Resistivity Meter:	TLS-100	**Needle ID:**	810	**Needle Insertion:**	Pre-drilled

Remarks

Ground Science
A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **Email** reception@groundscience.com.au

PERMEABILITY - CONSTANT HEAD (Triaxial method) AS1289 6.7.3

Client :	**SMS GEOTECHNICAL (SOUTH AUSTRALIA)**	**Job No.**	**GS6592/1**
Project:	**GEOTECHNICAL TESTING**	**Report No.**	**BF**
Location:	**-**	**Test date:**	**23-Dec-22**

Sample number		**#S26**
Borehole / test pit		**TP #12-BH02**
Depth, m		**0.6 - 0.9 m**
Sample diameter	mm	63.26
Sample height	mm	62.84
Specimen wet density	t/m3	2.010
Specimen dry density	t/m3	1.71
Moisture content	%	17.5
Cell pressure	kPa	560
Inlet pressure	kPa	520
Outlet pressure	kPa	500
Mean effective stress	kPa	50
Hydraulic head	kPa	20
Saturation	%	96
PERMEABILITY	**m/sec**	**3.E-10**
Water type		de-aired - filtered
Specimen description		CLAY, medium plasticity, brown, with gravel, trace sand
Notes:		Sample remoulded to a target of 98% SMDD @ OMC MDD = 1.73 t/m3 OMC = 18 % Density Ratio = 99 %

Comments: Sampled by client, tested as received
MDD and OMC Supllied by client

NATA ACCREDITED FOR TECHNICAL COMPETENCE

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing

Date of issue
12/01/2023

Aaron Stuart
Approved Signatory

Aarons

Ground Science
A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **Email** reception@groundscience.com.au

PERMEABILITY - CONSTANT HEAD (Triaxial method) AS1289 6.7.3

Client :	**SMS GEOTECHNICAL (SOUTH AUSTRALIA)**	**Job No.**	**GS6592/1**
Project:	**GEOTECHNICAL TESTING**	**Report No.**	**BG**
Location:	**-**	**Test date:**	**22-Dec-22**

Sample number		**#S27**
Borehole / test pit		**TP #09-BH02**
Depth, m		**0.8 - 1.2 m**
Sample diameter	mm	63.26
Sample height	mm	62.48
Specimen wet density	t/m3	2.020
Specimen dry density	t/m3	1.70
Moisture content	%	19.1
Cell pressure	kPa	560
Inlet pressure	kPa	520
Outlet pressure	kPa	500
Mean effective stress	kPa	50
Hydraulic head	kPa	20
Saturation	%	98
PERMEABILITY	**m/sec**	**1.E-10**
Water type		de-aired - filtered
Specimen description		CLAY, medium plasticity, brown, trace gravel
Notes:		Sample remoulded to a target of 98% SMDD @ OMC MDD = 1.72 t/m3 OMC = 18.5 % Density Ratio = 99 %

Comments: Sampled by client, tested as received
MDD and OMC Supllied by client

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing

Date of issue
11/01/2023

Aaron Stuart
Approved Signatory

Ground Science
A C N 105 704 078
13 Brock Street Thomastown VIC, **P** 03 9464 4617 **Email** reception@groundscience.com.au

PERMEABILITY - CONSTANT HEAD (Triaxial method) AS1289 6.7.3

Client :	**SMS GEOTECHNICAL (SOUTH AUSTRALIA)**	**Job No.**	**GS6592/1**
Project:	**GEOTECHNICAL TESTING**	**Report No.**	**BH**
Location:	**-**	**Test date:**	**23-Dec-22**

Sample number		**#S28**
Borehole / test pit		**TP #13-BH01**
Depth, m		**0.2 - 0.6 m**
Sample diameter	mm	50.64
Sample height	mm	50.78
Specimen wet density	t/m3	1.941
Specimen dry density	t/m3	1.61
Moisture content	%	20.6
Cell pressure	kPa	560
Inlet pressure	kPa	520
Outlet pressure	kPa	500
Mean effective stress	kPa	50
Hydraulic head	kPa	20
Saturation	%	100
PERMEABILITY	**m/sec**	**7.E-10**
Water type		de-aired - filtered
Specimen description		silty CLAY, medium plasticity, brown, with gravel
Notes:		Sample remoulded to a target of 98% SMDD @ OMC MDD = 1.64 t/m3 OMC = 21.2 % Density Ratio = 98 %

Comments: Sampled by client, tested as received
MDD and OMC Supllied by client

NATA ACCREDITED FOR TECHNICAL COMPETENCE

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing

Date of issue
12/01/2023

Aaron Stuart
Approved Signatory

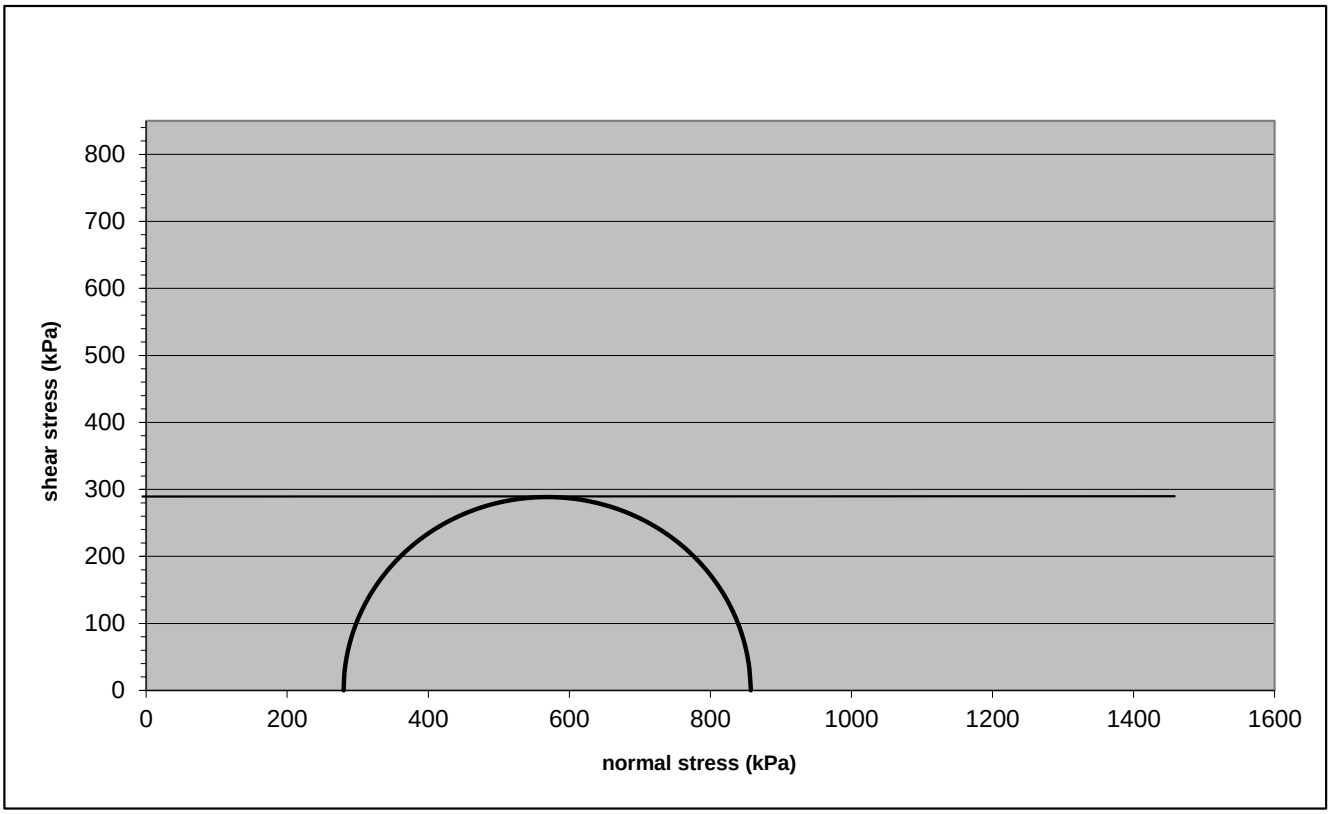
Aaron S

GroundScience
A C N 105 704 078
13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

UU TRIAXIAL - Unconsolidated Undrained Single Stage

client :	SMS GEOTECHNICAL	job No. :	GS6592/1
principal :	-	report No :	AU
project :	GEOTECHNICAL TESTING	test date :	13/12/2022
location :	-	Page :	1 of 2

borehole:	BH1	sample type:	Undisturbed	test type:	UU	test procedure:	AS 1289 6.4.1
sample No.	#S29	client ref:	1-2229500	normal stress:	280		
depth (m):	13.0-13.5	sample size (mm):	101.1 x		50	date of sampling:	Sampled by client



Stage	Deviator Stress kPa (σ1-σ3)	Peak lateral stress kPa (σ3)	Peak axial stress kPa (σ1)	Strain @ failure %
1	577	280	857	15.8

Undrained cohesion: **289 kPa**

failure criteria: maximum deviator stress

failure mode : Shear failure

sample description : silty CLAY, medium plasticity, mottled grey/brown

Notes :
1. Mohrs circles are a graphical presentation of the results and are not to scale
2. Tested as received

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing

Pelin Atas Erden
Approved Signatory

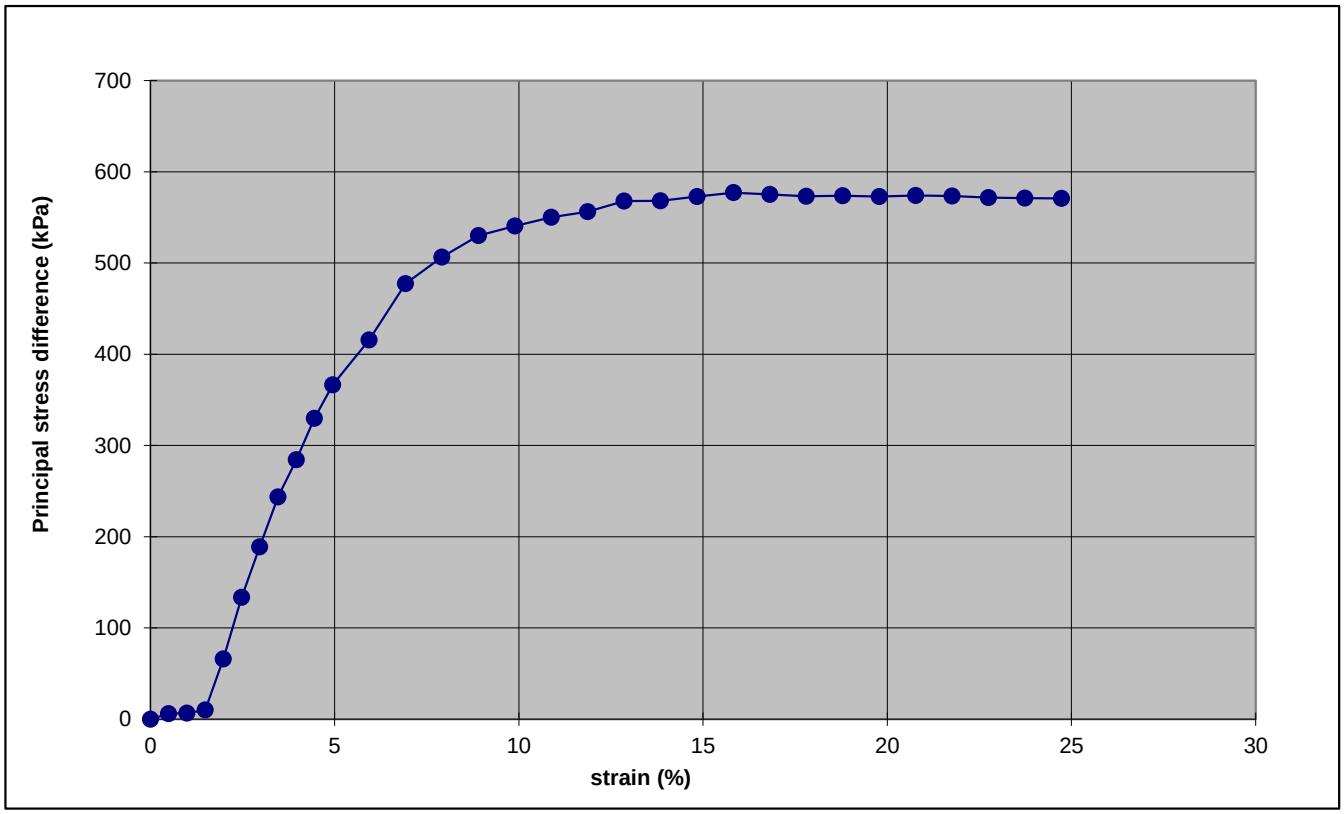
Date: 14-Dec-22

Ground Science
A C N 105 704 078
13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

UU TRIAXIAL - Unconsolidated Undrained Single Stage

client :	SMS GEOTECHNICAL	job No. :	GS6592/1
principal :	-	report No :	AU
project :	GEOTECHNICAL TESTING	test date :	13/12/2022
location :	-	page :	2 of 2

borehole:	BH1	sample type:	Undisturbed	test type:	UU	test procedure:	AS 1289 6.4.1
sample No.	#S29	client ref:	1-2229500	normal stress:	280		
depth (m):	13.0-13.5	sample size (mm):	101.1 x	50		date of sampling:	Sampled by client



Stage	Strain rate %/min
1	1.000

Speciman after test

		Specific gravity	2.65 (assumed)
initial dry density :	1.81 t/m^3	**Degree of Saturation**	97.1 %
mositure content :	17.1 % (before test)	20.7 % (after test)	

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing

Pelin Atas Erden
Approved Signatory

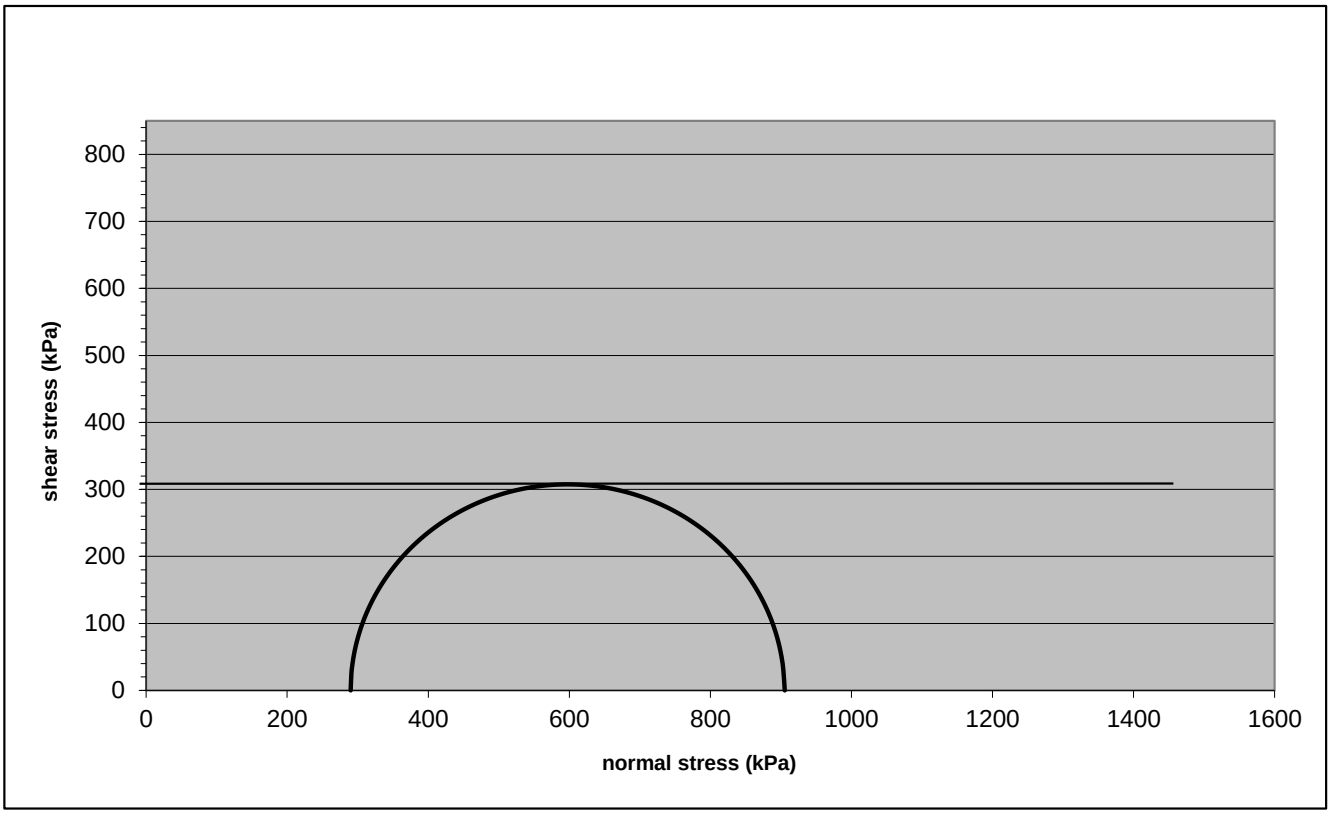
Date: 14-Dec-22

GroundScience
A C N 105 704 078
13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

UU TRIAXIAL - Unconsolidated Undrained Single Stage

client :	SMS GEOTECHNICAL	job No. :	GS6592/1
principal :	-	report No :	AV
project :	GEOTECHNICAL TESTING	test date :	13/12/2022
location :	-	Page :	1 of 2

borehole:	BH03	sample type:	Undisturbed	test type:	UU	test procedure:	AS 1289 6.4.1
sample No.	#S30	client ref:	1-2229501	normal stress:	290		
depth (m):	14.5-15.0	sample size (mm):	101.6 x		50.8	date of sampling:	Sampled by client



Stage	Deviator Stress kPa (σ1-σ3)	Peak lateral stress kPa (σ3)	Peak axial stress kPa (σ1)	Strain @ failure %
1	615	290	905	8.9

Undrained cohesion: **308 kPa**

failure criteria: maximum deviator stress

failure mode : Shear failure

sample description : silty CLAY, medium plasticity, mottled grey/brown

Notes :
1. Mohrs circles are a graphical presentation of the results and are not to scale
2. Tested as received

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing

Pelin Atas Erden
Approved Signatory

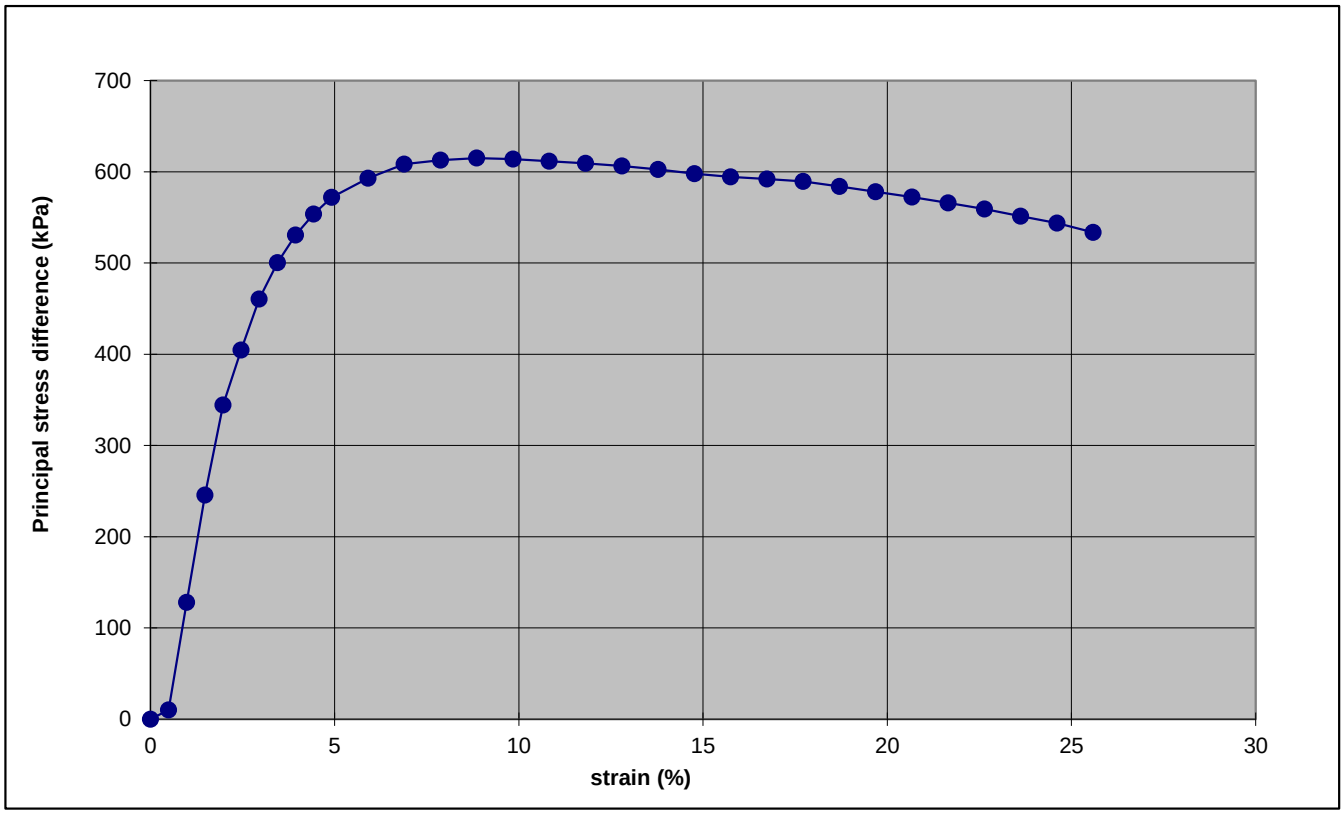
Date: 14-Dec-22

Ground Science
A C N 105 704 078
13 Brock Street Thomastown VIC, P 03 9464 4617 F 03 9464 4618

UU TRIAXIAL - Unconsolidated Undrained Single Stage

client :	SMS GEOTECHNICAL	job No. :	GS6592/1
principal :	-	report No :	AV
project :	GEOTECHNICAL TESTING	test date :	13/12/2022
location :	-	page :	2 of 2

borehole:	BH03	sample type:	Undisturbed	test type:	UU	test procedure:	AS 1289 6.4.1
sample No.	#S30	client ref:	1-2229501	normal stress:	290		
depth (m):	14.5-15.0	sample size (mm):	101.6 x		50.8	date of sampling:	Sampled by client



Stage	Strain rate %/min
1	1.000

Speciman after test

		Specific gravity	2.65 (assumed)
initial dry density :	1.64 t/m^3	**Degree of Saturation**	93.9 %
mositure content :	21.8 % (before test)	23.8 % (after test)	

NATA Accredited Laboratory No. 15055
Accredited for compliance with ISO/IEC 17025 - Testing

Pelin Atas Erden
Approved Signatory

Date: 14-Dec-22

APPENDIX 5:

Laboratory Test Certificates - Geochemical

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☐ Sydney Laboratory — Unit F3 Bld F, 16 Mars Road Lane Cove West NSW 2066 — 02 9900 8400 — EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory — Unit 1 21 Smallwood Place Murarrie QLD 4172 — 07 3902 4600 — EnviroSampleQLD@eurofins.com

☐ Perth Laboratory — Unit 2 91 Leach Highway Kewdale WA 6105 — 08 9251 9600 — EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory — 6 Monterey Road Dandenong South VIC 3175 — 03 8564 5000 — EnviroSampleVic@eurofins.com

Company	ENGEO	Project №	20651	Project Manager	Rhys Matheson
Address	170 Greenhill Rd	Project Name	BAM Bolivar	EDD Format (ESdat, EQuIS etc)	
Contact Name	Rhys Matheson				
Phone №	0457 562 109				
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	Harjeet Singh
Handed over by	
Email for Invoice	
Email for Results	

Analyses — Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.

Acid sulphate soils

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked.

♦Surcharge will apply

☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☐ 5 days (Standard)
☐ Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Acid sulphate soils	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	TP04 - ASS 1	24/11		X									
2	TP08 - ASS 2	24/11		X									
3	TP20 - ASS 3	24/11		X									#944513
4	TP12 - ASS 4	24/11		X									Pagewal
5	TP11 - ASS 5	25/11		X									
6													4.4°C
7													−1.2°C
8													3.2°C
9													on i.B.
10													
		Total Counts											

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name	Signature	Date	Time

Laboratory Use Only									
Received By	Pagewal	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	25/11	Time	10 am	Temperature
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

Parimal Acharya

From: Rhys Mathews <RMathews@engeo.com.au>
Sent: Friday, 25 November 2022 1:48 PM
To: Enquiries Adelaide
Subject: RE: Eurofins Sample Receipt Advice - Report 944513 : Site BAM BOLIVAR (20651)

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Parimal,

Thanks for sorting these out for us.
Can we please undertake the Chromium Reducible Sulfur Suite and pH field screen on the five (5) samples that I dropped off today?
Is a pH field screen required if we do the CRSS?

	ACID SULFATE SOIL ASSESSMENT	METHOD REFERENCE	LIMIT OF R STANDARD
	pH - Field Screen (pH_f and pH_{fox})	ASSL Methods Guidelines Version 2.1	0.1 pH units
	Net Acid Generation (NAG) & Net Acid Production Potential (NAPP)	ASSL Methods Guidelines Version 2.1	NA
	SPOCAS /Acid Sulfate Soil Assessment - constituents reported as below	ASSL Methods Guidelines Version 2.1	See Below
	pH_{KCl} TAA		0.1 pH units, 2m H+/tonne
	pH_{OX} TPA		0.1 pH units, 2m H+/tonne
	KCl Extractable Sulfur		0.02%S
	Peroxide Extractable Sulfur		0.02%S
	ANC_E Acid Neutralizing Capacity		0.02%CaCO
	S_{NAS} Nett Acid Soluble Sulfur		0.02%S
	Chromium Reducible Sulfur Suite - constituents reported as below	ASSL Methods Guidelines Version 2.1	See Below
	Chromium Reducible Sulfur (S_{CR})		0.005%S
	pH_{KCl} TAA		0.1 pH units, 2m H+/tonne
	ANC_E Acid Neutralizing Capacity		0.02%CaCO
	S_{NAS} Nett Acid Soluble Sulfur		0.02%S

Thanks very much,
Rhys

#944513
Parimal

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521
Phone: +61 3 8564 5000
e.mail: EnviroRemittances@eurofins.com

Tax Invoice

ENGEO Australia Pty Ltd
PO Box 79
Mitcham
SA 5062

Purchase Order #:	Not provided
Invoice #:	738301
Date:	Dec 06, 2022
Report #:	944513
Project Name:	BAM BOLIVAR
Project ID:	20651
Contact:	Rhys Matthews

Description	Quantity	Price	Total	Notes
Solid Samples				
Acid Sulfate Soils Field pH Test	5	$5.00	$25.00	
Chromium Reducible Sulfur Suite	5	$70.00	$350.00	
Handling Charge	1	$30.00	$30.00	

Nett Total	$405.00
GST	$40.50
Total Inc GST	$445.50

This invoice is subject to Eurofins General Terms of Sales. Copies available on request or at http://environment.eurofins.com.au

Please detach and return with payment to:
Postal:
Eurofins Environment Testing
6 Monterey Road
Dandenong South
Victoria, 3175

Please EFT Payments to:
Eurofins Environment Testing
BSB 063-498
Acct No: 10057019
e.mail Remittances:
EnviroRemittances@eurofins.com

Invoice Number : 738301
Amount Inc GST : $445.50

TERMS STRICTLY 30 DAYS

Laboratories & Offices : Auckland, Christchurch, Melbourne, Sydney, Perth, Brisbane, Adelaide, Darwin, Newcastle, Wollongong, Canberra, Geelong,

eurofins | Environment Testing

www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	4/52 Industrial Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield East NSW 2304
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	PO Box 60 Wickham 2293
Tel: +61 3 8564 5000	Tel: +61 3 8564 5000	Tel: +61 2 9900 8400	Tel: +61 2 6113 8091	Tel: +61 7 3902 4600	Tel: +61 2 4968 8448
NATA# 1261 Site# 1254	NATA# 1261 Site# 1254	NATA# 1261 Site# 18217		NATA# 1261 Site# 20794	NATA# 1261 Site# 25079

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool
WA 6106
Tel: +61 8 6253 4444
NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland	Christchurch
35 O'Rorke Road	43 Detroit Drive
Penrose,	Rolleston,
Auckland 1061	Christchurch 7675
Tel: +64 9 526 45 51	Tel: 0800 856 450
IANZ# 1327	IANZ# 1290

Sample Receipt Advice

Company name:	ENGEO Australia Pty Ltd
Contact name:	Rhys Matthews
Project name:	BAM BOLIVAR
Project ID:	20651
Turnaround time:	5 Day
Date/Time received	Nov 25, 2022 10:00 AM
Eurofins reference	944513

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Michael Cassidy on phone : +61 3 8564 5000 or by email: MichaelCassidy@eurofins.com

Results will be delivered electronically via email to Rhys Matthews - RMathews@engeo.com.au.

Note: A copy of these results will also be delivered to the general ENGEO Australia Pty Ltd email address.

Global Leader - Results you can trust

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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

Geelong
19/8 Lewalan Street
Grovedale
VIC 3216
Tel: +61 3 8564 5000
NATA# 1261 Site# 1254

Sydney
179 Magowar Road
Girraween
NSW 2145
Tel: +61 2 9900 8400
NATA# 1261 Site# 18217

Canberra
Unit 1,2 Dacre Street
Mitchell
ACT 2911
Tel: +61 2 6113 8091

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

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

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Company Name: ENGEO Australia Pty Ltd
Address: Level 7, 19 Grenfell Street
Adelaide
SA 5000

Order No.:
Report #: 944513
Phone: 1800 136 436
Fax:

Received: Nov 25, 2022 10:00 AM
Due: Dec 2, 2022
Priority: 5 Day
Contact Name: Rhys Matthews

Project Name: BAM BOLIVAR
Project ID: 20651

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Acid Sulfate Soils Field pH Test	Chromium Reducible Sulfur Suite	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP04-ASS 1	Nov 24, 2022		Soil	M22-No0061400	X	X	X
2	TP08-ASS 2	Nov 24, 2022		Soil	M22-No0061401	X	X	X
3	TP20-ASS 3	Nov 24, 2022		Soil	M22-No0061402	X	X	X
4	TP12-ASS 4	Nov 24, 2022		Soil	M22-No0061403	X	X	X
5	TP11-ASS 5	Nov 25, 2022		Soil	M22-No0061404	X	X	X
Test Counts						5	5	5

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition 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.

ENGEO Australia Pty Ltd
Level 7, 19 Grenfell Street
Adelaide
SA 5000

Attention: **Rhys Matthews**

Report **944513-S**
Project name BAM BOLIVAR
Project ID 20651
Received Date Nov 25, 2022

Client Sample ID			**TP04-ASS 1**	**TP08-ASS 2**	**TP20-ASS 3**	**TP12-ASS 4**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M22-No0061400**	**M22-No0061401**	**M22-No0061402**	**M22-No0061403**
Date Sampled			**Nov 24, 2022**	**Nov 24, 2022**	**Nov 24, 2022**	**Nov 24, 2022**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	9.2	9.2	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	9.3	9.5	8.8
Reaction Ratings*[S05]	0	-	4.0	4.0	4.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	6.1	9.3	9.0	8.0
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	2.3	< 2	< 2	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.004	< 0.003	< 0.003	< 0.003
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	3	mol H+/t	< 3	< 3	< 3	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	N/A	N/A	N/A	N/A
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	38	4.1	0.45
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	N/A	12	1.3	0.14
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	7700	810	89
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
CRS Suite - Net Acidity - NASSG (Including ANC)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate - NASSG (Including ANC)[S01]	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Extraneous Material						
<2mm Fraction	0.005	g	220	130	80	280
>2mm Fraction	0.005	g	< 0.005	87	120	< 0.005
Analysed Material	0.1	%	100	60	40	100
Extraneous Material	0.1	%	< 0.1	40	60	< 0.1
% Moisture	1	%	11	20	25	17

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Client Sample ID			TP11-ASS 5
Sample Matrix			Soil
Eurofins Sample No.			M22-No0061404
Date Sampled			Nov 25, 2022
Test/Reference	LOR	Unit	
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	9.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.9
Reaction Ratings*[S05]	0	-	4.0
Actual Acidity (NLM-3.2)			
pH-KCL (NLM-3.1)	0.1	pH Units	9.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	< 0.003
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	N/A
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	18
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	5.8
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	3600
ANC Fineness Factor		factor	1.5
Net Acidity (Including ANC)			
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 CaCO3/t	< 1
Extraneous Material			
<2mm Fraction	0.005	g	130
>2mm Fraction	0.005	g	90
Analysed Material	0.1	%	58
Extraneous Material	0.1	%	42
% Moisture	1	%	19

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	Nov 30, 2022	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Reducible Sulfur Suite			
Chromium Suite	Brisbane	Nov 30, 2022	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Extraneous Material	Brisbane	Nov 30, 2022	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Brisbane	Nov 25, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			

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Order No.:
Report #: 944513
Phone: 1800 136 436
Fax:

Received: Nov 25, 2022 10:00 AM
Due: Dec 2, 2022
Priority: 5 Day
Contact Name: Rhys Matthews

Project Name: BAM BOLIVAR
Project ID: 20651

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Acid Sulfate Soils Field pH Test	Chromium Reducible Sulfur Suite	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP04-ASS 1	Nov 24, 2022		Soil	M22-No0061400	X	X	X
2	TP08-ASS 2	Nov 24, 2022		Soil	M22-No0061401	X	X	X
3	TP20-ASS 3	Nov 24, 2022		Soil	M22-No0061402	X	X	X
4	TP12-ASS 4	Nov 24, 2022		Soil	M22-No0061403	X	X	X
5	TP11-ASS 5	Nov 25, 2022		Soil	M22-No0061404	X	X	X
Test Counts						5	5	5

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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
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

Terms

APHA	American Public Health Association
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 a moisture has been determined on a solid sample the result is expressed on a dry 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 is representative of 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 like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-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 5.4
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 be used as a guide only 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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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. 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)			%	103			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)			%	104			80-120	Pass	
LCS - % Recovery									
Potential Acidity - Chromium Reducible Sulfur									
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)			%	105			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)	L22-No0066115	NCP	pH Units	9.4	9.4	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L22-No0066115	NCP	mol H+/t	< 2	< 2	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L22-No0066115	NCP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD			
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)	L22-No0066115	NCP	% S	0.013	0.012	4.9	20%	Pass	
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	L22-No0066115	NCP	mol H+/t	7.8	7.4	4.9	30%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L22-No0066115	NCP	% S	N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	L22-No0066115	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	L22-No0066115	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (s-SNAS) NLM-4.1	L22-No0066115	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (a-SNAS) NLM-4.1	L22-No0066115	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)	L22-No0066115	NCP	% CaCO3	1.6	1.6	1.9	20%	Pass	
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	L22-No0066115	NCP	% S	0.52	0.53	1.9	30%	Pass	
ANC Fineness Factor	L22-No0066115	NCP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Net Acidity (Including ANC)				Result 1	Result 2	RPD			
CRS Suite - Net Acidity - NASSG (Including ANC)	L22-No0066115	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity - NASSG (Including ANC)	L22-No0066115	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate - NASSG (Including ANC)	L22-No0066115	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M22-No0058258	NCP	%	29	28	3.7	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	M22-No0061404	CP	pH Units	9.7	9.5	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 (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Harry Bacalis	Analytical Services Manager
Jonathon Angell	Senior Analyst-Sample Properties
Jonathon Angell	Senior Analyst-SPOCAS
Myles Clark	Senior Analyst-SPOCAS

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

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☐ Brisbane Laboratory — Unit 1 21 Smallwood Place Murarrie QLD 4172 — 07 3902 4600 — EnviroSampleQLD@eurofins.com

☐ Perth Laboratory — Unit 2 91 Leach Highway Kewdale WA 6105 — 08 9251 9600 — EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory — 6 Monterey Road Dandenong South VIC 3175 — 03 8564 5000 — EnviroSampleVic@eurofins.com

Company	ENGEO	Project №	20651	Project Manager	Rhys
Address		Project Name	BAM, BOLIVAR	EDD Format (ESdat, EQuIS etc)	
Contact Name	HARVI SINGH / Rhys				
Phone №	0421247594				
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	H.S
Handed over by	Harvi.
Email for Invoice	Rhys
Email for Results	Rhys & Harvi

Analyses — Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked. ♦Surcharge will apply

☐ Overnight (reporting by 9am)♦ ☐ Same day♦ ☐ 1 day♦ ☐ 2 days♦ ☐ 3 days♦ ☐ 5 days (Standard) ☐ Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	pH, Chloride, Sodium sulph, resistivity	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	BH03/E1 (11.6-11.7)	15/11/22		Y									
2	BH01/E2 (0.7-0.8)	18/11		Y									
3	BH01/E3 (1.5-1.6)	18/11		Y									
4	BH02/E4 (2.1-2.2)	21/11		Y									#944863
5	BH04/E5 (4.8-4.9)	22/11		Y									Parkmal
6													
7													
8													17.9°C
9													− 1.2°C
10													16.7°C
		Total Counts											

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal — Name — Signature — Date — Time

Laboratory Use Only								
Received By	Parkmal	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date 28/11	Time 10 am	Temperature	
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	Time	Report №	

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

Parimal Acharya

From: Harjeet Singh <hsingh@engeo.com.au>
Sent: Monday, 28 November 2022 10:49 AM
To: Enquiries Adelaide; Rhys Mathews
Subject: RE: Eurofins Sample Receipt Advice - Report 944863 : Site BAM BOLIVAR (20651)

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Primal,

Can you remove Sodium testing for all Jars please?

Thank you

From: EnquiriesAdelaide@eurofins.com <EnquiriesAdelaide@eurofins.com>
Sent: Monday, 28 November 2022 10:19 am
To: Rhys Mathews <RMathews@engeo.com.au>
Cc: Harjeet Singh <hsingh@engeo.com.au>
Subject: Eurofins Sample Receipt Advice - Report 944863 : Site BAM BOLIVAR (20651)

Security WARNING: This is an external email. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Valued Client,

Please find attached a Sample Receipt Advice (SRA), a Summary Sheet and a scanned copy of your Chain-of-Custody (COC). It is important that you check this documentation to ensure that the details are correct such as the Client Job Number, Turn Around Time, any comments in the Notes section and sample numbers as well as the requested analysis. If there are any irregularities then please contact your Eurofins Analytical Services Manager as soon as possible to make certain that they get changed.

#.944863
Parimal

Regards

Parimal Acharya
Sample Receipt

Eurofins Environment Testing
9 Main Tce
Richmond SA 5033
AUSTRALIA
Phone: +61 884 434 430
Email: ParimalAcharya@eurofins.com
Website:environment.eurofins.com.au
View our latest EnviroNotes
How did we do? Provide your feedback here

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521
Phone: +61 3 8564 5000
e.mail: EnviroRemittances@eurofins.com

Tax Invoice

ENGEO Australia Pty Ltd
PO Box 79
Mitcham
SA 5062

Purchase Order #:	Not provided
Invoice #:	738938
Date:	Dec 1, 2022
Report #:	944863
Project Name:	BAM BOLIVAR
Project ID:	20651
Contact:	Rhys Matthews

Description	Quantity	Price	Total	Notes
Solid Samples				
Chloride	5	$11.00	$55.00	
pH (1:5 Aqueous extract at 25 °C as rec.)	5	$5.00	$25.00	
Resistivity*	5	$5.00	$25.00	
Sulphate (as SO4)	5	$11.00	$55.00	
Handling Charge	1	$30.00	$30.00	

	Nett Total	$190.00
	GST	$19.00
	Total Inc GST	$209.00

This invoice is subject to Eurofins General Terms of Sales. Copies available on request or at http://environment.eurofins.com.au

Please detach and return with payment to:
Postal:
Eurofins Environment Testing
6 Monterey Road
Dandenong South
Victoria, 3175

Please EFT Payments to:
Eurofins Environment Testing
BSB 063-498
Acct No: 10057019
e.mail Remittances:
EnviroRemittances@eurofins.com

Invoice Number : 738938
Amount Inc GST : $209.00

TERMS STRICTLY 30 DAYS

Laboratories & Offices : Auckland, Christchurch, Melbourne, Sydney, Perth, Brisbane, Adelaide, Darwin, Newcastle, Wollongong, Canberra, Geelong,

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www.eurofins.com.au EnviroSales@eurofins.com

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Christchurch
43 Detroit Drive
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Tel: 0800 856 450
IANZ# 1290

Sample Receipt Advice

Company name:	ENGEO Australia Pty Ltd
Contact name:	Rhys Matthews
Project name:	BAM BOLIVAR
Project ID:	20651
Turnaround time:	5 Day
Date/Time received	Nov 28, 2022 10:46 AM
Eurofins reference	944863

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Michael Cassidy on phone : +61 3 8564 5000 or by email: MichaelCassidy@eurofins.com

Results will be delivered electronically via email to Rhys Matthews - RMathews@engeo.com.au.

Note: A copy of these results will also be delivered to the general ENGEO Australia Pty Ltd email address.

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

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IANZ# 1327

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

Company Name: ENGEO Australia Pty Ltd
Address: Level 7, 19 Grenfell Street
Adelaide
SA 5000

Order No.:
Report #: 944863
Phone: 1800 136 436
Fax:

Received: Nov 28, 2022 10:46 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: Rhys Matthews

Project Name: BAM BOLIVAR
Project ID: 20651

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Chloride	pH (1:5 Aqueous extract at 25 °C as rec.)	Resistivity*	Sulphate (as SO4)	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	BH03/E1 (11.6-11.7)	Nov 15, 2022		Soil	M22-No0064784	X	X	X	X	X
2	BH01/E2 (0.7-0.8)	Nov 18, 2022		Soil	M22-No0064785	X	X	X	X	X
3	BH01/E3 (1.5-1.6)	Nov 18, 2022		Soil	M22-No0064786	X	X	X	X	X
4	BH02/E4 (2.1-2.2)	Nov 21, 2022		Soil	M22-No0064787	X	X	X	X	X
5	BH04/E5 (4.8-4.9)	Nov 22, 2022		Soil	M22-No0064788	X	X	X	X	X
Test Counts						5	5	5	5	5

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition 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.

ENGEO Australia Pty Ltd
Level 7, 19 Grenfell Street
Adelaide
SA 5000

Attention: **Rhys Matthews**

Report **944863-S**
Project name BAM BOLIVAR
Project ID 20651
Received Date Nov 28, 2022

Client Sample ID			**BH03/E1 (11.6-11.7)**	**BH01/E2 (0.7-0.8)**	**BH01/E3 (1.5-1.6)**	**BH02/E4 (2.1-2.2)**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M22-No0064784**	**M22-No0064785**	**M22-No0064786**	**M22-No0064787**
Date Sampled			**Nov 15, 2022**	**Nov 18, 2022**	**Nov 18, 2022**	**Nov 21, 2022**
Test/Reference	LOR	Unit				
Chloride	5	mg/kg	1200	1100	2100	4600
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	7.5	8.1	7.3	8.0
Resistivity*	0.5	ohm.m	16	3.8	8.7	4.8
Sulphate (as SO4)	30	mg/kg	640	420	720	1600
% Moisture	1	%	21	17	19	21

Client Sample ID			**BH04/E5 (4.8-4.9)**
Sample Matrix			**Soil**
Eurofins Sample No.			**M22-No0064788**
Date Sampled			**Nov 22, 2022**
Test/Reference	LOR	Unit	
Chloride	5	mg/kg	1600
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	8.6
Resistivity*	0.5	ohm.m	12
Sulphate (as SO4)	30	mg/kg	680
% Moisture	1	%	17

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
Chloride	Melbourne	Nov 29, 2022	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
pH (1:5 Aqueous extract at 25 °C as rec.)	Melbourne	Nov 29, 2022	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Melbourne	Nov 29, 2022	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
% Moisture	Melbourne	Nov 28, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

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Christchurch 7675
Tel: 0800 856 450
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Company Name: ENGEO Australia Pty Ltd
Address: Level 7, 19 Grenfell Street
Adelaide
SA 5000

Project Name: BAM BOLIVAR
Project ID: 20651

Order No.:
Report #: 944863
Phone: 1800 136 436
Fax:

Received: Nov 28, 2022 10:46 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: Rhys Matthews

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Chloride	pH (1:5 Aqueous extract at 25 °C as rec.)	Resistivity*	Sulphate (as SO4)	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X	X	X	X
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	BH03/E1 (11.6-11.7)	Nov 15, 2022		Soil	M22-No0064784	X	X	X	X	X
2	BH01/E2 (0.7-0.8)	Nov 18, 2022		Soil	M22-No0064785	X	X	X	X	X
3	BH01/E3 (1.5-1.6)	Nov 18, 2022		Soil	M22-No0064786	X	X	X	X	X
4	BH02/E4 (2.1-2.2)	Nov 21, 2022		Soil	M22-No0064787	X	X	X	X	X
5	BH04/E5 (4.8-4.9)	Nov 22, 2022		Soil	M22-No0064788	X	X	X	X	X
Test Counts						5	5	5	5	5

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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
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

Terms

APHA	American Public Health Association
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 a moisture has been determined on a solid sample the result is expressed on a dry 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 is representative of 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 like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-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 5.4
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 be used as a guide only 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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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. 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
Method Blank									
Sulphate (as SO4)			mg/kg	< 30			30	Pass	
LCS - % Recovery									
Chloride			%	107			70-130	Pass	
Sulphate (as SO4)			%	100			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Sulphate (as SO4)	M22-No0066703	NCP	%	94			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Chloride	B22-No0064432	NCP	mg/kg	RR	RR	<1	30%	Pass	
pH (1:5 Aqueous extract at 25 °C as rec.)	M22-No0064784	CP	pH Units	7.5	7.5	pass	30%	Pass	
Resistivity*	M22-No0064784	CP	ohm.m	16	17	4.7	30%	Pass	
Sulphate (as SO4)	B22-No0064432	NCP	mg/kg	< 30	< 30	<1	30%	Pass	
% Moisture	B22-No0064460	NCP	%	3.0	2.6	14	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

Authorised by:

Catherine Wilson	Analytical Services Manager
Caitlin Breeze	Senior Analyst-Inorganic
Linda Chouman	Senior Analyst-Sample Properties
Mary Makarios	Senior Analyst-Inorganic

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Glossary of Terms Specific to this Report

Term (Abbreviation)	Definition
Acid Sulfate Soil (ASS)	Soil or sediment distinguished from other soil materials by having properties and behaviour that have either been affected considerably by the oxidation of Reduced Inorganic Sulfur (RIS), or the capacity to be affected considerably by the oxidation of their RIS constituents. ASS materials include Potential acid sulfate soils (PASS or sulfidic soil materials) and Actual Acid Sulfate Soils (AASS or sulfuric soil materials). These are often found in the same profile, with AASS overlying PASS.
Actual Acid Sulfate Soils (AASS)	Soils containing highly acidic soil horizons resulting from the oxidation of soil materials are rich in RIS, primarily pyrite. When this oxidation of RIS produces acidity in excess of the soil material's capacity to neutralise this acidity, the soil material will often acidify to a pH 4 or less, forming an Actual ASS. The recognition of Actual ASS materials can be confirmed by the presence of jarosite in these materials, or the location of other Actual ASS or PASS materials within or in the nearby vicinity to the sampling location.
Potential Acid Sulfate Soils (PASS)	Soils that contain appreciable RIS that have not oxidised but will acidify to a pH of less than 4.0 after oxidation. The soils are also known as hypersulfidic soil materials. The field pH of these soils in their undisturbed state is pH 4 or more, and may be neutral or slightly alkaline. Potential ASS pose an environmental hazard if disturbed, as they can generate considerable acidity if mismanaged.
pH_F	Field pH. Field determination of pH in a soil:water paste or equivalent.
pH_{FOX}	Field peroxide pH. Field determination of pH in a soil: conc. H2O2 mixture after the complete reaction between 30% H2O2 and RIS has taken place.
Δ pH	$(pH_F) - (pH_{FOX})$
RIS	Reduced Inorganic Sulfur; including iron disulfides (FeS_2), most commonly pyrite but also marcasite, and lower amounts of other compounds such as monosulfides (for example FeS) and elemental sulfur (S_8).

Source: Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, *National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual*, Department of Agriculture and Water Resources, Canberra ACT. CC BY 4.0.

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing ABN 50 005 085 521

☐ Sydney Laboratory — Unit F3 Bld F, 16 Mars Road Lane Cove West NSW 2066 — 02 9900 8400 — EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory — Unit 1 21 Smallwood Place Murarrie QLD 4172 — 07 3902 4600 — EnviroSampleQLD@eurofins.com

☐ Perth Laboratory — Unit 2 91 Leach Highway Kewdale WA 6105 — 08 9251 9600 — EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory — 6 Monterey Road Dandenong South VIC 3175 — 03 8564 5000 — EnviroSampleVic@eurofins.com

Company	ENGEO	Project №	20651	Project Manager	Rhys Matheson
Address	170 Greenhill Rd	Project Name	BAM Bolivar	EDD Format (ESdat, EQuIS etc)	
Contact Name	Rhys Matheson				
Phone №	0457 562 109				
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	Harjeet Singh
Handed over by	
Email for Invoice	
Email for Results	

Analyses — Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.

Acid sulphate soils

Containers — Change container type & size if necessary.

Required Turnaround Time (TAT) — Default will be 5 days if not ticked.

♦Surcharge will apply

☐ Overnight (reporting by 9am)♦
☐ Same day♦ ☐ 1 day♦
☐ 2 days♦ ☐ 3 days♦
☐ 5 days (Standard)
☐ Other( )

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Acid sulphate soils	500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	TP04 - ASS 1	24/11		X									
2	TP08 - ASS 2	24/11		X									
3	TP20 - ASS 3	24/11		X									#944513
4	TP12 - ASS 4	24/11		X									Pagewal
5	TP11 - ASS 5	25/11		X									
6													4.4°C
7													−1.2°C
8													3.2°C
9													on i.B.
10													
		Total Counts											

Method of Shipment	☐ Courier (#)	☐ Hand Delivered	☐ Postal	Name	Signature	Date	Time

Laboratory Use Only									
Received By	Pagewal	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	25/11	Time	10 am	Temperature
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

Parimal Acharya

From: Rhys Mathews <RMathews@engeo.com.au>
Sent: Friday, 25 November 2022 1:48 PM
To: Enquiries Adelaide
Subject: RE: Eurofins Sample Receipt Advice - Report 944513 : Site BAM BOLIVAR (20651)

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins. Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Hi Parimal,

Thanks for sorting these out for us.
Can we please undertake the Chromium Reducible Sulfur Suite and pH field screen on the five (5) samples that I dropped off today?
Is a pH field screen required if we do the CRSS?

	ACID SULFATE SOIL ASSESSMENT	METHOD REFERENCE	LIMIT OF R STANDARD
	pH - Field Screen (pH_f and pH_{fox})	ASSL Methods Guidelines Version 2.1	0.1 pH units
	Net Acid Generation (NAG) & Net Acid Production Potential (NAPP)	ASSL Methods Guidelines Version 2.1	NA
	SPOCAS /Acid Sulfate Soil Assessment - constituents reported as below	ASSL Methods Guidelines Version 2.1	See Below
	pH_{KCl} TAA		0.1 pH units, 2m H+/tonne
	pH_{OX} TPA		0.1 pH units, 2m H+/tonne
	KCl Extractable Sulfur		0.02%S
	Peroxide Extractable Sulfur		0.02%S
	ANC_E Acid Neutralizing Capacity		0.02%CaCO
	S_{NAS} Nett Acid Soluble Sulfur		0.02%S
	Chromium Reducible Sulfur Suite - constituents reported as below	ASSL Methods Guidelines Version 2.1	See Below
	Chromium Reducible Sulfur (S_{CR})		0.005%S
	pH_{KCl} TAA		0.1 pH units, 2m H+/tonne
	ANC_E Acid Neutralizing Capacity		0.02%CaCO
	S_{NAS} Nett Acid Soluble Sulfur		0.02%S

Thanks very much,
Rhys

#944513
Parimal

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IANZ# 1327	IANZ# 1290

Sample Receipt Advice

Company name:	ENGEO Australia Pty Ltd
Contact name:	Rhys Matthews
Project name:	BAM BOLIVAR
Project ID:	20651
Turnaround time:	5 Day
Date/Time received	Nov 25, 2022 10:00 AM
Eurofins reference	944513

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Michael Cassidy on phone : +61 3 8564 5000 or by email: MichaelCassidy@eurofins.com

Results will be delivered electronically via email to Rhys Matthews - RMathews@engeo.com.au.

Note: A copy of these results will also be delivered to the general ENGEO Australia Pty Ltd email address.

Global Leader - Results you can trust

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IANZ# 1290

Company Name: ENGEO Australia Pty Ltd
Address: Level 7, 19 Grenfell Street
Adelaide
SA 5000

Order No.:
Report #: 944513
Phone: 1800 136 436
Fax:

Received: Nov 25, 2022 10:00 AM
Due: Dec 2, 2022
Priority: 5 Day
Contact Name: Rhys Matthews

Project Name: BAM BOLIVAR
Project ID: 20651

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Acid Sulfate Soils Field pH Test	Chromium Reducible Sulfur Suite	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP04-ASS 1	Nov 24, 2022		Soil	M22-No0061400	X	X	X
2	TP08-ASS 2	Nov 24, 2022		Soil	M22-No0061401	X	X	X
3	TP20-ASS 3	Nov 24, 2022		Soil	M22-No0061402	X	X	X
4	TP12-ASS 4	Nov 24, 2022		Soil	M22-No0061403	X	X	X
5	TP11-ASS 5	Nov 25, 2022		Soil	M22-No0061404	X	X	X
Test Counts						5	5	5

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition 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.

ENGEO Australia Pty Ltd
Level 7, 19 Grenfell Street
Adelaide
SA 5000

Attention: **Rhys Matthews**

Report **944513-S**
Project name BAM BOLIVAR
Project ID 20651
Received Date Nov 25, 2022

Client Sample ID			**TP04-ASS 1**	**TP08-ASS 2**	**TP20-ASS 3**	**TP12-ASS 4**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M22-No0061400**	**M22-No0061401**	**M22-No0061402**	**M22-No0061403**
Date Sampled			**Nov 24, 2022**	**Nov 24, 2022**	**Nov 24, 2022**	**Nov 24, 2022**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	9.2	9.2	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	9.3	9.5	8.8
Reaction Ratings*[S05]	0	-	4.0	4.0	4.0	4.0
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	6.1	9.3	9.0	8.0
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	2.3	< 2	< 2	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.004	< 0.003	< 0.003	< 0.003
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	3	mol H+/t	< 3	< 3	< 3	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	N/A	N/A	N/A	N/A
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	38	4.1	0.45
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	N/A	12	1.3	0.14
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	7700	810	89
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
CRS Suite - Net Acidity - NASSG (Including ANC)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate - NASSG (Including ANC)[S01]	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Extraneous Material						
<2mm Fraction	0.005	g	220	130	80	280
>2mm Fraction	0.005	g	< 0.005	87	120	< 0.005
Analysed Material	0.1	%	100	60	40	100
Extraneous Material	0.1	%	< 0.1	40	60	< 0.1
% Moisture	1	%	11	20	25	17

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Client Sample ID			TP11-ASS 5
Sample Matrix			Soil
Eurofins Sample No.			M22-No0061404
Date Sampled			Nov 25, 2022
Test/Reference	LOR	Unit	
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	9.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.9
Reaction Ratings*[S05]	0	-	4.0
Actual Acidity (NLM-3.2)			
pH-KCL (NLM-3.1)	0.1	pH Units	9.3
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	< 0.003
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	N/A
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	18
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	5.8
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	3600
ANC Fineness Factor		factor	1.5
Net Acidity (Including ANC)			
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 CaCO3/t	< 1
Extraneous Material			
<2mm Fraction	0.005	g	130
>2mm Fraction	0.005	g	90
Analysed Material	0.1	%	58
Extraneous Material	0.1	%	42
% Moisture	1	%	19

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	Nov 30, 2022	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Reducible Sulfur Suite			
Chromium Suite	Brisbane	Nov 30, 2022	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Extraneous Material	Brisbane	Nov 30, 2022	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Brisbane	Nov 25, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			

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Order No.:
Report #: 944513
Phone: 1800 136 436
Fax:

Received: Nov 25, 2022 10:00 AM
Due: Dec 2, 2022
Priority: 5 Day
Contact Name: Rhys Matthews

Project Name: BAM BOLIVAR
Project ID: 20651

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Acid Sulfate Soils Field pH Test	Chromium Reducible Sulfur Suite	Moisture Set
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP04-ASS 1	Nov 24, 2022		Soil	M22-No0061400	X	X	X
2	TP08-ASS 2	Nov 24, 2022		Soil	M22-No0061401	X	X	X
3	TP20-ASS 3	Nov 24, 2022		Soil	M22-No0061402	X	X	X
4	TP12-ASS 4	Nov 24, 2022		Soil	M22-No0061403	X	X	X
5	TP11-ASS 5	Nov 25, 2022		Soil	M22-No0061404	X	X	X
Test Counts						5	5	5

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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
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

Terms

APHA	American Public Health Association
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 a moisture has been determined on a solid sample the result is expressed on a dry 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 is representative of 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 like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-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 5.4
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 be used as a guide only 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

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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. 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)			%	103			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)			%	104			80-120	Pass	
LCS - % Recovery									
Potential Acidity - Chromium Reducible Sulfur									
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)			%	105			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)	L22-No0066115	NCP	pH Units	9.4	9.4	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L22-No0066115	NCP	mol H+/t	< 2	< 2	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L22-No0066115	NCP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD			
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)	L22-No0066115	NCP	% S	0.013	0.012	4.9	20%	Pass	
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	L22-No0066115	NCP	mol H+/t	7.8	7.4	4.9	30%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L22-No0066115	NCP	% S	N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	L22-No0066115	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	L22-No0066115	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (s-SNAS) NLM-4.1	L22-No0066115	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (a-SNAS) NLM-4.1	L22-No0066115	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)	L22-No0066115	NCP	% CaCO3	1.6	1.6	1.9	20%	Pass	
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	L22-No0066115	NCP	% S	0.52	0.53	1.9	30%	Pass	
ANC Fineness Factor	L22-No0066115	NCP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Net Acidity (Including ANC)				Result 1	Result 2	RPD			
CRS Suite - Net Acidity - NASSG (Including ANC)	L22-No0066115	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity - NASSG (Including ANC)	L22-No0066115	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate - NASSG (Including ANC)	L22-No0066115	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	M22-No0058258	NCP	%	29	28	3.7	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	M22-No0061404	CP	pH Units	9.7	9.5	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 (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Harry Bacalis	Analytical Services Manager
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Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Appendix 09 Ecology Assessment

A – Battery Anode Material Facility Ecological Assessment

B – Native Vegetation Clearance Report

ECOSPHERE
Ecological Solutions

Battery Anode Material Facility Ecological Assessment

June 2023

Document information and distribution

Document information	
Item	**Detail**
Project number	K20609
Document title	Battery Anode Material Facility Ecological Assessment, June 2023
Client	JBS&G
Prepared by	Ecosphere Ecological Solutions
Document status	Final
Version number	4

Document distribution				
Authors	**Document status**	**Version number**	**Date of issue**	**Issued to**
Andrew Sinel	Draft	1	06/10/2022	Dr Nicole Patten, Senior Project Manager, JBS&G
Andrew Sinel	Draft	2	12/01/2023	Dr Nicole Patten, Senior Project Manager, JBS&G
Andrew Sinel, Imogen Marshall	Draft	3	05/06/2023	Dr Nicole Patten, Senior Project Manager, JBS&G
Andrew Sinel, Imogen Marshall	Final	4	22/06/2023	Dr Nicole Patten, Senior Project Manager, JBS&G

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The ecological assessment was undertaken on Kaurna country. Ecosphere Ecological Solutions acknowledge the traditional owners of this country and pay our respects to their Elders past, present and emerging.

Acronyms and definitions

Abbreviation	Description
BDBSA	Biological Databases of South Australia
BAM	Battery Anode Material
CBD	Central Business District
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEW	Department for Environment and Water
Ecosphere	Ecosphere Ecological Solutions
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectare
HV	High Voltage
IBRA	Interim Biogeographic Regionalisation for Australia
LSA Act	*Landscape South Australia Act 2019*
MNES	Matters of National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1972*
NV Act	*Native Vegetation Act 1991*
NVC	Native Vegetation Council
NV Regulations	*Native Vegetation Regulations 2017*
NVIS	Native Vegetation Information System
PDI Act	*Planning Development and Infrastructure Act 2016*
PMST	Protected Matters Search Tool
PSG	Purified Spherical Graphite
Renascor	Renascor Resources Pty Ltd
SA	South Australia
SEB	Significant Environmental Benefit
TEC	Threatened Ecological Community
UBS	Unit Biodiversity Score
WWTP	Wastewater Treatment Plant

Contents

1 Introduction 1
1.1 Project overview 1
1.2 Objectives 1
2 Background 3
2.1 Climate 6
2.2 Interim Biogeographical Regionalisation of Australia (IBRA) 6
2.3 NVIS mapping 7
3 Legislative requirements 8
4 Methods 11
4.1 Desktop assessment 11
4.1.1 Protected Matters Search Tool (PMST) – EPBC Act 11
4.1.2 Biological Database of South Australia (BDBSA) 11
4.1.3 Assessment of the likelihood of occurrence 11
4.1.4 Desktop study limitations 12
4.2 Field survey 12
4.2.1 Vegetation survey 12
4.2.2 Fauna 12
5 Results 14
5.1 Desktop assessment 14
5.1.1 Threatened ecological communities 15
5.1.2 Nationally threatened flora 15
5.1.3 State threatened flora 15
5.1.4 Nationally threatened fauna 18
5.1.5 State threatened fauna 19
5.1.6 Commonwealth listed migratory species 19
5.1.7 Nationally listed marine species 19

5.2 Field Assessment 30
5.2.1 Vegetation associations 30
5.2.2 Regionally significant flora species 47
5.2.3 Significant and Regulated Scattered Trees 48
5.2.4 Fauna species 51
5.3 Cumulative impact 51
5.4 Address the Mitigation Hierarchy 51
5.5 Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*) 52
6 Offset requirements 55
7 Summary 56
8 References 57
9 Appendices 58

Appendix 1. Regulated trees. 58
Appendix 2. PMST results summary 65
Appendix 3. BDBSA flora records 66
Appendix 4. BDBSA fauna records 69

List of Figures

Figure 1. General location of the proposed Renascor BAM facility at Bolivar. 2
Figure 2. Project boundary and infrastructure layout of BAM facility and pipeline. 4
Figure 3. Project boundary and infrastructure layout of BAM facility. 5
Figure 4. Average climatic conditions occurring at the BAM facility project site. 6
Figure 5.BDBSA records for conservation significant flora observations within 5km of project site. 17
Figure 6. National and state conservation significant fauna observations within 5km of project site 28
Figure 7. Threatened fauna species legend. 29

Figure 8. Vegetation associations recorded within the BAM facility and pipeline sites. 31

Figure 9. Vegetation associations recorded within the BAM facility site. 32

Figure 10. Vegetation associations recorded along the eastern extent of the pipeline site. ...33

Figure 11. Vegetation associations recorded along the north-eastern extent of the pipeline site. 34

Figure 12. Vegetation associations recorded along the north-western extent of the pipeline site.....35

Figure 13. Vegetation associations recorded along the western extent of the pipeline site....36

Figure 14. Locations of scattered regulated trees. 49

Figure 15. Locations of scattered regulated trees. 50

List of Tables

Table 1. Summary of relevant Commonwealth and state legislation. 8

Table 2. Criteria for the likelihood of occurrence of species within the project site.....11

Table 3. EPBC Act PMST report results summary (5km buffer from project extent). 14

Table 4. The threatened ecological communities identified by the PMST and their likelihood of presence within the project site. 15

Table 5. Threatened flora species potentially or known to occur within the project site identified from the PMST (DCCEEW 2022) and Naturemaps (DEW 2022). 16

Table 6. Threatened and migratory fauna species potentially or known to occur within the project site identified from the PMST (DCCEEW 2023) and Naturemaps (DEW 2022). 20

Table 7. Vegetation association summary. 30

Table 8. Regionally significant flora species (Adelaide region) observed during assessment. .47

Table 9. Scattered regulated tree summary. 48

1 Introduction

1.1 Project overview

Ecosphere Ecological Solutions (Ecosphere) was engaged by JBS&G on behalf of Renascor Resources Pty Ltd (Renascor) to prepare an ecological assessment report for a proposed Battery Anode Material (BAM) Facility located at Bolivar, South Australia (The Project, Figure 1).

1.2 Objectives

The specific objectives of the ecological assessment were to:

- Record vegetation association and condition values of any vegetation subject to provisions of the *Native Vegetation Act 1991* (NV Act).
- Identify of any flora species of Commonwealth or state significance present or likely to occur within the project site either on a temporary or permanent basis.
- Identify any declared plants under the *Landscape South Australia Act 2019* (LSA Act) that may be significant in relation to the proposed BAM facility.
- Undertake an opportunistic fauna assessment to determine if any native fauna species, or fauna habitat, may be significantly impacted by the proposed BAM facility.
- Identify any areas where significant ecological constraints may occur and provide preliminary spatial data to describe these areas if relevant.
- Identify flora subject to regulated tree legislation under the *Planning Development and Infrastructure Act 2016* (PDI Act).
- Calculate the Significant Environmental Benefit (SEB) requirement to offset any vegetation clearance as part of development of the proposed BAM facility.

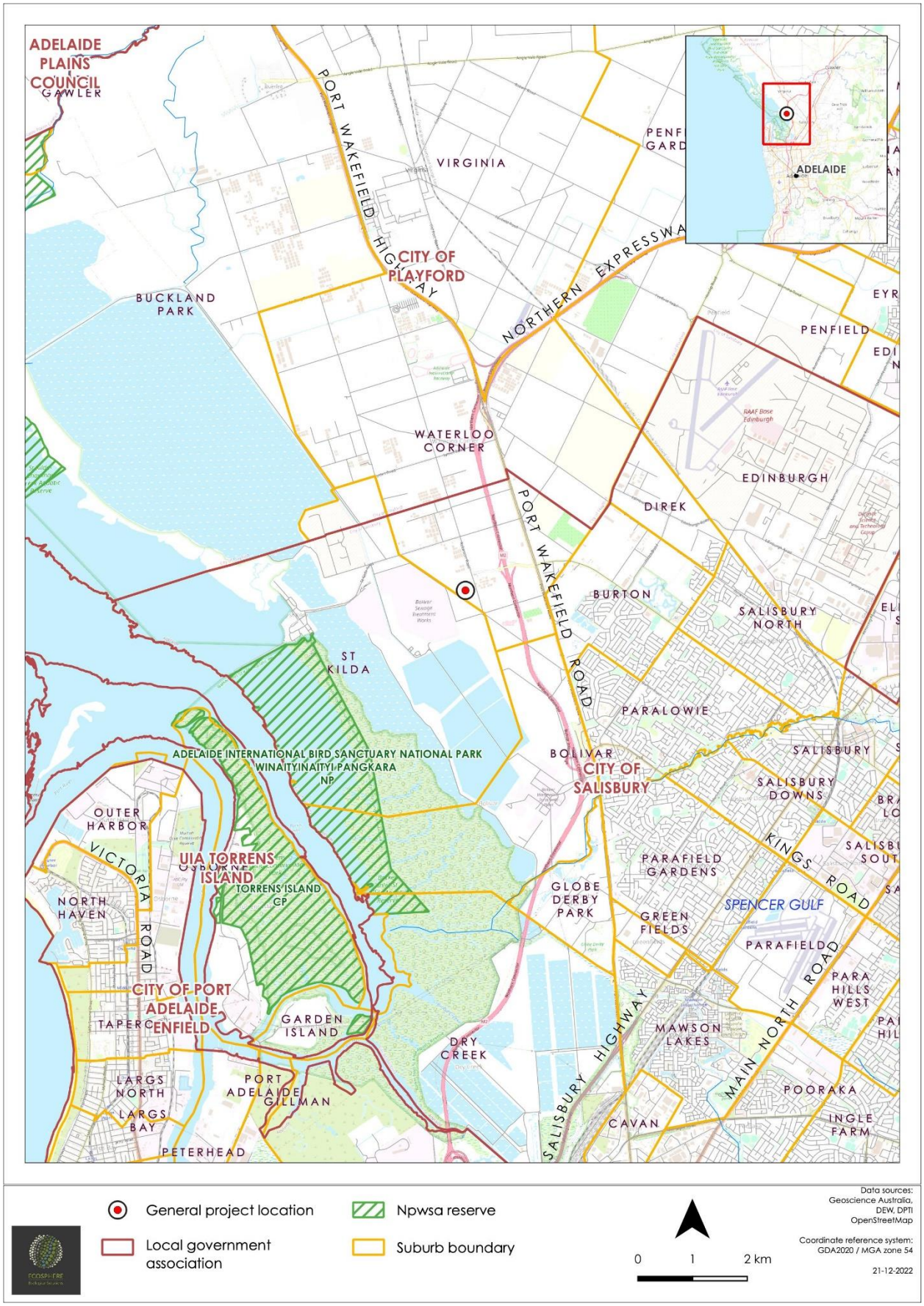

Figure 1. General location of the proposed Renascor BAM facility at Bolivar.

2 Background

Renascor Resources Pty Ltd (Renascor) is a South Australian based exploration and development company, listed on the Australian Securities Exchange (ASX:RNU) with projects located on the Eyre Peninsula, South Australia. Renascor's flagship project is the Siviour Graphite Project located near Arno Bay in South Australia. Sitting over the world's second largest known Graphite Reserve and operating under Mining Lease (ML) 6495, the mine will produce high quality graphite concentrate products via an open cut mining operation. Critical to the Siviour Graphite Project is the need for a BAM Facility.

The proposed BAM Facility (the project) is located in South Australia, approximately 16 km northwest of the Adelaide CBD and located within the City of Playford council area (Figure 1). The BAM Facility will accept graphite concentrate from the Siviour Graphite Mine and process, refine and package the Purified Spherical Graphite (PSG) product, which will then be transported offsite for export.

The project is anticipated to cover an area of approximately 24.5 hectares (ha) and is comprised of the following components:

- micronisation and spheronisation plant
- water treatment plant
- administration and laboratory facilities
- warehousing
- electrical high voltage (HV) switchyard
- water pipelines
- stormwater channel and detention basin
- access roads.

Figure 2 and Figure 3 show further detail of the project components including the proposed water pipeline, stormwater channel and retention basin and infrastructure layout.

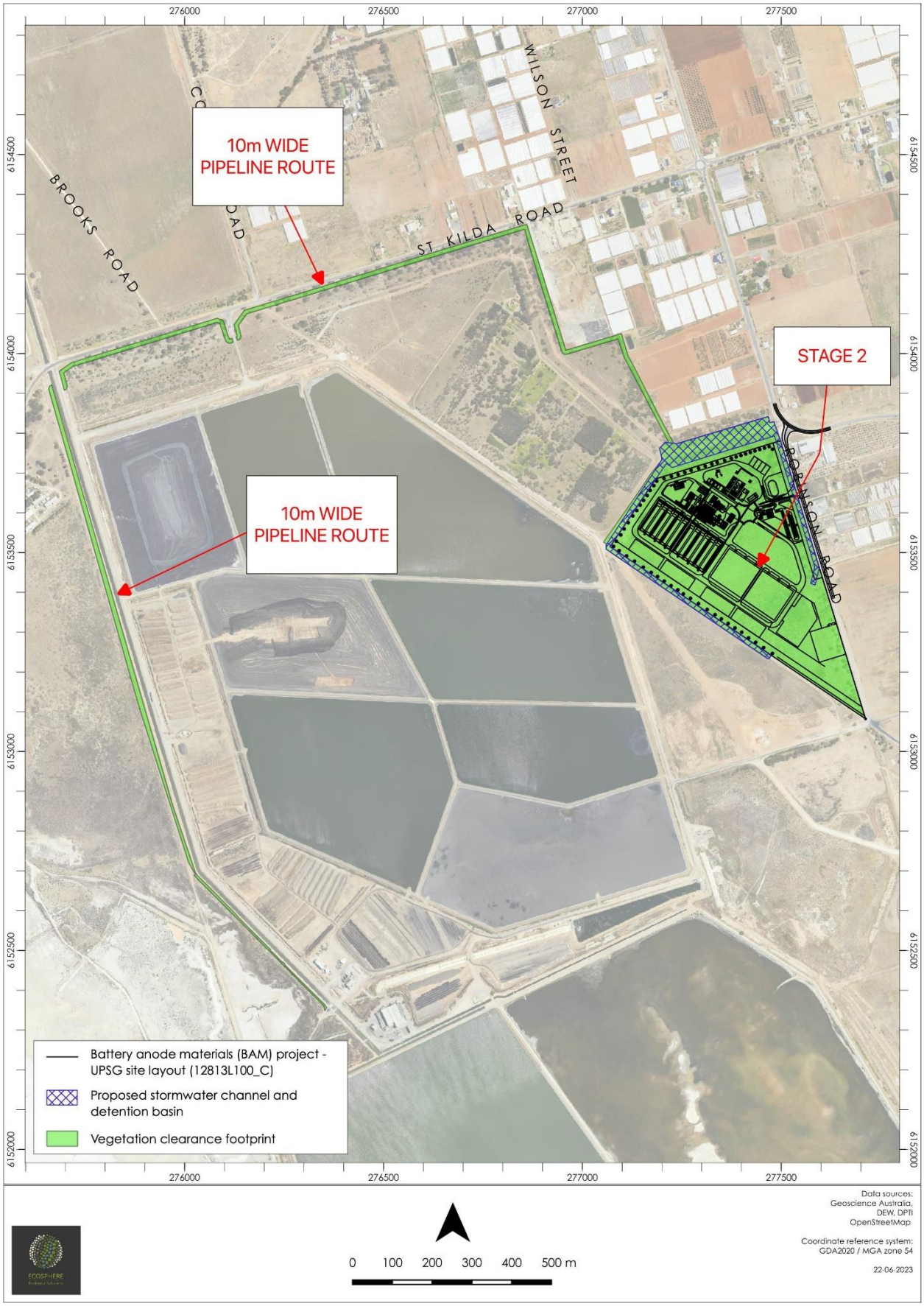

Figure 2. Project boundary and infrastructure layout of BAM facility and pipeline.

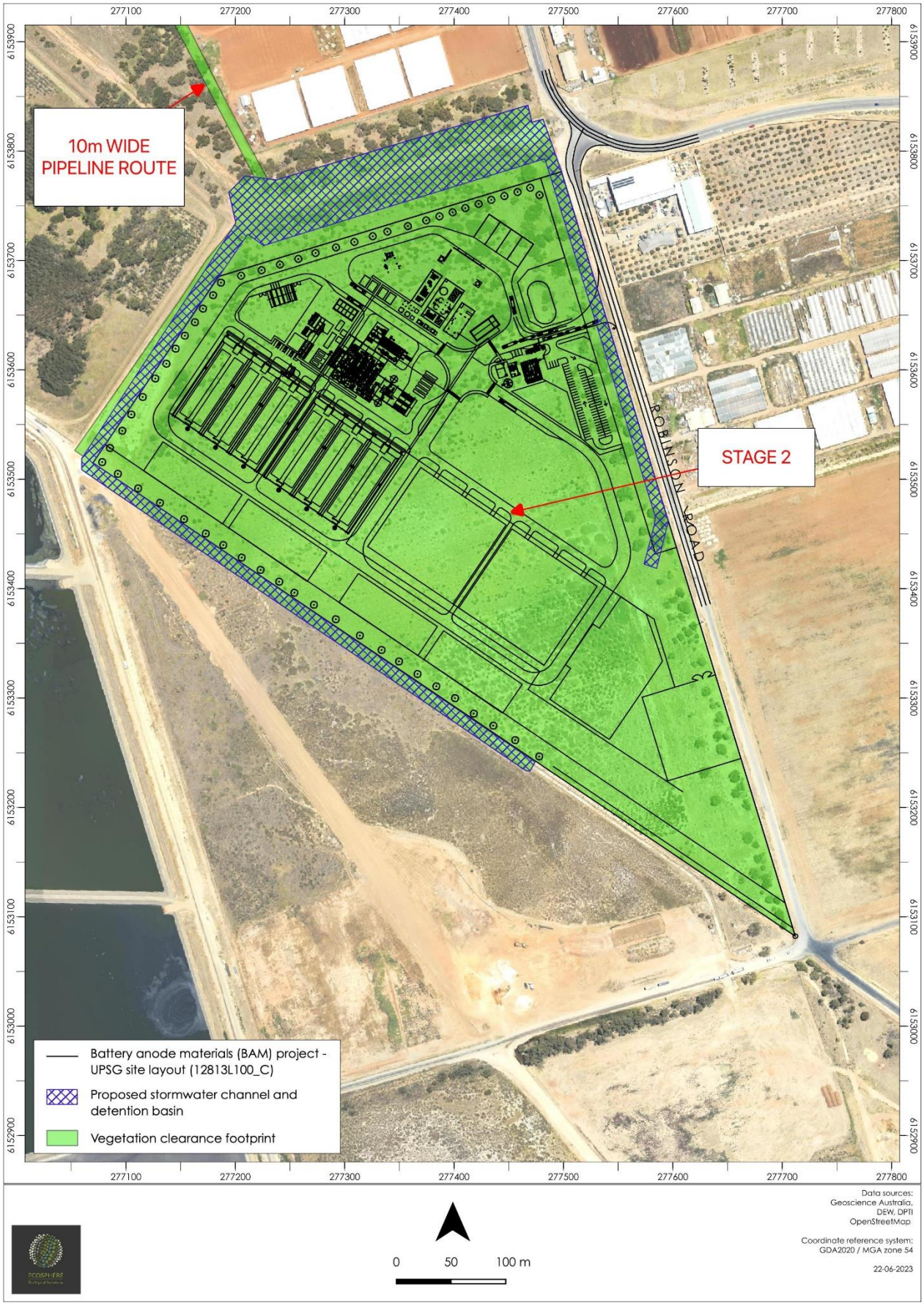

Figure 3. Project boundary and infrastructure layout of BAM facility with stormwater channels.

2.1 Climate

Local climatic historical records were gained through the Edinburgh RAAF weather station (station 023083, open since 1961), located approximately 6 km east of the project site (BOM, 2023). Edinburgh has an annual mean rainfall of 426.9 mm (Figure 4). This results in vegetation of moderate cover, typically comprised of Mallee, open woodlands or chenopod shrublands. The primary winter rainfall provides for periods of high annual species growth and generally is the highest weed risk period. At Bolivar, this also results in periods of inundation and soft soil conditions due to low lying topography and clay soils.

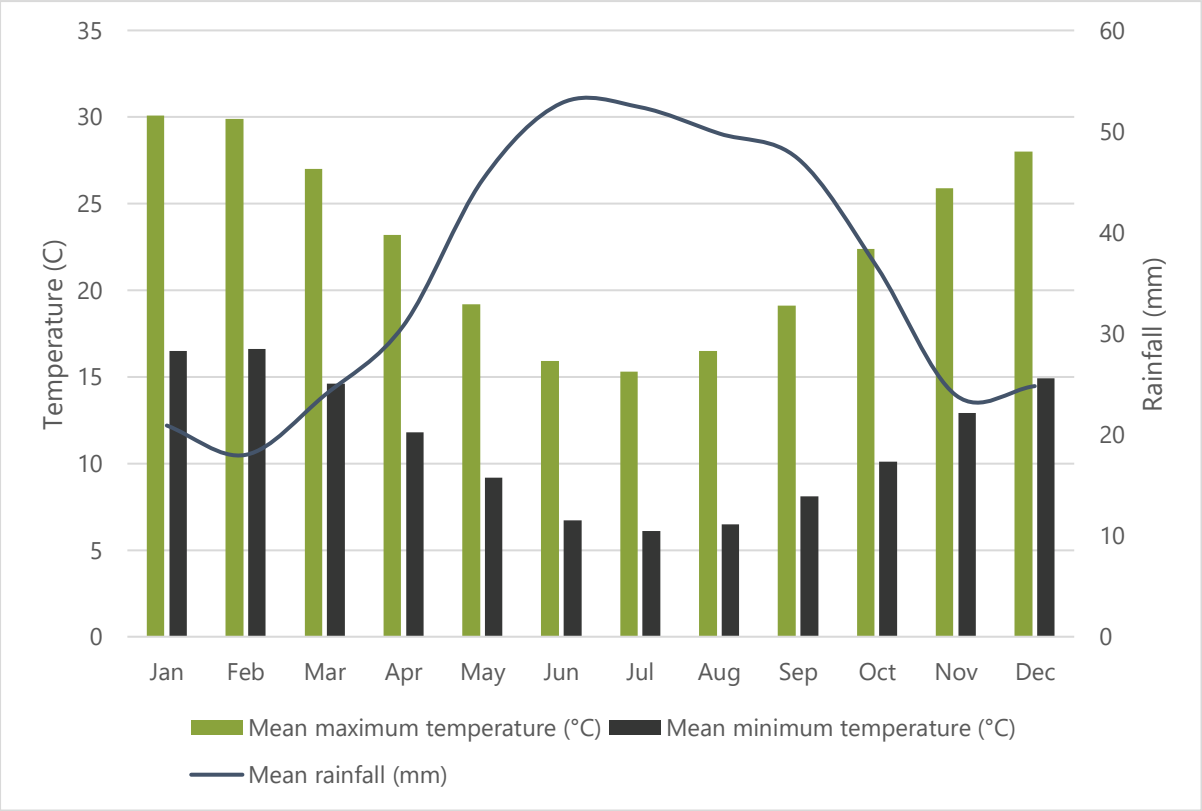

Figure 4. Average climatic conditions occurring at the BAM facility project site.

2.2 Interim Biogeographical Regionalisation of Australia (IBRA)

The Interim Biogeographical Regionalisation of Australia (IBRA) was developed as a key tool for identifying land for conservation under Australia's Strategy for the National Reserve System 2009-2030 (DoEE 2012). IBRA identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation, and species information. The bioregions are further refined into subregions and environmental associations.

The project falls within the Eyre Yorke Block IBRA Bioregion, the St. Vincent Subregion, and both the Mallala and Parham environmental associations. Approximately 3% of the Mallala association and 44% of the Parham association is mapped as remnant vegetation of which 2% and 7% respectively is formally conserved and protected within National Parks and Wildlife reserves or private heritage agreements under the NV Act.

2.3 NVIS mapping

The Native Vegetation Floristic Areas - NVIS - Statewide South Australian government vegetation mapping shows the project site as non-indigenous vegetation communities. The following vegetation descriptions apply to areas within and surrounding the project site as an indicator of typical communities present in a pre-European environment.

- *Tecticornia* sp., *Sarcocornia quinqueflora* low open shrubland over *Parapholis incurva*, *Disphyma crassifolium* ssp. *clavellatum*, +/- *Wilsonia humilis*.

This association is a samphire/saltmarsh community and was confirmed within sections of the project site during the field assessment. This association is typically recorded in tidal and supra tidal zones. However, the presence of infrastructure has removed the connectivity of tidal influence and as a result the communities present are in poorer than average condition.

3 Legislative requirements

A summary of key legislation relating to flora and fauna consideration and their relevance to the proposed project is provided in Table 1 below.

Table 1. Summary of relevant Commonwealth and state legislation.

Legislation	Summary	Relevance
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999	To protect 'matters of national environmental significance' (MNES): • World Heritage properties • National Heritage properties • wetlands of international importance (Ramsar wetlands) • listed threatened species and ecological communities. • migratory species • Commonwealth marine areas • the Great Barrier Reef Marine Park • nuclear actions (including uranium mining). • a water resource, in relation to coal seam gas development and large coal mining development	Where an activity may trigger requirements of the EPBC Act, this legislation must be considered. Any action that has, will have, or is likely to have a significant impact on a matter of national environmental significance requires referral and approval. Significant penalties apply. To determine whether an action is likely to have a significant impact on a matter of national environmental significance, refer to the Significant Impact Guidelines (Commonwealth of Australia 2009) at: http://www.environment.gov.au/epbc/publications/pubs/nes-guidelines.pdf.
South Australia		
National Parks and Wildlife Act 1972	Allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters); provides for the protection of native flora and fauna; identifies flora and fauna species considered to be of conservation significance (under Schedules 7, 8, and 9 of the Act); and provides for the use of approved wildlife through a system of permits allowing certain actions, i.e. keeping and selling (s.58), harvesting (s.60G), farming (s.60C), hunting (s.68A), releasing (s.55) and undertaking scientific research (s.53) on/of native fauna species, and for the taking of plants (s.49).	A person must not "take" a native plant, protected animal or the eggs of a protected animal without approval (s.48A). Significant penalties apply. To take a native plant means to remove the plant or part of the plant, from the place in which it is growing; or to damage the plant. To take a protected animal means to remove, hunt, catch, restrain, kill or injure an animal, or attempt to do so. A person may take non-prescribed plant species from private land with the consent of the owner; however, these species may also be covered under the *Native Vegetation Act 1991*. There are several non-complying activities in parks and reserves that result in penalty (parts 4-6).
Native Vegetation Act 1991	To preserve, enhance and manage the State's native vegetation; provide a regulatory framework to control clearance of vegetation; and provide incentives and assistance to landowners to encourage them to	Persons wanting to clear native vegetation must apply for a permit from the Native Vegetation Council (NVC) (ss.7,14), unless exempt under the regulations. The NVC will consider the impacts of the proposed clearance and may grant consent, refuse consent or grant consent subject to certain

Legislation	Summary	Relevance
	preserve and enhance native vegetation. The Act protects all native vegetation that naturally occurs, i.e., vegetation which has not been planted. This includes all naturally occurring local native plants, from small ground covers and native grasses to mallee scrub and tall trees. It does not cover planted trees. Approval is required for the clearance of native vegetation. Clearance is defined as: • the killing or destruction of native vegetation • the removal of native vegetation • the severing of branches, limbs, stems or trunks of native vegetation. • the burning, poisoning and slashing of native vegetation. • any other substantial damage to native vegetation including activities such as the draining for the reclamation of wetlands or flooding of land, grazing land where stock have been excluded for more than ten years.	conditions (s.29). A net environment benefit is generally conditional on an approval being granted. Significant penalties apply if a person clears native vegetation without the permission of the NVC (s.26). The NVC can also take civil enforcement proceedings in the District Court for an order that the native vegetation be re-instated (s.31). The Act also provides the opportunity for landholders to enter into voluntary "Heritage Agreement(s)" to ensure vegetation on private land is protected for perpetuity (s.23). As the project will be assessed via an EIS under the *Planning, Development and Infrastructure Act 2016*, it is understood that Regulations 12 and 13 of the NV Regulations will apply. Under these Regulations and Schedule 1, Part 4 (clause 27) of the NV Regulations, vegetation clearance for major developments that are approved under an EIS (that was referred to the NVC for comment) is permitted, provided that it is undertaken in accordance with the development consent and an approved management plan (or a payment into the Native Vegetation Fund) which results in a significant environmental benefit.
Landscape South Australia Act 2019	From July 1, 2020, the *Landscape South Australia Act 2019* (LSA Act) replaced the *Natural Resources Management Act 2004*, as the key framework for managing the state's land, water, pest plants and animals, and biodiversity across the state.	Under the South Australian LSA Act landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation. A key priority of landscape boards is to support local communities and landowners to be solely responsible for sustainably managing their region's landscapes with an emphasis on land and water management, pest animal and plant control, and biodiversity. This includes providing greater funding and partnership opportunities with local community organisations to deliver on ground works and projects.
Planning Development and Infrastructure Act 2016	The Planning and Design Code is the cornerstone of the new system and has replaced all council development plans to become the only source of planning policy for assessing development applications. The *new Act has replaced the Development Act 1993* state-wide and is no longer operational. The *Planning Development and Infrastructure Act 2016* provides	Any activity that damages a 'regulated tree' or 'significant tree' is 'development,' and as such requires a development approval. Specifically, development approval is required for removal, killing or destruction, branch or limb lopping, ringbarking, or topping, or any other substantial damage to a regulated or significant tree, including to its root system other than maintenance pruning. Significant fines apply if breaches are proven.

Legislation	Summary	Relevance
	provision for the protection of 'regulated trees' and 'significant trees.	

4 Methods

The desktop study involved searching Commonwealth and state databases which included the project footprint and an additional 5km buffer. This aims to identify threatened species, protected under the EPBC Act and NPW Act, either occurring or with the potential to occur within the project site. Following field survey work, the desktop study was updated to reflect habitat assessments.

4.1 Desktop assessment

4.1.1 Protected Matters Search Tool (PMST) – EPBC Act

A PMST report was generated on 23rd November 2022 with an updated report generated on the 29th of May 2023 to identify MNES under the EPBC Act, relevant to the project site (DCCEEW, 2023). The PMST is maintained by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and was used to identify flora and fauna species or ecological communities of national environmental significance that may occur or likely to have suitable habitat within 5km of the project site.

4.1.2 Biological Database of South Australia (BDBSA)

Threatened species listed under the EPBC Act and NPW Act were assessed using the Naturemaps Supertable, obtained through the general query tool on Naturemaps. The dataset was obtained on 16th June 2022 and was used to identify threatened species that have been recorded within 5km of the project site (DEW 2020). Search criteria also included records since 1st January 1995 with a spatial reliability of <1km.

4.1.3 Assessment of the likelihood of occurrence

The likelihood of each threatened flora and fauna species potential of occurring within the project site was assessed. A likelihood of occurrence rating (Highly Likely / Known, Likely, Possible and Unlikely) was assigned to each threatened species identified in the desktop PMST and BDBSA search using the parameters as outlined below in Table 2.

Table 2. Criteria for the likelihood of occurrence of species within the project site.

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is largely intact and falls within the known Project of the species distribution or. The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides species habitat which is largely intact.

Likelihood	Criteria
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area does not provide species habitat which is largely intact. Recorded within 20 -40 years, survey effort is considered adequate, habitat is present and intact, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records within the previous 40 years despite suitable habitat being known to occur in the area. No records despite adequate survey effort.

4.1.4 Desktop study limitations

The content of the desktop study was derived from existing datasets and references from a range of sources. Flora and fauna records were sourced from the Protected Matters Database via the PMST and the BDBSA via Naturemaps. The BDBSA only includes verified flora and fauna records submitted to Department for Environment and Wildlife (DEW) or partner organisations. It is recognised that drawing conclusions can be unreliable within areas that have been underrepresented in terms of biological studies. It is possible, therefore, that significant species occur within the project site that were not reflected by database records.

4.2 Field survey

The field survey was conducted on 29th June 2022 and 11th May 2023 by NVC accredited ecologists Andrew Sinel and Rob Kelman. The field survey included a vegetation survey and passive fauna assessment.

4.2.1 Vegetation survey

The vegetation survey for areas of native vegetation was undertaken in accordance with the NVC endorsed Bushland Assessment Method.

Vegetation within the individual associations was surveyed for national, state and regionally significant flora species that occurred within the area. A ramble survey method was adopted (i.e., randomly walking through areas of vegetation, attempting to cover different topography and habitats) to ensure best coverage of the individual associations.

The following information is recorded for any threatened flora observed:

- Location and extent of any populations (hand-held GPS); and
- Vegetation association and additional habitat observations where relevant.

4.2.2 Fauna

A focus of the on-ground fauna assessment was on avian species due to ability to passively identify and record species. For more inconspicuous fauna species, opportunistic observations were recorded, and fauna likelihood based largely on the presence and quality of habitat. The likelihood of specific species occurring within the project site included:

- Reviewing previous field survey results and database records
- assessing the habitat value of the vegetation during the field survey to determine the fauna species likely to occur within the project site.
- presence of any areas of significant fauna value such as fallen timber, areas for shelter such as caves or overhangs or permanent or casual water/wetlands.

5 Results

5.1 Desktop assessment

A total of 48 listed threatened species and 63 migratory species were identified by the EPBC Act PMST report as potentially occurring or having suitable habitat potentially occurring within 5 km of the project site (Table 3) (DECCEW 2023). The relevant MNES protected under the EPBC Act are discussed in detail below. Marine only species were not assessed as part of this desktop work due to a lack of connectivity of the project site to marine environments within the scope of the project option layouts.

Table 3. EPBC Act PMST report results summary (5km buffer from project extent).

Search area (5 km buffer)	Matters of national environmental significance under the EPBC Act	Identified within the search area
	World heritage properties	None
	National heritage properties	None
	Wetlands of international importance	None
	Great Barrier Reef marine park	None
	Commonwealth marine area	None
	Threatened ecological communities	2
	Listed Threatened species	48
	Migratory species	63
	Commonwealth land	22
	Commonwealth heritage places	None
	Listed marine species	97
	Whales and other cetaceans	8
	Critical habitats	None
	Commonwealth reserves terrestrial	None
	Commonwealth reserves marine	None
	State and Territory reserves	5
	Regional forest agreements	None
	Nationally important wetlands	2
	Key Ecological Features	None
	Biologically Important Areas	None
	Key ecological features (marine)	None

5.1.1 Threatened ecological communities.

Two Threatened Ecological Communities (TEC's) were identified in the PMST as potentially occurring within 5 km of the project site. A summary of these communities and comment regarding their likelihood of occurrence in the project site are provided in Table 4 below.

Table 4. The threatened ecological communities identified by the PMST and their likelihood of presence within the project site.

Threatened Ecological Community	EPBC Status	Likelihood of Occurrence in the Project Site
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	The field survey recorded no areas with connectivity to supra tidal conditions. The presence of infrastructure and evaporation ponds associated with the WWTP ensure no flooding from tidal surges can occur within the project site. Tidal influence is a key criterion and therefore rules out the possibility any samphire shrublands in the area can fulfill conditions for the TEC.
Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia	Critically Endangered	No indigenous intact Peppermint Box Woodlands recorded in project site. There were areas of *Eucalyptus odorata* planted within the project site as a screen along the boundary. A lack of understorey species richness and intact perennial grass stands meant that any areas of *E. odorata* woodland could not be considered part of the threatened ecological community.

5.1.2 Nationally threatened flora

Five flora species listed as threatened under the EPBC Act were identified in the PMST report as potentially occurring or having suitable habitat within the project site (Table 5 and Figure 5). One flora species of national conservation significance had historical records within 5km of the project site, *Tecticornia flabelliformis* (Bead Glasswort, VU:AUS). Bead Glasswort typically occupies a specific niche at the edge of the supra tidal zone where winter inundation from rainfall and storm surges creates a temporary wet zone. This species defoliates during winter and regains leaf cover during summer when surface water is largely not present. The locations of this population occur approximately 2 km west of the project site at St Kilda. No individuals of this species were recorded within the project site nor were they considered likely to occur based on the type and quality of habitat present.

5.1.3 State threatened flora.

One flora species of state conservation significance had historical records from the BDBSA. *Juncus radula* (Hoary Rush) was considered unlikely due to the lack of permanent water within the project site. A list of all flora species with records within 5km of the project site is provided in Appendix 3.

Table 5. Threatened flora species potentially or known to occur within the project site identified from the PMST (DCCEEW 2022) and Naturemaps (DEW 2022).

Scientific name	Common name	Conservation status		Source	BDBSA last record (year)	Distribution and preferred habitat	Likelihood of Occurrence within Project Site
		Aus.	SA				
Caladenia tensa	Green-comb Spider-orchid	EN	R	1	None	This species is considered to be widespread in SA from the west coast, throughout Eyre Peninsula and adjacent pastoral zone, the Flinders Ranges, rare in the Mt Lofty Ranges and more common in the Murray and upper south-east. The Green-comb Spider-orchid grows on red-brown sandy loams on rises in open woodland dominated by *Eucalyptus leucoxylon* (SA Blue gum) and *Callitris gracilis* (Native Pine).	Unlikely
Juncus radula	Hoary Rush		V	2	24/09/1999	Recorded in depressions and along seasonal drainage lines in a range of vegetation communities. Known to hybridize with *J. subsecundus.*	Unlikely
Prasophyllum pallidum	Pale Leek-orchid	VU	E	1	None	Grows in woodland on slopes and gullies. Limited to intact stratums not subject to disturbance.	Unlikely
Senecio macrocarpus	Large Fruit Fireweed	VU	V	1	None	Occurs in a variety of habitats, including grasslands, sedgelands, shrublands and woodlands, generally on sparsely vegetated sites on sandy loam to heavy clay soils, often in depressions that are waterlogged in winter.	Unlikely
Swainsona pyrophila	Yellow Swainson-pea	VU	R	1	None	Occurs in mallee vegetation communities on a variety of soil types including well-drained sands, sandy loams and heavier clay loams.	Unlikely
Tecticornia flabelliformis	Beaded Glasswort	VU	E	1,2	25/12/2001	Sub tidal and supra tidal zones. Several records within 5km of project site. Not likely to occur outside of known location.	Unlikely

Conservation status: Aus.: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: EN/E: Endangered. VU/V: Vulnerable, R: Rare.

Figure 5.BDBSA records for conservation significant flora observations within 5km of project site.

5.1.4 Nationally threatened fauna

A total of 43 fauna species listed as threatened under the EPBC Act were identified by the PMST as having suitable habitat potentially occurring within 5 km of the project site (Table 6 and Figure 6). This included three mammals, four reptiles, two fish and a shark with the remaining 33 being avian species. Ten nationally threatened fauna species had historical records since 1995 and within 5km of the project site from the BDBSA. The desktop assessment resulted in three species considered to possibly occur within the project site, these were:

- St Vincent Gulf Slender-billed Thornbill (*Acanthiza iredalei rosinae,* EPBC: VU, SA: V)
- Grey-headed Flying-fox (*Pteropus Poliocephalus,* EPBC: VU, SA: R)
- Blue-winged Parrot (*Neophema chrysostoma,* EPBC: VU, SA: V).

An additional species, the Fairy Tern (*Sternula nereis nereis* EPBC: VU, SA: E) was considered to possible fly over the site periodically but not utilise the habitat within the area.

The St Vincent Gulf **Slender-billed Thornbill** subspecies (*Acanthiza iredalei rosinae*) is known to inhabit samphire shrublands. There was a lack of low compact shrubs within the project site and coupled with the grazing of the area and a planted modified overstorey dominated by *Melaleuca halmaturorum* (Coast Tea-tree), resulted in an unlikely likelihood of this species occupying the project site. Further, a targeted survey did not identify the species within the project site (see Section 5.2.4). Based on the degraded quality of the vegetation within the project footprint and land use for sheep grazing, the potential for this species to utilise the habitat is very unlikely.

Grey-headed Flying-fox (*Pteropus Poliocephalus*) are known to roost in the Adelaide Botanic Park and forage over a wide area, with individuals capable of travelling 40 km between their roost and feeding sites in a night (Eby and Law, 2008), which places the project site well within their range. Grey-headed Flying Foxes consume fleshy fruits and blossoms, have been observed feeding on the fruits of the Moreton Bay Fig (*Ficus macrophylla*) and the blossoms of eucalypts (*Eucalyptus* spp. and *Corymbia* sp.). Although the species may fly through the project site, the field survey did not identify any habitat critical to the species within the project site.

Blue-winged Parrot (*Neophema chrysostoma*) are known to inhabit coastal, sub-coastal and inland areas. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. The species is also known to be found in altered environments such as airfields, golf-courses and paddocks. Habitat within the project site is not deemed critical for the species given the project site is a previously degraded and marginally rehabilitated area that is subject to grazing by sheep and incurs ongoing disturbance occurs from heavy vehicles and machinery associated with the WWTP. No records occur within 5km of the project site. However, suitable habitat for the species is present within the wider area and this transient species is considered to possibly move through the project site to access areas of suitable habitat.

5.1.5 State threatened fauna.

A total of 32 state threatened fauna species have historical records within 5 km of the project site (Table 6). Three species were considered as possibly or likely to occur within the project site, these were:

- Elegant Parrot (*Neophema elegans*)
- Little Egret (*Egretta garzetta nigripes*)
- Brown Quail (*Coturnix ypsilophora australis*)

None of these species were considered likely to be impacted by the extent of the project as the **Elegant Parrot** and **Little Egret** are typically transient in nature and do not occupy habitats on a permanent basis (Table 6) and the **Brown Quail** requires dense undergrowth which is not present within the project site. A list of all fauna species with historical records within 5 km of the project site is provided in Appendix 4.

5.1.6 Commonwealth listed migratory species.

Sixty-three migratory species were highlighted as part of the search (Table 6) and most of these species were associated with the Adelaide International Bird Sanctuary National Park - Winaityinaityi Pangkara. The park is located at the southern end of the East Asian-Australasian Flyway (EAAF) which is used by more than 5 million birds every year. 27,000 of these birds stop and rest in the Adelaide International Bird Sanctuary (DEW 2022). Most of these species are unlikely to utilise the project site other than as a brief flyover as a result of the surrounding land use and high levels of disturbance from machinery and heavy vehicles.

5.1.7 Nationally listed marine species

Ninety-seven listed marine species listed under the EPBC Act were identified in the PMST as potentially occurring or having suitable habitat potentially occurring within 5 km of the project site. Thirty-two of these were marine mammals fish and reptiles and were not considered as part of this assessment being entirely terrestrial in nature. The remaining 65 avian species were likely to fly over the area or utilise saltmarsh areas associated with the gulf mangrove systems. The project site was considered unsuitable for migratory bird species due to a lack of foraging and coastal saltmarsh habitat.

Table 6. Threatened and migratory fauna species potentially or known to occur within the project site identified from the PMST (DCCEEW 2023) and Naturemaps (DEW 2022).

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Occurrence within Project Site
		Aus.	SA				
BIRDS							
Acanthiza iredalei rosinae	Slender-billed Thornbill	VU	V	1, 2	06/11/2020	Open Chenopod shrublands and samphire shrublands. Historical record north of project site associated with intact samphire shrublands however the project site itself is a previously degraded and marginally rehabilitated area that is subject to grazing by sheep. The samphire shrubland stands have only extremely low cover and height and are mixed with planted coastal Tea-tree. The habitat within the project site is overall not suitable for this species and coupled with the existing land use and ongoing disturbance from heavy vehicles and machinery associated with the WWTP it is considered unlikely that the project site supports any suitable habitat for this species.	Unlikely
Aphelocephala leucopsis	Southern Whiteface	VU		1	None	Open woodlands and shrublands where there are an understorey of grasses or shrubs, or both. Favours habitat with low tree densities and herbaceous understorey litter cover.	Unlikely
Actitis hypoleucos	Common Sandpiper	Mi (W)	R	1, 2	13/12/2014	Coastal tidal salt marshes	Unlikely
Anhinga novaehollandiae	Australasian Darter		R	2	02/12/2012	Freshwater Wetlands	Unlikely
Apus pacificus	Fork-tailed Swift	Mi (M), Ma		1	None	Migratory and aerial species will roost in large tress	Unlikely
Ardea intermedia plumifera	Plumed Egret		R	2	19/01/2012	Wetlands and open grazing country	Unlikely
Ardenna carneipes	Flesh-footed Shearwater,	Mi.		1	None	Marine species, comes to islands to nest.	Unlikely
Ardenna grisea	Sooty Shearwater	Mi.		1	None	Marine species, comes to islands to nest.	Unlikely
Arenaria interpres	Ruddy Turnstone	MI (W)	R	1,2	26/02/2006	Coastal shorebird often found around high tide mark amongst wrack on beach	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Occurrence within Project Site
		Aus.	SA				
Biziura lobata menziesii	Musk Duck		R	2	13/12/2014	Freshwater wetland species	Unlikely
Botaurus poiciloptilus	Australasian Bittern	EN	E	1,2	25/08/2007	Freshwater wetland species, inhabits swamps and wetlands, largely nocturnal	Unlikely
Bubulcus ibis coromandus	Eastern Cattle Egret		R	2	08/08/2006	Wetlands and open paddocks	Unlikely
Calidris acuminata	Sharp-tailed Sandpiper	Mi (W)		1	None	Wading shorebird	Unlikely
Calidris alba	Sanderling	Mi (W)		1	None	Wading shorebird	Unlikely
Calidris canutus rogersi	Red Knot	EN, Mi (W)	E	1, 2	08/02/1998	Wading shorebird	Unlikely
Calidris ferruginea	Curlew Sandpiper	CE, Mi (W)		1,2	02/12/2012	Wading shorebird	Unlikely
Calidris melanotus	Pectoral Sandpiper	Mi (W)	R	1, 2	13/10/2015	Wading shorebird	Unlikely
Calidris pugnax	Ruff		R	2	13/01/2011	Wading shorebird	Unlikely
Calidris ruficollis	Red-necked Stint	Mi (W)		1	None	Wading shorebird	Unlikely
Calidris subminuta	Long-toed Stint	MI (W)	R	1,2	17/01/2006	Wading shorebird	Unlikely
Calidris tenuirostris	Great Knot	CE, Mi (W)	R	1	None	Wading shorebird	Unlikely
Cereopsis novaehollandiae	Cape Barren Goose		R	2	20/03/2004	Cape Barren Goose prefers offshore islands with scrub or pasture, ocean beaches, headlands, margins of lakes, swamps, farm pastures. Cape Barren geese live mostly on small, windswept and generally uninhabited offshore islands	Unlikely
Charadrius bicinctus	Double-banded Plover	Mi (W)		1	None	Wading shorebird	Unlikely
Charadrius leschenaultii	Greater Sand Plover	VU, Mi (W)	R	1	None	Wading shorebird	Unlikely
Charadrius mongolus	Lesser Sand Plover	EN, Mi (W)	R	1	None	Wading shorebird	Unlikely
Charadrius veredus	Oriental Plover	Mi (W)		1	None	Wading shorebird	Unlikely
Cladorhynchus leucocephalus	Banded Stilt		V	2	20/12/2015	Wading shorebird	Unlikely
Coturnix ypsilophora australis	Brown Quail		V	2	13/12/2014	Open flats and grassy plains	Possible
Diomedea antipodensis	Antipodean Albatross	VU, Mi		1	None	Pelagic marine species	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Occurrence within Project Site
		Aus.	SA				
Diomedea epomophora	Southern Royal Albatross	VU, Mi	V	1	None	Pelagic marine species	Unlikely
Diomedea exulans	Wandering Albatross	VU, Mi	V	1	None	Pelagic marine species	Unlikely
Diomedea sanfordi	Northern Royal Albatross	EN, Mi		1	None	Pelagic marine species	Unlikely
Egretta garzetta nigripes	Little Egret		R	2	14/10/2020	Wading bird, nearby record within samphire shrublands.	Possible
Falco hypoleucos	Grey Falcon	VU	R	1	None	Distributed sparsely over Australia's arid and semi-arid zones.	Unlikely
Falco subniger	Black Falcon		R	2	14/08/2007	Sparsely spread in the inland and across northern, eastern, southern and central Australia. The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas.	Unlikely
Gallinago hardwickii	Latham's Snipe	Mi (W)	R	1,2	23/09/2006	Wading bird, likely in salt fields areas but no samphire shrubland	Unlikely
Gallinago megala	Swinhoe's Snipe	Mi (W)		1	None	Wading bird	Unlikely
Gallinago stenura	Pin-tailed Snipe	Mi (W)		1	None	Wading bird	Unlikely
Grantiella picta	Painted Honeyeater	VU	V	1	None	Wading bird	Unlikely
Haematopus fuliginosus fuliginosus	Sooty Oystercatcher		R	2	26/11/2014	Coastal shorebird, likely to occur along coastal fringe and around nearby Torrens Island. Unlikely within project site.	Unlikely
Haematopus longirostris	Pied Oystercatcher		R	2	26/11/2014	Coastal shorebird, likely to occur along coastal fringe and around Torrens Island	Unlikely
Hieraaetus morphnoides	Little Eagle		V	2	19/06/2005	The Little Eagle is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest.	Unlikely
Hirundapus caudacutus	White-throated Needletail	VU, Mi	V	1	None	Largely aerial species, may roost locally in large trees	Unlikely
Limicola falcinellus	Broad-billed Sandpiper	Mi (W)		1	None	Wading species, likely in salt pan areas	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Occurrence within Project Site
		Aus.	SA				
Limosa lapponica baueri	Bar Tailed Godwit	VU, Mi (W)	R	1, 2	28/03/2010	Wading species, likely in salt pan areas	Unlikely
Limosa limosa	Black-tailed Godwit	Mi (W)	R	1,2	02/04/2011	Wading species, likely in salt pan areas	Unlikely
Macronectes giganteus	Southern Giant Petrel	EN, Mi	V	1	None	Pelagic marine species	Unlikely
Macronectes halli	Northern Giant Petrel	VU, Mi		1	None	Pelagic marine species	Unlikely
Melanodryas cucullata cucullata	South-eastern Hooded Robin	EN	R	1	None	Prefer dry eucalypt and acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer. Sometimes occur in tall, dense heaths with scattered open areas.	Unlikely
Melithreptus gularis gularis	Black-chinned Honeyeater		V	2	11/09/2007	Occupies mostly upper levels of drier open forests or woodlands dominated by box bark Eucalypts,	Unlikely
Motacilla cinerea	Grey Wagtail	Mi (T),		1	None	Vagrant only	Unlikely
Motacilla flava	Yellow Wagtail	Mi (T),		1	None	Vagrant only	Unlikely
Myiagra cyanoleuca	Satin Flycatcher	Mi (T)		1	None	Recorded in woodlands	Unlikely
Neophema chrysogaster	Orange-bellied Parrot	CE	E	1	None	Formerly widespread along coastal margins and samphire marshes now only recorded along the southern Victorian coastline mostly around the Bellarine Peninsula and breeding areas at Melaleuca Tasmania. Remnants important in the event that population recovers.	Unlikely
Neophema chrysostoma	Blue-winged Parrot	VU	V	1	None	Inhabit a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. Can also be seen in altered environments such as airfields, golf-courses and paddocks.	Possible

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Occurrence within Project Site
		Aus.	SA				
Neophema elegans elegans	Elegant Parrot		R	2	13/01/2011	Occupies woodlands, mallee and open shrublands	Likely
Numenius madagascariensis	Eastern Curlew	CE, Mi (W)	E	1,2	02/12/2012	Coastal Shorebird	Unlikely
Numenius minutus	Little Whimbrel	Mi (W)		1	None	Coastal Shorebird	Unlikely
Numenius phaeopus variegatus	Whimbrel	Mi (W)	R	1,2	26/02/2006	Coastal Shorebird records in proximity to project site on samphire shrubland community.	Unlikely
Oxyura australis	Blue-billed Duck		R	2	02/12/2012	Wetlands	Unlikely
Pachyptila turtur subantarctica	Fairy Prion	VU		1	None	Pelagic marine species	Unlikely
Pandion haliaetus	Osprey	Mi (W),	E	1	None	Ospreys require extensive areas of open fresh, brackish or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes.	Unlikely
Pedionomus torquatus	Plains-wanderer	CE	E	1	None	Open plains in arid and semi-arid areas	Unlikely
Pezoporus occidentalis	Night Parrot	EN	E	1	None	Extinct in area	Unlikely
Phalaropus lobatus	Red-necked Phalarope	Mi (W)		1	None	Migratory wetland species	Unlikely
Philomachus pugnax	Ruff (Reeve)	Mi (W)		1	None	Migratory wetland species	Unlikely
Phoebetria fusca	Sooty Albatross	VU, Mi	E	1	None	Pelagic marine species	Unlikely
Plegadis falcinellus	Glossy Ibis		R	2	01/12/2004	The Glossy Ibis requires shallow water and mudflats, so is found in well-vegetated wetlands, floodplains, mangroves and rice fields	Unlikely
Pluvialis fulva	Pacific Golden Plover	Mi (W)	R	1,2	25/01/2007	Migratory wetlands species likely in adjacent salt pans and saline wetlands	Unlikely
Pluvialis squatarola	Grey Plover	Mi (W)		1	None	Migratory wetlands species likely in adjacent salt pans and saline wetlands	Unlikely
Podiceps cristatus cristatus	Great Crested Grebe		R	2	13/12/2014	Wetlands from rivers and lakes to estuaries and sheltered bays, but favours large, deep, open bodies of fresh water	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Occurrence within Project Site
		Aus.	SA				
Rostratula australis	Australian Painted Snipe	EN, Ma	E	1, 2	22/11/2004	Migratory wetlands species likely in adjacent salt pans and saline wetlands	Unlikely
Spatula rhynchotis	Australasian Shoveler		R	2	09/04/2016	Wetland's species	Unlikely
Stagonopleura guttata	Diamond Firetail	VU	V	1	None	Open grassy woodland, heath and farmland or grassland with scattered trees.	Unlikely
Sternula albifrons sinensis	Little Tern	Mi		1, 2	24/11/2005	The Little Tern is mainly coastal, being found on beaches, sheltered inlets, estuaries, lakes, sewage farms, lagoons, river mouths and deltas	Possible, as fly over
Sternula nereis nereis	Australian Fairy Tern	VU	E	1,2	02/12/2012	Found on coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries and lagoons. It favours both fresh and saline wetlands and near-coastal terrestrial wetlands, including lakes and salt-ponds.	Possible, as fly over only
Stictonetta naevosa	Freckled Duck		V	2	09/09/2017	Freshwater wetlands	Unlikely
Thalassarche carteri	Indian Yellow-nosed Albatross	VU, Mi		1	None	Pelagic marine species	Unlikely
Thalassarche cauta	Shy Albatross	EN, Mi	V	1	None	Pelagic marine species	Unlikely
Thalassarche impavida	Campbell Albatross,	VU, Mi		1	None	Pelagic marine species	Unlikely
Thalassarche melanophris	Black-browed Albatross	VU, MI	ssp.	1	None	Pelagic marine species	Unlikely
Thalassarche steadi	White-capped Albatross	VU, Mi	V	1	None	Pelagic marine species	Unlikely
Thinornis cucullatus cucullatus	Hooded Plover	VU	V	1	None	Occurs mainly on sandy ocean beaches, just on the tide line. Total population in SA is approx. 540 birds.	Unlikely
Tringa brevipes	Grey-tailed Tattler	Mi (W)	R	1, 2	20/03/2004	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
Tringa glareola	Wood Sandpiper	Mi (W)	R	1,2	18/03/2006	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
Tringa nebularia	Common Greenshank	Mi (W)		1	None	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Occurrence within Project Site
		Aus.	SA				
Tringa stagnatilis	Marsh Sandpiper	Mi (W)		1	None	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
Xenus cinereus	Terek Sandpiper	Mi (W)	R	1,2	04/04/2012	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
REPTILES							
Caretta caretta	Loggerhead Turtle	EN, Mi (Ma)	E	1	None	Marine Species	Unlikely
Chelonia mydas	Green Turtle	VU, Mi (Ma)	V	1,2	22/12/2008	Marine Species	Unlikely
Dermochelys coriacea	Leatherback Turtle	EN, MI (Ma)	V	1	None	Marine Species	Unlikely
Tiliqua adelaidensis	Pygmy Blue-tongue Lizard	EN	E	1	None	Remnant native grassland or grassy woodland with a sparse overstorey of trees.	Unlikely
MAMMALS							
Balaenoptera edeni	Bryde's Whale	Mi (M)		1	None	Marine Species	Impossible
Caperea marginata	Pygmy Right Whale	Mi (M)		1	None	Marine Species	Impossible
Eubalaena australis	Southern Right Whale	EN	V	1	None	Marine Species	Impossible
Lagenorhynchus obscurus	Dusky Dolphin	Mi (M)		1	None	Marine Species	Impossible
Megaptera novaeangliae	Humpback Whale	VU, Mi (Ma)	V	1	None	Marine Species	Impossible
Neophoca cinerea	Australian Sea-lion,	VU	V	1	None	About 80 per cent of the world's Australian Sea-lion population occurs in SA. These animals travel large distances to find food but return to the same places to rest on land.	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Occurrence within Project Site
		Aus.	SA				
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R	1,2	25/02/2020	The distribution of the Grey-headed Flying Fox has contracted in the north of Australia, and expanded in the south, with the roosting colony at Botanic Park first recorded in 2010. Grey-headed Flying Foxes forage over a wide area, with individuals capable of travelling 40 km between their roost and feeding sites in a night feeding on flowers fruits and nectar.	Possible
SHARKS							
Carcharodon carcharias	Great White Shark	VU, Mi (Ma)		1	None	Marine Species	Impossible
Lamna nasus	Porbeagle, Mackerel Shark	Mi (MA)		1	None	Marine Species	Impossible
FISH							
Thunnus maccoyii	Southern Bluefin Tuna	CD		1	None	Marine Species	Impossible
Seriolella brama	Blue Warehou	CD		1	None	Marine Species	Impossible

Conservation status: Aus.: Australia (*Environment Protection and Biodiversity Conservation Act 1999)*. SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CD: Conservation Dependent. CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. Mi: Migratory, Ma: Marine, T: Terrestrial, W: Wetland species.

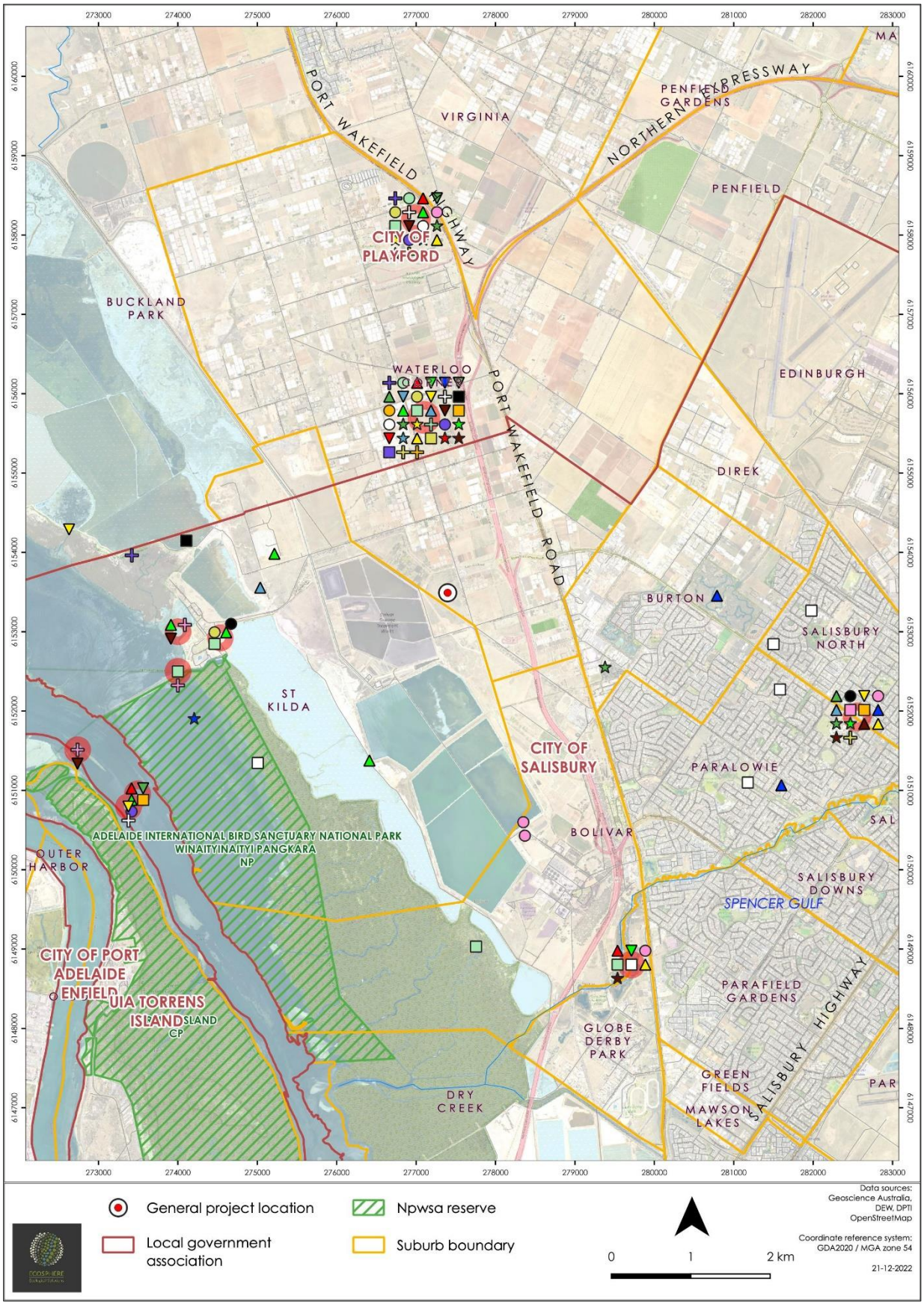

Figure 6. National and state conservation significant fauna observations within 5km of project site.

Over lapping data cluster origin

Threatened fauna (BDBSA records, number of records per point not represented)

- Australasian Bittern (*Botaurus poiciloptilus*) AUS : EN, SA : E
- Australasian Darter (*Anhinga novaehollandiae novaehollandiae*) SA : R
- Australasian Shoveler (*Spatula rhynchotis*) SA : R
- Australian Painted-snipe (*Rostratula australis*) AUS : EN, SA : E
- Banded Stilt (*Cladorhynchus leucocephalus*) SA : V
- Black Falcon (*Falco subniger*) SA : R
- Black-chinned Honeyeater (*Melithreptus gularis*) SA : R
- Black-tailed Godwit (*Limosa limosa melanuroides*) SA : R
- Blue-billed Duck (*Oxyura australis*) SA : R
- Brown Quail (*Coturnix ypsilophora australis*) SA : V
- Cape Barren Goose (*Cereopsis novaehollandiae novaehollandiae*) SA : R
- Common Sandpiper (*Actitis hypoleucos*) SA : R
- Curlew Sandpiper (*Calidris ferruginea*) AUS : CR, SA : E
- Eastern Cattle Egret (*Bubulcus ibis coromandus*) SA : R
- Elegant Parrot (*Neophema elegans elegans*) SA : R
- Fairy Tern (*Sternula nereis nereis*) AUS : VU, SA : E
- Far Eastern Curlew (*Numenius madagascariensis*) AUS : CR, SA : E
- Freckled Duck (*Stictonetta naevosa*) SA : V
- Glossy Ibis (*Plegadis falcinellus*) SA : R
- Great Crested Grebe (*Podiceps cristatus australis*) SA : R
- Green Sea Turtle (*Chelonia mydas*) AUS : VU, SA : V
- Grey-headed Flying-fox (*Pteropus poliocephalus*) AUS : VU, SA : R
- Grey-tailed Tattler (*Tringa brevipes*) SA : R
- Latham's Snipe (*Gallinago hardwickii*) SA : R
- Little Eagle (*Hieraaetus morphnoides*) SA : V
- Little Egret (*Egretta garzetta nigripes*) SA : R
- Little Tern (*Sternula albifrons sinensis*) SA : E
- Long-toed Stint (*Calidris subminuta*) SA : R
- Musk Duck (*Biziura lobata menziesi*) SA : R
- Pacific Golden Plover (*Pluvialis fulva*) SA : R
- Pectoral Sandpiper (*Calidris melanotos*) SA : R
- Pied Oystercatcher (*Haematopus longirostris*) SA : R
- Plumed Egret (*Ardea intermedia plumifera*) SA : R
- Red Knot (ssp. rogersi) (*Calidris canutus rogersi*) SA : E
- Ruddy Turnstone (*Arenaria interpres interpres*) SA : R
- Ruff (*Calidris pugnax*) SA : R
- Samphire Thornbill or Slender-billed Thornbill Gulf St Vincent) (*Acanthiza iredalei rosinae*) AUS : VU, SA : V
- Sooty Oystercatcher (*Haematopus fuliginosus fuliginosus*) SA : R
- Terek Sandpiper (*Xenus cinereus*) SA : R
- Whimbrel (*Numenius phaeopus variegatus*) SA : R
- Wood Sandpiper (*Tringa glareola*) SA : R

Figure 7. Threatened fauna species legend.

5.2 Field Assessment

Field assessments were undertaken within the project site on 29th June 2022 (BAM facility) and 11th May 2023 (Pipeline) (Figure 2). The vegetation was comprised of planted indigenous amenity shrub and tree species over an exotic understorey with low density emergent native indigenous shrubland vegetation. Plantings of amenity species were comprised of locally indigenous species however were planted in rows and likely to be as a functional stand for water take up or filtration rather than as a habitat area. Sheep were grazing this area as a pasture at the time of the assessment.

5.2.1 Vegetation associations

Ten vegetation associations were recorded within the project site and are summarised below in Table 7 and shown in to Figure 13 in more detail. The total area is 26.72 ha with 22.22 ha comprised of at least one stratum of native vegetation. These associations were observed to be in poor condition and providing low habitat value being present as emergent naturally regenerating species which are recognised as highly disturbance resistant and grow naturally in areas where high disturbance occurs such as around water points and roadsides.

Table 7. Vegetation association summary.

Assoc #	Description	UBS	Area (ha)
1	*Myoporum insulare* (Boobialla) amenity plantings over exotic grassland and emergent chenopod shrubs.	3.14	0.64
2	Mixed Amenity plantings over emergent chenopod shrubs.	6.23	3.41
3	Sparsely planted *Eucalyptus largiflorens* (Black Box), *E. odorata* (Peppermint Box) Woodland +/- planted *Eucalyptus spathulata* (Swamp Mallet) over planted amenity species and emergent *Nitraria billardierei* (Nitre Bush) and *Maireana brevifolia* (Lobe Fruit Bluebush) shrubland.	22.23	3.13
4	*Tecticornia pergranulata* (Black See Samphire) emergent under planted *Melaleuca halmaturorum* (Swamp Paperbark) and *Atriplex rhagodioides* (Silver Saltbush).	29.60	0.75
5	Planted *Melaleuca halmaturorum* (Swamp Paperbark) over planted *Atriplex rhagodioides* (Silver Saltbush) and emergent chenopod shrubs	15.15	3.68
6	Mixed amenity shrubs over exotic grassland and emergent chenopod shrubs	7.79	9.65
7	Fallow land used for industrial or storage areas.	N/S*	4.49
8	*Nitraria billardierei* (Nitre Bush) Low Open Shrubland.	15.50	0.21
9	*Myoporum insulare* (boobialla) emergent shrubs over *Threlkeldia diffusa* (Coast Bonefruit) and *Maireana brevifolia* (Short leaved Bluebush).	4.16	0.65
10	*Austrostipa* spp. (Spear Grass), *Chloris truncata* (Windmill Grass) Open Grassland.	7.62	0.10
		Total	26.72

*N/S denotes not scored as native vegetation or bushland.

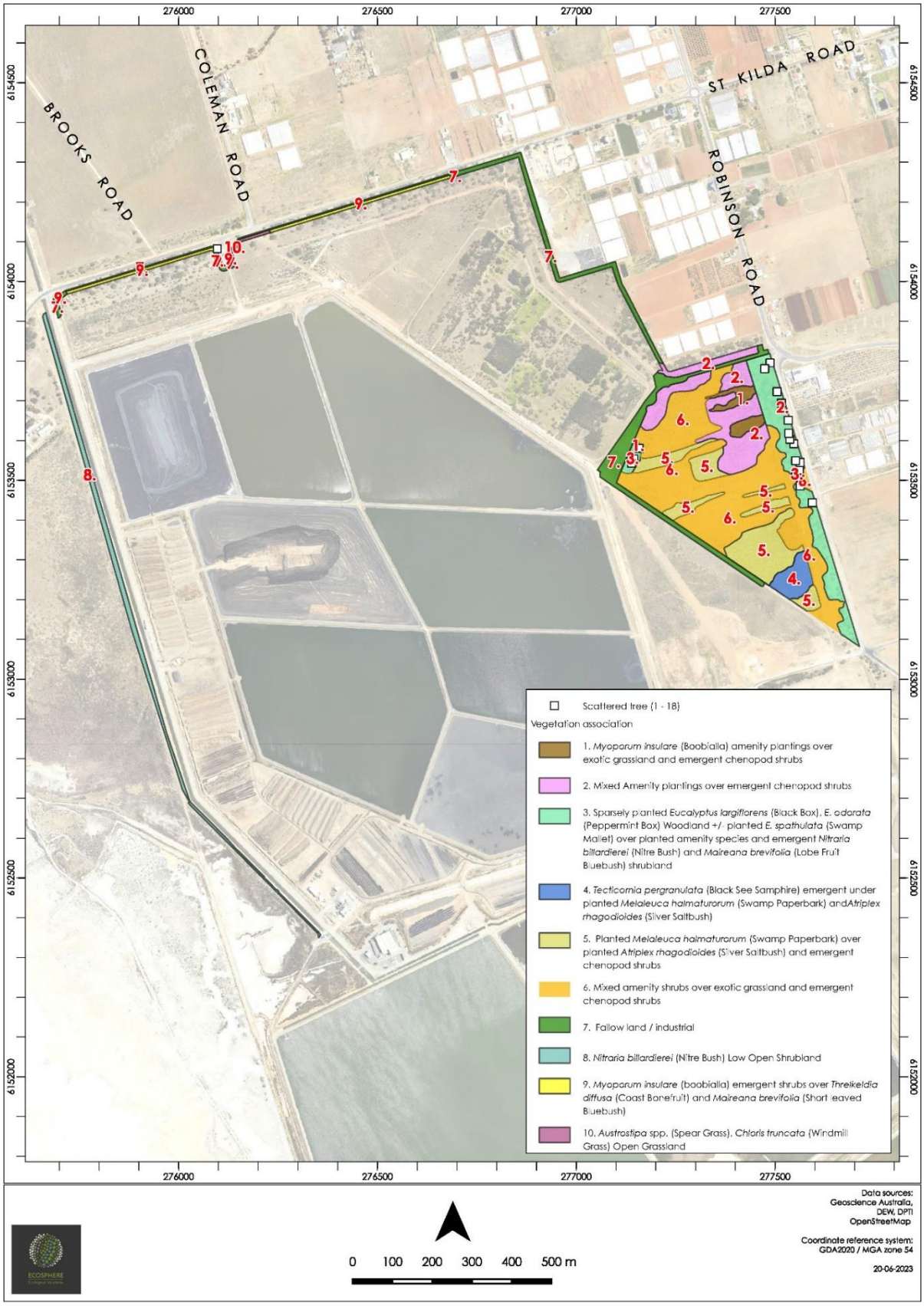

Figure 8. Vegetation associations recorded within the BAM facility and pipeline sites.

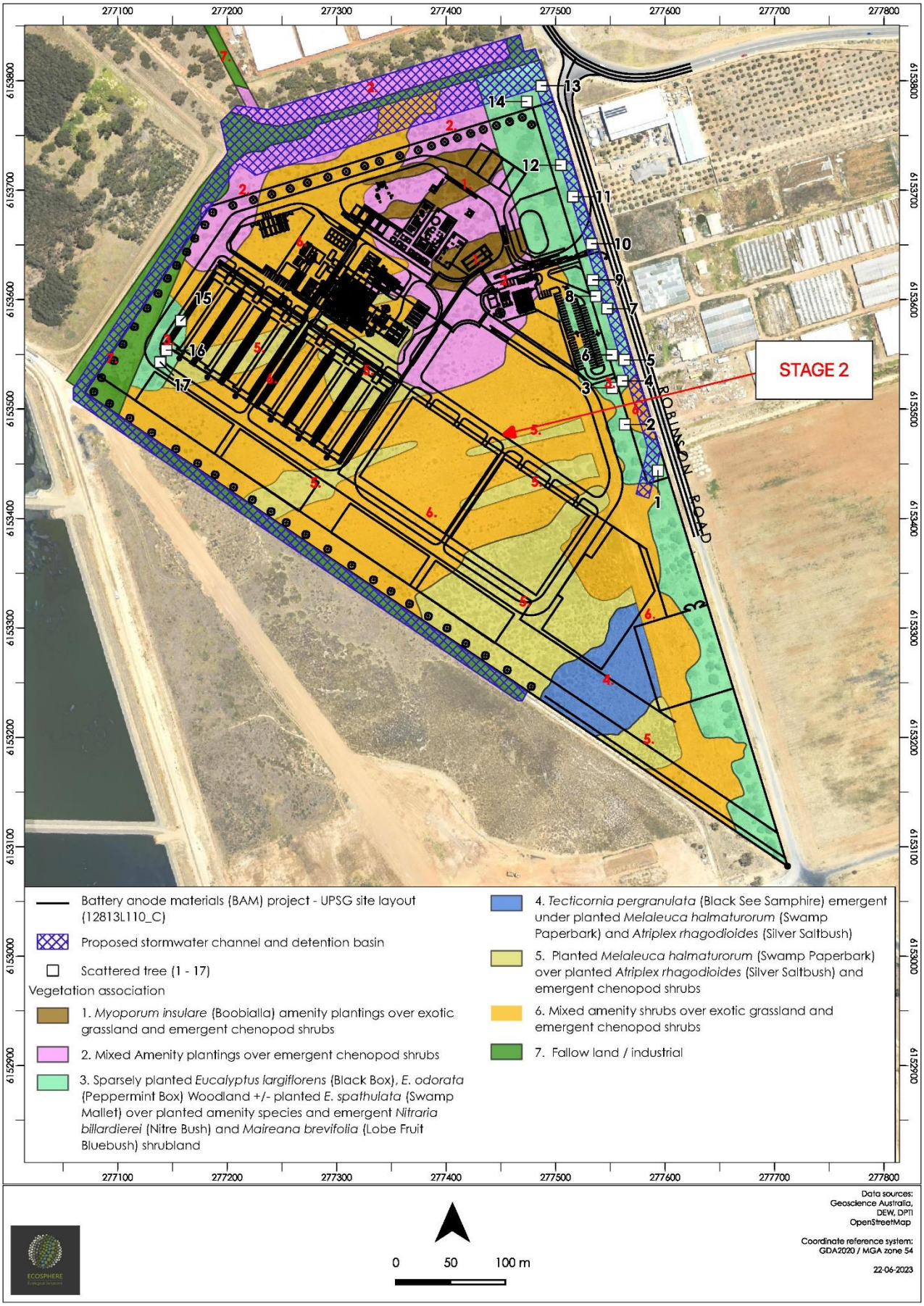

Figure 9. Vegetation associations recorded within the BAM facility site.

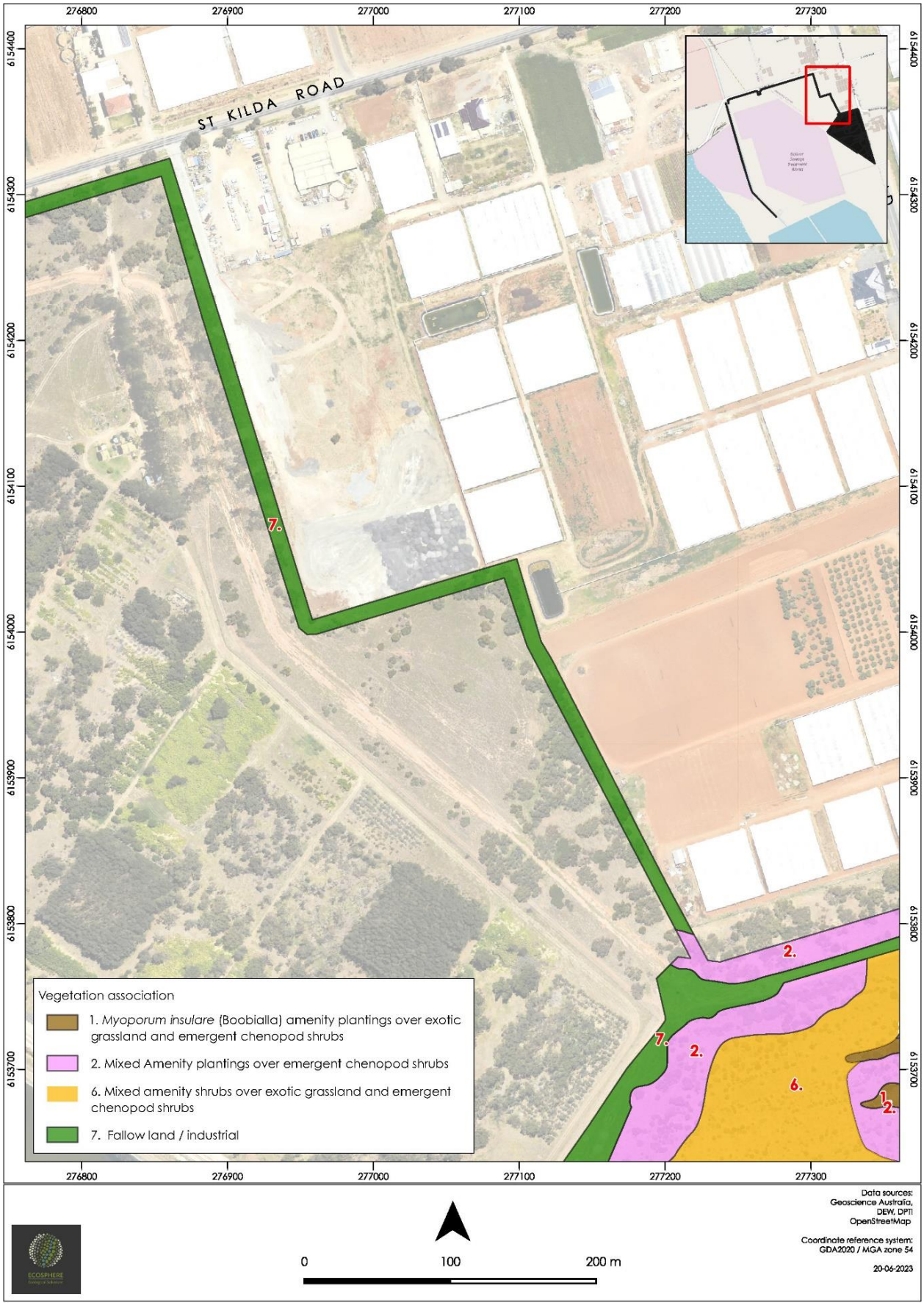

Figure 10. Vegetation associations recorded along the eastern extent of the pipeline site.

Figure 11. Vegetation associations recorded along the north-eastern extent of the pipeline site.

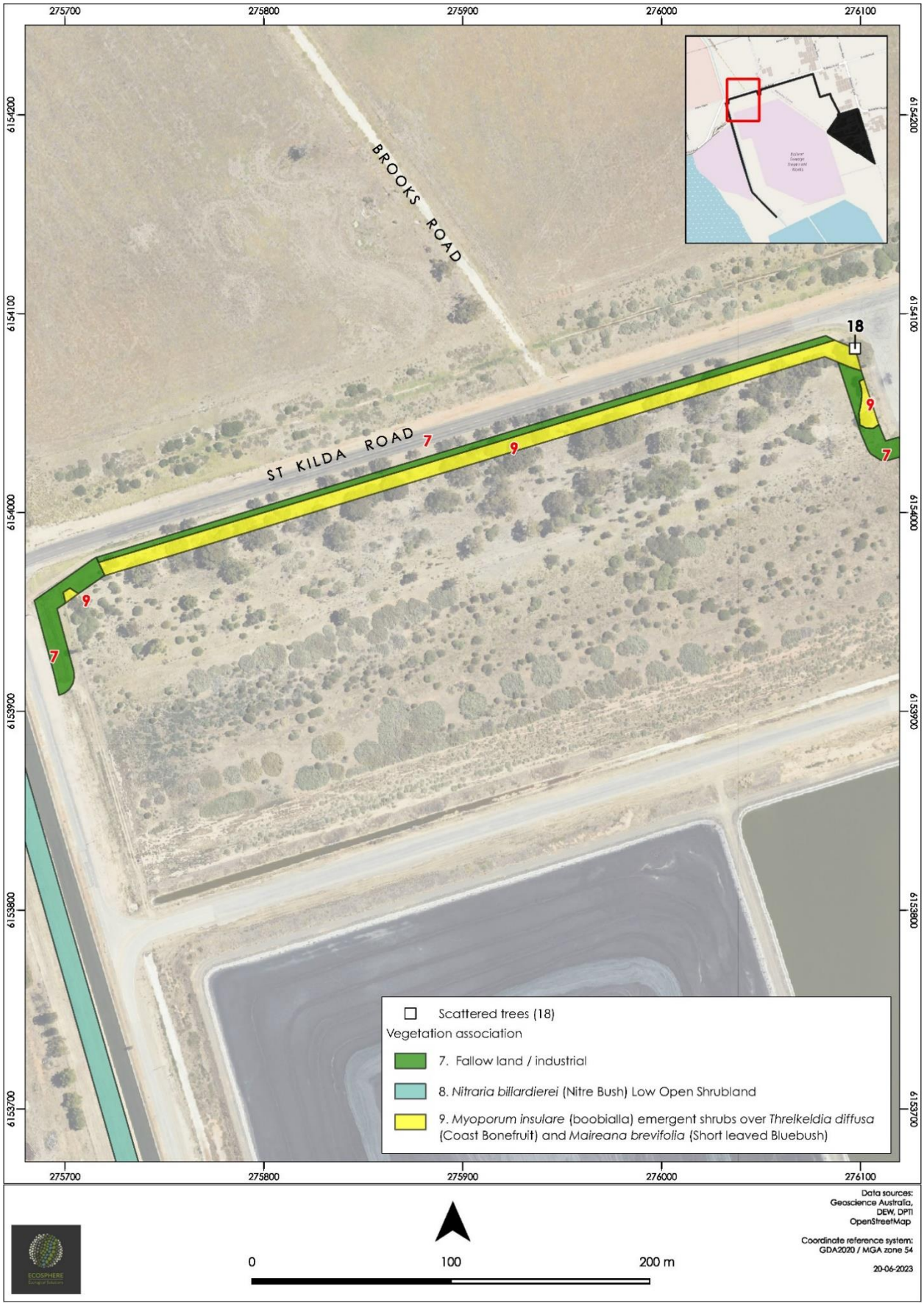

Figure 12. Vegetation associations recorded along the north-western extent of the pipeline site.

Figure 13. Vegetation associations recorded along the western extent of the pipeline site.

Vegetation Association 1	*Myoporum insulare* (Boobialla) amenity plantings over exotic grassland and emergent chenopod shrubs.

General description	Planted strips of Boobialla exclude almost all other species in a large monoculture. High habitat value for bird species due to dense growth. Has low biodiversity score due to contribution made primarily from planted species with low level indigenous regeneration in this site. Understory largely absent due to domination by density of shrub growth.
Threatened species or community	Not conservation significant as a vegetation community but is likely to provide habitat for the following conservation significant species: • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot)

Landscape context score	1.22	Vegetation Condition Score	2.32	Conservation significance score	1.10
Unit biodiversity Score	3.12	Area (ha)	0.64	Total biodiversity Score	1.99

Vegetation association 2	Mixed Amenity plantings over emergent chenopod shrubs

General description	Sparsely planted shrubland and woodland species with emergent chenopod shrubs providing the NVC value as regenerated indigenous species. Species planted as overstorey shrub and tree canopy included: • *Eucalyptus odorata, E. porosa, E. largiflorens, E. camaldulensis* • *Acacia salicina, A. paradoxa, A. ligulata, A. victoriae* • *Melaleuca lanceolata, M. halmaturorum* • *Duma florulenta* • *Santalum lanceolatum* • *Atriplex rhagodioides, A. paludosa, Rhagodia candolleana, R. parabolica* • *Myoporum insulare.*
Threatened species or community	This association is not conservation significant. The following species may possibly utilise the site on an infrequent basis, most probably as a pass-through refuge during movements between more suitable habitats. The variety of overstorey trees is likely to provide food resources at a variety of times for various species. • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle)

Landscape context score	1.22	Vegetation Condition Score	4.64	Conservation significance score	1.10
Unit biodiversity Score	6.23	Area (ha)	2.85	Total biodiversity Score	17.76

Vegetation association 3	Sparsely planted *Eucalyptus largiflorens* (Black Box), *E. odorata* (Peppermint Box) Woodland +/- planted *Eucalyptus spathulata* (Swamp Mallet) over planted amenity species and emergent *Nitraria billardierei* (Nitre Bush) and *Maireana brevifolia* (Lobe Fruit Bluebush) shrubland

General description	The community present in this area consists of planted rows of trees with the outer row *Melaleuca lanceolata* (Moonah) an inner row of *Eucalyptus spathulata* (Swamp Mallet) and then the middle row *Eucalyptus largiflorens* / *E. odorata*. Emergent *Maireana brevifolia* was present as the dominant understory with declared weed species prevalent.
Threatened species or community	Not conservation significant as a vegetation community and could be best described as a highly disturbance resistant emergent chenopod shrubland of extremely low ecological value. The following threatened species with records locally may use this area on a temporary or irregular basis: • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle)

Landscape context score	1.22	Vegetation Condition Score	16.56	Conservation significance score	1.10
Unit biodiversity Score	22.23	Area (ha)	2.50	Total biodiversity Score	55.57

Vegetation association 4	*Tecticornia pergranulata* emergent under planted *Melaleuca halmaturorum* and *Atriplex rhagodioides*

General description	Area adjacent semi-intact samphire community and infrequently inundated by rainfall during the winter months. Good cover of samphire and lower weed invasion in this section due to annual wetting drowning many species not tolerant of wet and saline conditions.
Threatened species or community	This community is not conservation significant at regional, state or Federal level. • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle) • *Acanthiza iredalei rosinae* (Samphire Thornbill or Slender-billed Thornbill Gulf St Vincent)

Landscape context score	1.22	Vegetation Condition Score	22.06	Conservation significance score	1.10
Unit biodiversity Score	29.60	Area (ha)	0.75	Total biodiversity Score	22.20

Vegetation association 5	Planted *Melaleuca halmaturorum* over planted *Atriplex rhagodioides* and emergent chenopod shrubs

General description	Fringe community to samphire dominant area and planted vegetation dominated cover however still significant cover of emergent chenopod shrubs. Mix of samphire and *Maireana aphylla* with these species' conservation significant at a regional level, avoidance of these better zones would be prudent as well as easier to manage from a flooding perspective.
Threatened species or community	This community is not conservation significant at regional, state or Federal level due to lack of connectivity to natural processes such as tidal influence. • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle)

Landscape context score	1.22	Vegetation Condition Score	11.29	Conservation significance score	1.10
Unit biodiversity Score	15.15	Area (ha)	3.68	Total biodiversity Score	55.74

Vegetation association 6	Mixed amenity shrubs over exotic grassland and emergent chenopod shrubs

General description	Planted amenity overstorey over exotic cover, heavy clay loams mean that suitable for exotic annual grass and herbaceous species and grazing maintains fresh growth of chenopod shrubs at small stature and height. Most trees and particularly *Atriplex paludosa* (Marsh Saltbush) being heavily grazed.
Threatened species or community	This site is not conservation significant at regional, state or Federal level. It may however provide temporary habitat for the following species: • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle)

Landscape context score	1.22	Vegetation Condition Score	5.81	Conservation significance score	1.10
Unit biodiversity Score	7.79	Area (ha)	9.52	Total biodiversity Score	74.16

Vegetation association 7	Fallow land / Industrial
General description	Exotic grass and herbaceous species dominated by *Aizoon pubescens* (Carpet Weed) and has no ecological value and no indigenous species present.
Threatened species or community	Not assessed as intact community.

Vegetation association 8	*Nitraria billardierei* (Nitre Bush) Low Open Shrubland.

General description		Semi degraded chenopod shrubland where natural ground level has been altered by the presence of the drain bank. The resultant regrowth in this area is a mix of exotic and indigenous species not resembling a natural stratum and in poor condition with elevated levels of exotic grass, herbaceous and woody species.			
Threatened species or community		This site is not conservation significant at regional, state or Federal level. Unlikely to support habitat for threatened species. It may potentially provide transient habitat for *Neophema elegans elegans* (Elegant Parrot). The adjacent samphire shrubland has high ecological and conservation value but will not be impacted by this project.			
Landscape context score	1.20	Vegetation Condition Score	11.74	Conservation significance score	1.10
Unit biodiversity Score	15.50	Area (ha)	1.52	Total biodiversity Score	23.55

Vegetation association 9	*Myoporum insulare* (boobialla) emergent shrubs over *Threlkeldia diffusa* (Coast Bonefruit) and *Maireana brevifolia* (Short leaved Bluebush)

General description	Area of largely exotic grassland with planted amenity trees but where some regeneration of indigenous disturbance resistant species has occurred resulting in a degraded chenopod shrubland / grassland with a planted overstorey. Historically was likely to be comprised of a mix of *Atriplex paludicola* (Marsh Saltbush) and *Maireana* spp. (Bluebush) Low open Shrubland however these stratums have long been lost and unlikely to persist under today's conditions with high weed cover.
Threatened species or community	This site is not conservation significant at regional, state or Federal level. Has extremely low potential for threatened species due to proximity to road and poor habitat value other than that provided by amenity plantings.

Landscape context score	1.20	Vegetation Condition Score	3.15	Conservation significance score	1.10
Unit biodiversity Score	4.16	Area (ha)	0.65	Total biodiversity Score	2.70

Vegetation association 10	*Austrostipa* spp. (Spear Grass), *Chloris truncata* (Windmill Grass) Open Grassland.

General description		Small disjunct patch of native grassland surrounded by other areas of poor condition. Approximately 50% native cover, this area is not contiguous with other intact patches and is therefore likely to not change in condition or spread to other areas.			
Threatened species or community		This site is not conservation significant at regional, state or Federal level due to the small extent and quality of the grassland. Low levels of connectivity to any other intact patches.			
Landscape context score	1.20	Vegetation Condition Score	5.78	Conservation significance score	1.10
Unit biodiversity Score	7.62	Area (ha)	0.10	Total biodiversity Score	0.76

5.2.2 Regionally significant flora species

Flora species richness within the project site was low as a result of the site being grazed and has been almost entirely modified historically. As a result, all remnant native vegetation is present as re-established or emergent shrubs only. No flora species of state or national significance were recorded within the project site and were not considered likely to occur based on the quality of the habitat present within the project site. At a regional context, remnant species rated vulnerable or rare in the Adelaide Mt Lofty Ranges (AMLR) region were recorded from within the project site (Table 8). *Maireana aphylla* (Cotton-bush) was present within amenity planted associations as remnant scattered individuals within density increasing with proximity to the intact samphire areas adjacent to the project site.

Table 8. Regionally significant flora species (Adelaide region) observed during assessment.

Species name	Common name	AMLR	Comment
Maireana aphylla	Cotton-bush	VU	Likely to be sparsely remnant in parts of the project site. Never in dense growth habit but present within planted amenity zones.
Nitraria billardierei	Nitre-bush	RA	Present sparsely within remnant communities and degraded areas. While listed as rare, this species is very disturbance resistant and a common component of disturbed roadsides and high traffic areas.
Tecticornia halocnemoides	Grey Samphire	VU	Associated within intact Samphire shrublands only in the south-eastern corner of project site.
Tecticornia pergranulata ssp.	Black-seed Samphire	RA	Associated within intact Samphire shrublands only in the south-eastern corner of project site.

AMLR conservation ratings: Vulnerable: VU, Rare: RA.

5.2.3 Significant and Regulated Scattered Trees

Eighteen regulated trees subject to provisions under the PDI Act were located within the project site. Stormwater drainage infrastructure is located around the site boundary however where possible, larger trees providing screening around the boundary will be retained as visual amenity for the Project. The locations of these trees are summarised below in Table 9 and shown in Figure 14 and Figure 15. Ten of these trees were significant by warrant of them having a circumference of greater than 3m. A high number of these trees were in less than optimum health with numerous broken limbs and dieback observed across the area. Each tree is summarised individually including images in Appendix 1.

Table 9. Scattered regulated tree summary.

Tree ID	Species	Height	Diameters	Average Circumference	Total Circumference	Regulated/ Significant
1	*Eucalyptus spathulata*	10	54, 19, 21	98.44	295.31	R
2	*Eucalyptus odorata*	11.4	71.5	224.62	224.62	R
3	*Eucalyptus odorata*	7.6	70.5	221.48	221.48	R
4	*Eucalyptus nicholii*	8.2	32, 28.5, 21, 24, 22	85.35	400.55	S
5	*Melaleuca lanceolata*	8.7	36, 35, 34	109.96	329.87	S
6	*Eucalyptus spathulata*	9.8	81.5, 28.5, 17	132.99	398.98	S
7	*Eucalyptus spathulata*	12.1	81, 35	182.21	364.42	S
8	*Eucalyptus spathulata*	9.7	82, 35, 25	148.70	446.11	S
9	*Eucalyptus spathulata*	5.7	48, 29, 29.5	111.53	334.58	S
10	*Melaleuca lanceolata*	4.7	46,34	125.66	251.33	R
11	*Eucalyptus spathulata*	11.2	87	273.32	273.32	R
12	*Eucalyptus spathulata*	7.7	53,27	125.66	251.33	R
13	*Melaleuca lanceolata*	8	43.5, 29, 22, 29, 20, 20,	99.48	515.22	S
14	*Eucalyptus odorata*	7.5	51,18	108.38	216.77	R
15	*Eucalyptus spathulata*	13.2	69	216.77	216.77	R
16	*Eucalyptus spathulata*	11.7	53,51	163.36	326.73	S
17	*Eucalyptus spathulata*	11.1	33, 25.5, 23, 40	85.35	381.70	S
18	*Eucalyptus spathulata*	13.0	112	351.85	351.85	S

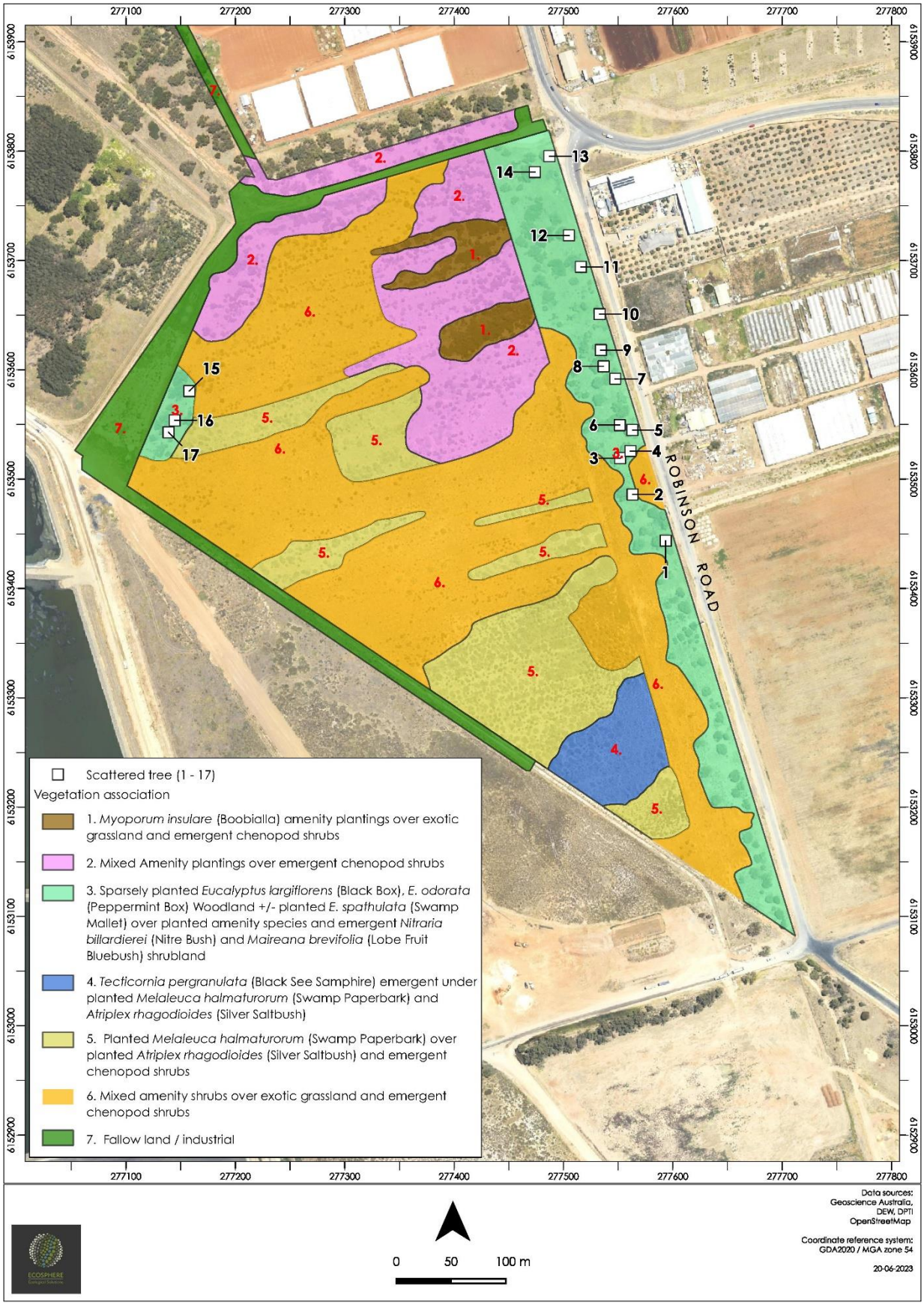

Figure 14. Locations of scattered regulated trees.

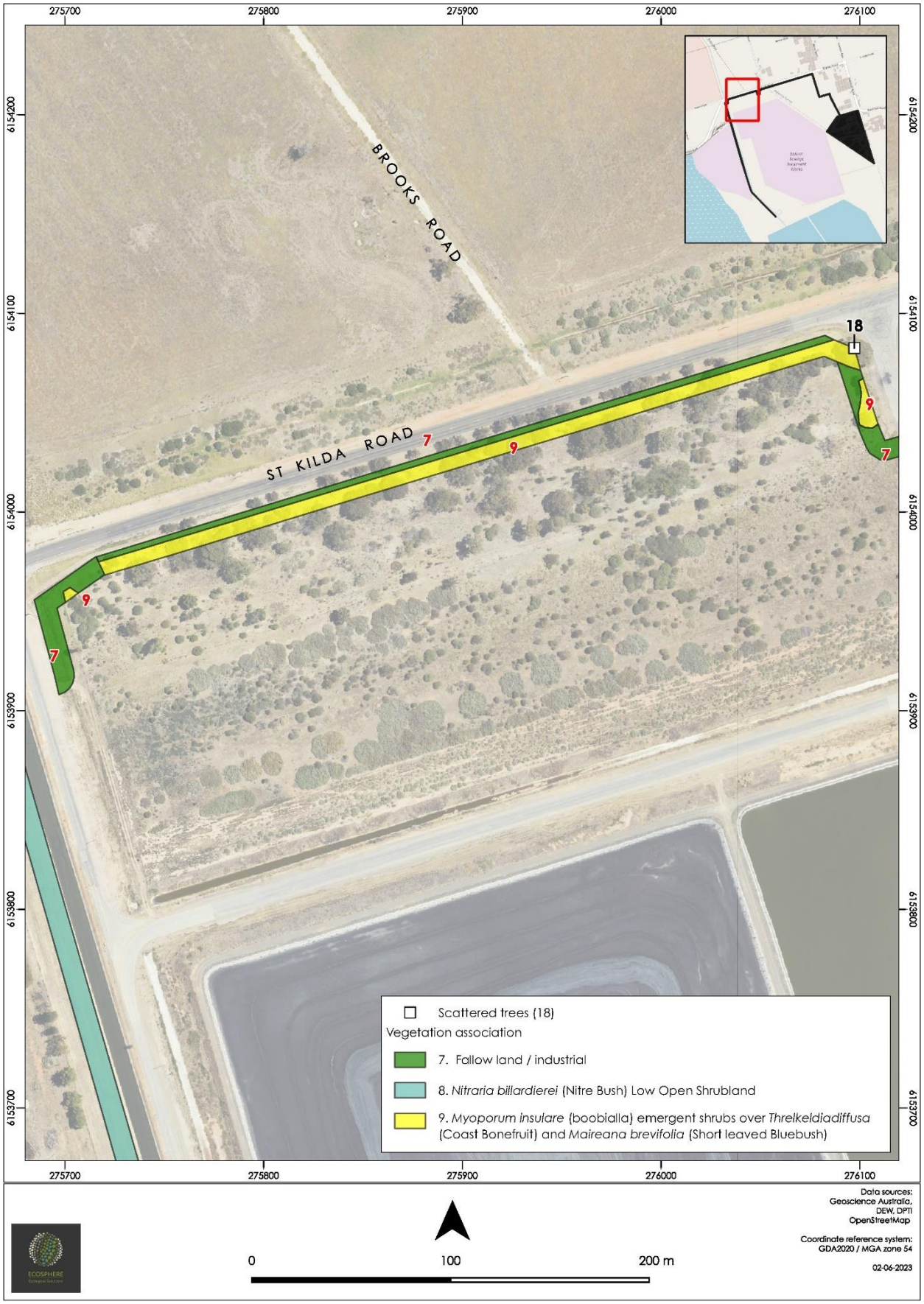

Figure 15. Locations of scattered regulated trees.

5.2.4 Fauna species

A total of 31 fauna species were recorded during site specific fauna surveys within the project site and were all avian species. No species of conservation significance were recorded. A targeted survey for Slender billed Thornbill (*Acanthiza iredalei iredalei*) was undertaken and no individuals of any thornbill species were observed. Given the stable home range extents for this species and lack of records within the area, it is considered highly unlikely that this species occurs within the project site (also see Section 5.1.4 and Table 6).

5.3 Cumulative impact

Under the current proposal the entirety of the project site is included for clearance accounting for cumulative impacts associated with the operation of an industrial plant. Offsite impacts such as dust etc would only drift onto other areas used for industrial purposes and the WWTP. No cumulative impacts area expected from this proposal.

5.4 Address the Mitigation Hierarchy

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.

a) Avoidance – outline measures taken to avoid clearance of native vegetation.

The project has been designed to minimise clearance of native vegetation where practicable. The stormwater channel runs along the eastern boundary and with its current design, would require some vegetation clearance. However, the stormwater channel design is maturing with ongoing collaboration with stakeholders, including SA Water and Council. Collaboration with the City of Playford Council includes discussions with regard to how stormwater design along Robinson Road can fit within the Councils long term planning for broader stormwater management. Final siting and design of the stormwater channel will aim to minimise clearing of native vegetation and maintain the screen along the eastern boundary, where practicable.

b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).

The surrounding land use means that adjoining vegetation is largely disturbed and that disturbance to surrounding areas is not likely to place added pressure on areas of vegetation.

c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.

Any vegetation areas retained within the project footprint will be managed for weeds and enhanced through additional plantings of locally indigenous species in the absence of grazing pressure from sheep.

d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.

5.5 Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*. As this project is being approved via an EIS under the Planning, Development and Infrastructure Act, Native Vegetation Regulation 13 applies. It is understood that, as a consequence, only Principles 1b, 1c and 1d require addressing. However, for completeness, the remaining principles of clearance have been addressed where information is available.

Principle of clearance	**Considerations**
Principle 1a - it comprises a high level of diversity of plant species	Relevant information Very low species richness with only highly disturbance resistant species emergent as understorey to amenity shrub and tree plantings. Association 4 (native species diversity score: 16) has a higher coverage of samphire and lower weed invasion due to annual wetting drowning many species not tolerant of wet and saline conditions.
	Assessment against the principles Association 4 is at variance with this principle
	Moderating factors that may be considered by the NVC. Only a small patch (0.75ha) of habitat is present which is surrounded by highly disturbed land use.
Principle 1b - significance as a habitat for wildlife	Relevant information A total of 42 fauna species had historical BDBSA records within and surrounding the project site. No species of conservation significance were recorded during field assessments within the project footprint over two survey periods. Three species of national conservation significance were considered to possibly occur within the project site. • Grey-headed Flying-fox (*Pteropus Poliocephalus*) • Blue-winged Parrot (*Neophema chrysostoma*) • Fairy Tern (*Sternula nereis nereis*) (Flyover only) A further three species of state conservation significance were considered to possibly occur within the project site. • Elegant Parrot (*Neophema elegans*) • Little Egret (*Egretta garzetta nigripes*) • Brown Quail (*Coturnix ypsilophora australis*) Threatened Fauna Score – The threatened fauna score for all associations was 0.1.

	Unit biodiversity Scores ranged from 32.07 down to 3.12.
	Assessment against the principles Seriously at Variance Vegetation associations 4, 5, 6, 8, 9, 10 were seriously at variance with this principle.
	Moderating factors that may be considered by the NVC. While the area may provide habitat for some threatened fauna species it is likely to be as a transient period only. The surrounding land use of a WWTP and horticulture means that there is a very low remnancy surrounding the area and that species moving through the area are likely to preferentially use even degraded zones such as the project site despite it being grazed as a farming allotment and little care shown for its ongoing maintenance as a vegetation stratum. There is another large, vegetated area to the north of the project site and provided this is retained in the longer term, development of the project site is not likely to lead to a long-term decline in threatened species populations.
Principle 1c - plants of a rare, vulnerable or endangered species	Relevant information No threatened flora recorded or likely to ever utilise this area while being used as a farming allotment.
	Assessment against the principles Not At Variance
	Moderating factors that may be considered by the NVC
Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered:	Relevant information No threatened ecological communities were recorded within the project site. The area has been subject to long term degradation and the only remnant communities within the local area are samphire and Mangroves associated with the coastal fringe. Threatened Community Score – 0, No threatened communities present.
	Assessment against the principles Not at variance
	Moderating factors that may be considered by the NVC
Principle 1e - it is significant as a remnant of vegetation in an area which has been extensively cleared.	Relevant information Remnancy in the St Vincent IBRA Subregion is 8%. Remnancy in the Mallala Environmental Association is 3% and, in the Parham, Environmental Association is 44%. Total Biodiversity Score – Total biodiversity score 232.99
	Assessment against the principles The clearance of vegetation within the Project is considered Seriously at Variance
	Moderating factors that may be considered by the NVC. This site has historically been mostly cleared and used for farming. The regeneration of disturbance resistant species is not unusual for areas such as this where heavy saline soils will grow little else other than annual grasses during winter.
Principle 1f - it is growing in, or in association with, a wetland environment.	Relevant information Prior to this area being highly modified through evaporation and salt pans, the project site was likely to be right at the edge of the supra tidal Zone. A 'sort of' wetland remains in the southern section of the project site however this is from rainfall collecting and having nowhere to naturally drain.
	Assessment against the principles Seriously at Variance Vegetation association 4 is theoretically a wetland and is evidenced by the persistence of Tecticornia shrubland that is the only species that can persist longer term in the area

	dependent on how wet each year is. The wetland composition is likely to flux from year-to-year dependent on the water depth and length of time that water remains in the wetland.
	Moderating factors that may be considered by the NVC. The wetland provides little to no habitat value as with the grazing that occurs in the site the bare ground is mud and is likely to provide little foraging value for wetland species.
Principle 1g - it contributes significantly to the amenity of the area in which it is growing or is situated.	Relevant information The boundary screen provides good amenity value however the useful lifespan of many of these trees is nearing completion with many trees either falling over or shedding limbs.
	N/A
	Moderating factors that may be considered by the NVC. The primary amenity value is provided by planted trees rather than the native vegetation which does not present as an attractive community.

6 Offset requirements

Unit biodiversity scores were highest in the southern section of the project site where temporary inundation from rainfall occurs adjacent to a semi-intact samphire community south of the project site. The indigenous cover in this area is moderate and evidence of emergent *Maireana brevifolia* being drowned out was observed during the field survey meaning there is a moderate disturbance level occurring where annual exotic species are unable to persist.

The lowest biodiversity scores were in the northern section of the project site where the majority of the cover was provided by planted amenity species.

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
1	1	6	1	0	0.1	3.12	0.64	2.00	1			2.10	$1,200.17	$66.01
1	2	6	1	0	0.1	6.23	3.41	21.24	1			22.31	$12,768.77	$702.28
1	3	8	1	0	0.1	22.23	3.13	69.58	1			73.06	$41,820.61	$2,300.13
1	4	16	1	0	0.1	29.6	0.75	22.20	1			23.31	$13,343.19	$733.88
1	5	10	1	0	0.1	15.15	3.68	55.75	1			58.54	$33,509.43	$1,843.02
1	6	6	1	0	0.1	7.79	9.65	75.17	1			78.93	$45,182.61	$2,485.04
1	8	10	1	0	0.1	17.66	0.21	3.71	1			3.89	$2,229.03	$122.60
1	9	10	1	0	0.1	4.23	0.65	2.75	1			2.89	$1,652.57	$90.89
1	10	6	1	0	0.1	7.75	0.1	0.78	1			0.81	$465.81	$25.62
						Total	22.22	**253.1796**				265.84	$152,172.18	$8,369.47

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	253.18	265.84	$152,172.18	$8,369.47	$160,541.65

7 Summary

The biodiversity scores and the observed habitat value were contradictory, with the large majority of bird species being observed in the northern section of the project site where native vegetation cover was lowest. There were a number of reasons for this, however, overwhelmingly the density of the planted *Myoporum insulare* strips as well as the multiple structures present in terms of vegetation stratum levels was the key driver of bird diversity. The diversity of planted species was above which would be considered natural from an overstorey canopy perspective. There were five species each represented in the genus *Eucalyptus* and *Acacia* as well as *Santalum, Myoporum, Allocasuarina* and *Atriplex*. The eastern boundary strip had Western Australian wheatbelt tree species which added additional structural and floristic variability. This range of species provided for a wide band of flowering periods as well as nesting and roosting habitat. Notwithstanding this, the samphire habitats, while not rich from a floristic diversity perspective, provide potential habitat for species with specific niche requirements and in an area where increasing pressure is placed on these communities through development, climate change and other indirect impacts. As such, these remnant communities are of higher local conservation value.

8 References

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9 Appendices

Appendix 1. Regulated trees.

Tree ID - 1	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 10	
Stems – Multi	
Average Circumference – 98.44	
Total Circumference – 295.31	

Tree ID - 2	
Eucalyptus odorata	
Number of trees – 1	
Height (m) – 11.4	
Stems – Single	
Average Circumference – 224.62	
Total Circumference – 224.62	

Tree ID - 3	
Eucalyptus odorata	
Number of trees – 1	
Height (m) – 7.6	
Stems – Multi	
Average Circumference – 221.48	
Total Circumference –221.48	

Tree ID - 4	
Eucalyptus nicholii	
Number of trees – 1	
Height (m) – 8.2	
Stems – Multi	
Average Circumference – 85.35	
Total Circumference – 400.55	

Tree ID - 5	
Melaleuca lanceolata	
Number of trees – 1	
Height (m) – 8.7	
Stems – Multi	
Average Circumference – 109.96	
Total Circumference – 329.87	

Tree ID - 6	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 9.8	
Stems – Multi	
Average Circumference – 132.99	
Total Circumference – 398.98	

Tree ID - 7	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 12.1	
Stems – Multi	
Average Circumference – 182.21	
Total Circumference – 364.42	

Tree ID - 8	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 9.7	
Stems – Multi	
Average Circumference – 148.70	
Total Circumference – 446.11	

Tree ID - 9	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 5.7	
Stems – Multi	
Average Circumference – 111.53	
Total Circumference – 334.58	

Tree ID - 10	
Melaleuca lanceolata	
Number of trees – 1	
Height (m) – 4.7	
Stems – Multi	
Average Circumference – 125.66	
Total Circumference – 251.33	

Tree ID - 11	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 11.2	
Stems – Single	
Average Circumference – 273.32	
Total Circumference – 273.32	

Tree ID - 12	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 7.7	
Stems – Multi	
Average Circumference – 125.66	
Total Circumference – 125.66	

Tree ID - 13	
Melaleuca lanceolata	
Number of trees – 1	
Height (m) – 8	
Stems – Multi	
Average Circumference – 99.48	
Total Circumference – 515.22	

Tree ID - 14	
Eucalyptus odorata	
Number of trees – 1	
Height (m) – 7.5	
Stems – Multi	
Average Circumference – 108.38	
Total Circumference – 216.77	

Tree ID - 15	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 13.2	
Stems – Single	
Average Circumference – 216.77	
Total Circumference – 216.77	

Tree ID - 16	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 11.7	
Stems – Multi	
Average Circumference – 163.36	
Total Circumference – 326.73	

Tree ID - 17	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 11.1	
Stems – Multi	
Average Circumference – 85.35	
Total Circumference – 381.70	

Tree ID - 18	
Eucalyptus spathulata	
Number of trees – 1	
Height (m) – 13	
Stems – Single	
Average Circumference – 351.85	
Total Circumference – 351.85	

Appendix 2. PMST results summary

Department of Agriculture, Water and the Environment

Protected Matters Search Tool

Report Generated - 3:25PM - 29 May 2023

Matters of National Environment Significance	Count
World Heritage Properties	0
National Heritage Places	0
Wetlands of International Importance (Ramsar Wetlands)	0
Great Barrier Reef Marine Park	0
Commonwealth Marine Area	0
Listed Threatened Ecological Communities	2
Listed Threatened Species	48
Listed Migratory Species	63

Other Matters Protected by the EPBC Act	Count
Commonwealth Lands	22
Commonwealth Heritage Places	0
Listed Marine Species	97
Whales and Other Cetaceans	8
Critical Habitats	0
Commonwealth Reserves Terrestrial	0
Australian Marine Parks	0
Habitat Critical to the Survival of Marine Turtles	0

Extra Information	Count
State and Territory Reserves	5
Regional Forest Agreements	0
Nationally Important Wetlands	2
EPBC Act Referrals	13
Key Ecological Features	0
Biologically Important Areas	3
Bioregional Assessments	0
Geological and Bioregional Assessments	0

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected and is accurate at the time of generation.
Please see the caveat for interpretation of information provided here.
Consider carefully the age of information for decision making.

Report Metadata	Caveat

Appendix 3. BDBSA flora records

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Acacia acinacea	Wreath Wattle			26/09/2010
Acacia cyclops	Western Coastal Wattle			14/02/2018
Acacia ligulata	Umbrella Bush			24/11/1999
Acacia sp.	Wattle			25/12/1997
Acacia victoriae ssp.	Elegant Wattle			20/08/2010
Aeonium arboreum	Tree Aeonium			18/04/2011
Aizoon pubescens	Coastal Galenia			14/02/2018
Aizoon sp.	Galenia			30/11/1999
Anredera cordifolia	Madeira Vine			11/04/2022
Arctotheca calendula	Cape Weed			28/09/2010
Arundo donax	Giant Reed			24/11/1999
Asphodelus fistulosus	Onion Weed			16/02/1999
Atriplex paludosa ssp.	Marsh Saltbush			20/08/2010
Atriplex paludosa ssp. cordata	Marsh Saltbush			24/11/1999
Atriplex paludosa ssp. paludosa	Marsh Saltbush			20/08/2010
Atriplex prostrata	Creeping Saltbush			14/02/2018
Atriplex semibaccata	Berry Saltbush			14/02/2018
Atriplex suberecta	Lagoon Saltbush			20/08/2010
Austrostipa nitida	Balcarra Spear-grass			26/09/2010
Austrostipa nodosa	Tall Spear-grass			20/08/2010
Austrostipa puberula	Fine-hairy Spear-grass			14/11/1996
Austrostipa scabra ssp.	Rough Spear-grass			28/09/2010
Austrostipa sp.	Spear-grass			23/11/1999
Avena barbata	Bearded Oat			30/11/1999
Avena sp.	Oat			14/02/2018
Avicennia marina ssp. marina	Grey Mangrove			27/11/2018
Brassica sp.				16/02/1999
Brassica tournefortii	Wild Turnip			20/08/2010
Bromus diandrus	Great Brome			10/11/2013
Bromus sp.	Brome			16/02/1999
Casuarinaceae sp.	Sheoak Family			16/02/1999
Cenchrus ciliaris	Buffel Grass			20/03/2015
Cenchrus clandestinus	Kikuyu			24/11/1999
Chenopodium album	Fat Hen			18/04/2011
Chenopodium sp.	Goosefoot			24/11/1999
Chloris truncata	Windmill Grass			13/08/2010
Compositae sp.	Daisy Family			25/12/1997
Convolvulus erubescens complex				20/08/2010
Conyza canadensis var. canadensis	Canadian Fleabane			20/08/2010
Critesion sp. (NC)	Barley-grass			17/12/1997
Cynara cardunculus ssp. flavescens	Artichoke Thistle			25/06/2021
Cynodon dactylon (NC)	Couch			24/11/1999
Cynodon sp.	Couch			14/02/2018

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Cyperus eragrostis	Drain Flat-sedge			18/04/2011
Danthonia sp. (NC)	Wallaby-grass			10/02/1999
Dichanthium sericeum ssp.	Silky Blue-grass			20/08/2010
Dichanthium sericeum ssp. sericeum	Silky Blue-grass			24/08/2010
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface			14/11/1996
Echinochloa crus-galli	Common Barnyard Grass			18/04/2011
Echium plantagineum	Salvation Jane			30/11/1999
Elytrigia repens	Twitch Grass			3/02/1996
Enchylaena tomentosa var.	Ruby Saltbush			20/08/2010
Enchylaena tomentosa var. tomentosa	Ruby Saltbush			14/02/2018
Enteropogon acicularis	Umbrella Grass			23/11/1999
Eragrostis cilianensis	Stink Grass			18/04/2011
Erodium cicutarium	Cut-leaf Heron's-bill			20/08/2010
Erodium moschatum	Musky Herons-bill			28/09/2010
Eucalyptus camaldulensis ssp. camaldulensis	River Red Gum			14/02/2018
Eucalyptus leucoxylon ssp.	South Australian Blue Gum			14/02/2018
Eucalyptus porosa	Mallee Box			14/02/2018
Eucalyptus sp.				14/02/2018
Eucalyptus torquata	Coral Gum			14/02/2018
Frankenia pauciflora var. gunnii	Southern Sea-heath			14/11/1996
Fraxinus angustifolia ssp. angustifolia	Narrow-leaved Ash			14/02/2018
Gahnia filum	Thatching Grass			14/11/1996
Gazania linearis	Gazania			18/04/2011
Glandularia aristigera	Mayne's Pest			23/11/1999
Gramineae sp.	Grass Family			25/12/1997
Halosarcia sp. (NC)	Samphire			16/02/1999
Heliotropium europaeum	Common Heliotrope			14/02/2018
Hemichroa pentandra	Trailing Hemichroa			23/11/2018
Hordeum glaucum	Blue Barley-grass			17/12/1997
Hordeum marinum	Sea Barley-grass			20/08/2010
Hordeum vulgare	Barley			30/11/1999
Hordeum vulgare ssp. (NC)				10/02/1999
Hornungia procumbens	Oval Purse			14/11/1996
Isolepis marginata	Little Club-rush			14/02/2018
Juncus acutus	Sharp Rush			14/02/2018
Juncus bufonius	Toad Rush			14/11/1996
Juncus radula	Hoary Rush		V	24/09/1999
Lactuca serriola (NC)	Prickly Lettuce			24/11/1999
Lactuca sp.	Lettuce			14/02/2018
Lepidium africanum	Common Peppercress			20/08/2010
Limonium companyonis	Sea-lavender			18/04/2011
Limonium diffusum				3/02/1996
Limonium lobatum	Winged Sea-lavender			20/08/2010

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Limonium sinuatum	Notch-leaf Sea-lavender			3/02/1996
Lolium rigidum	Wimmera Ryegrass			18/04/2011
Lolium sp.	Ryegrass			10/02/1999
Lomandra multiflora ssp. dura	Hard Mat-rush			23/11/1999
Lycium ferocissimum	African Boxthorn			22/01/2022
Lythrum sp.	Loosestrife			20/08/2010
Maireana aphylla	Cotton-bush			27/05/2022
Maireana brevifolia	Short-leaf Bluebush			14/02/2018
Maireana oppositifolia	Salt Bluebush			29/11/2018
Maireana sp.	Bluebush/Fissure-plant			25/12/1997
Marrubium vulgare	Horehound			15/06/2021
Marsilea drummondii	Common Nardoo			27/05/2022
Medicago polymorpha	Burr-medic			28/09/2010
Mesembryanthemum crystallinum	Common Iceplant			16/02/1999
Mesembryanthemum nodiflorum	Slender Iceplant			14/11/1996
Nitraria billardierei	Nitre-bush			14/02/2018
Olea europaea ssp.	Olive			14/02/2018
Olea europaea ssp. europaea	Olive			4/06/2021
Onopordum acanthium	Scotch Thistle			14/02/2018
Opuntia sp. (NC)	Prickly Pear			23/11/1999
Opuntia spp.	Prickly Pear			4/06/2021
Panicum decompositum var. decompositum	Native Millet			20/08/2010
Panicum hillmanii	Witch-grass			18/04/2011
Parapholis incurva	Curly Ryegrass			14/11/1996
Paspalum vaginatum	Salt-water Couch			16/02/1999
Phalaris sp.	Canary Grass			23/11/1999
Pinus sp.	Pine			17/12/1997
Piptatherum miliaceum	Rice Millet			16/02/1999
Plantago lanceolata var. lanceolata	Ribwort			28/09/2010
Plantago major	Greater Plantain			10/02/1999
Plantago sp.	Plantain			30/11/1999
Polygonum aviculare	Wireweed			14/02/2018
Polygonum aviculare (NC)	Wireweed			16/02/1999
Polypogon monspeliensis	Annual Beard-grass			19/10/2017
Puccinellia distans	Reflexed Poa			2/02/1995
Raphanus raphanistrum	Wild Radish			28/09/2010
Rapistrum rugosum ssp. rugosum	Turnip Weed			18/04/2011
Rumex sp.	Dock			24/11/1999
Rytidosperma caespitosum (NC)	Common Wallaby-grass			20/08/2010
Rytidosperma pilosum	Velvet Wallaby-grass			28/09/2010
Salicornia quinqueflora ssp. quinqueflora	Beaded Samphire			27/03/2020
Salsola australis	Buckbush			14/02/2018
Scabiosa atropurpurea	Pincushion			10/02/1999

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Sclerolaena muricata var.	Five-spine Bindyi			27/05/2022
Sclerostegia sp. (NC)	Samphire			16/02/1999
Secale cereale	Rye			14/02/2018
Senecio glossanthus	Annual Groundsel			21/10/2013
Senecio glossanthus (NC)	Annual Groundsel			14/11/1996
Senecio sp.	Groundsel			10/02/1999
Setaria jubiflora	Warrego Summer-grass			20/08/2010
Sisymbrium orientale	Indian Hedge Mustard			20/08/2010
Sisymbrium sp.	Wild Mustard			24/11/1999
Solanum elaeagnifolium	Silver-leaf Nightshade			11/03/2022
Sonchus oleraceus	Common Sow-thistle			14/11/1996
Sonchus sp.	Sow-thistle			10/02/1999
Sorghum halepense	Johnson Grass			18/04/2011
Spergularia marina	Salt Sand-spurrey			14/11/1996
Spergularia marina (NC)	Salt Sand-spurrey			14/11/1996
Sphenopus divaricatus	Wedge-foot Grass			14/11/1996
Suaeda australis	Austral Seablite			27/03/2020
Suaeda baccifera	Seablite			27/03/2020
Tamarix aphylla	Athel Pine			14/02/2018
Tamarix aphylla (NC)	Athel Pine			25/12/1997
Tecticornia arbuscula	Shrubby Samphire			29/11/2018
Tecticornia flabelliformis	Bead Samphire	VU	V	25/12/2001
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire			14/11/1996
Tecticornia indica ssp. bidens	Brown-head Samphire			14/11/1996
Tecticornia pergranulata ssp.	Black-seed Samphire			14/02/2018
Tecticornia pergranulata ssp. pergranulata	Black-seed Samphire			14/11/1996
Tecticornia syncarpa	Fused Samphire			14/11/1996
Tribulus terrestris	Caltrop			19/04/2022
Trifolium arvense var. arvense	Hare's-foot Clover			26/09/2010
Trifolium sp.	Clover			25/12/1997
Unidentified sp.				17/12/1997
Vicia sativa ssp.	Common Vetch			28/09/2010
Vittadinia cervicularis var. cervicularis	Waisted New Holland Daisy			20/08/2010
Vulpia bromoides	Squirrel-tail Fescue			20/08/2010
Vulpia myuros f. myuros	Rat's-tail Fescue			14/11/1996
Wilsonia humilis	Silky Wilsonia			29/11/2018

Appendix 4. BDBSA fauna records

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Acanthiza iredalei	Slender-billed Thornbill	ssp	ssp.	25/01/2007
Acanthiza iredalei rosinae	Samphire Thornbill or Slender-billed Thornbill Gulf St Vincent)	VU	V	6/11/2020
Actitis hypoleucos	Common Sandpiper		R	13/12/2014
Anhinga novaehollandiae novaehollandiae	Australasian Darter		R	2/12/2012
Ardea intermedia plumifera	Plumed Egret		R	19/01/2012
Arenaria interpres interpres	Ruddy Turnstone		R	26/02/2006
Biziura lobata menziesi	Musk Duck		R	13/12/2014
Botaurus poiciloptilus	Australasian Bittern	EN	E	25/08/2007
Bubulcus ibis coromandus	Eastern Cattle Egret		R	8/08/2006
Calidris canutus rogersi	Red Knot (ssp. rogersi)	sp	E	8/02/1998
Calidris ferruginea	Curlew Sandpiper	CR	E	2/12/2012
Calidris melanotos	Pectoral Sandpiper		R	13/10/2015
Calidris pugnax	Ruff		R	13/01/2011
Calidris subminuta	Long-toed Stint		R	17/01/2006
Cereopsis novaehollandiae novaehollandiae	Cape Barren Goose		R	20/03/2004
Chelonia mydas	Green Sea Turtle	VU	V	22/12/2008
Cladorhynchus leucocephalus	Banded Stilt		V	12/10/2015
Coturnix ypsilophora australis	Brown Quail		V	13/12/2014
Egretta garzetta nigripes	Little Egret		R	14/10/2020
Falco subniger	Black Falcon		R	1/08/2007
Gallinago hardwickii	Latham's Snipe		R	23/09/2006
Haematopus fuliginosus fuliginosus	Sooty Oystercatcher		R	26/11/2014
Haematopus longirostris	Pied Oystercatcher		R	26/11/2014
Hieraaetus morphnoides	Little Eagle		V	19/06/2005
Limosa lapponica	Bar-tailed Godwit	ssp.	ssp.	28/03/2010
Limosa Limosa melanuroides	Black-tailed Godwit		R	2/04/2011
Melithreptus gularis	Black-chinned Honeyeater		ssp.	11/09/2007
Neophema elegans elegans	Elegant Parrot		R	19/11/2021
Numenius madagascariensis	Far Eastern Curlew	CR	E	2/12/2012
Numenius phaeopus variegatus	Whimbrel		R	26/02/2006
Oxyura australis	Blue-billed Duck		R	2/12/2012
Plegadis falcinellus	Glossy Ibis		R	1/12/2004
Pluvialis fulva	Pacific Golden Plover		R	25/01/2007
Podiceps cristatus australis	Great Crested Grebe		R	13/12/2014
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R	25/02/2020
Rostratula australis	Australian Painted-snipe	EN	E	22/11/2004
Spatula rhynchotis	Australasian Shoveler		R	9/04/2016
Sternula albifrons sinensis	Little Tern		E	24/11/2005
Sternula nereis nereis	Fairy Tern	VU	E	2/12/2012
Stictonetta naevosa	Freckled Duck		V	9/09/2017
Tringa brevipes	Grey-tailed Tattler		R	20/03/2004
Tringa glareola	Wood Sandpiper		R	18/03/2006
Xenus cinereus	Terek Sandpiper		R	4/04/2012

Native Vegetation Clearance

Battery Anode Material Facility - Renascor Data Report

Clearance under the *Native Vegetation Regulations 2017*

29/06/2023

Prepared by Ecosphere Ecological Solutions

Table of contents

1. Application information
2. Purpose of clearance
    2.1 Description
    2.2 Background
    2.3 General location map
    2.4 Details of the proposal
    2.5 Approvals required or obtained
    2.6 Native Vegetation Regulation
    2.7 Development Application information (if applicable)
3. Method
    3.1 Flora assessment
    3.2 Fauna assessment
4. Assessment outcomes
    4.1 Vegetation assessment
    4.2 Threatened Species assessment
    4.3 Cumulative impacts
    4.4 Addressing the Mitigation hierarchy
    4.5 Principles of clearance
    4.6 Risk Assessment
    4.7 NVC Guidelines
5. Clearance summary
6. Significant environmental benefit
7. Appendices
    7.1 Fauna Survey (where applicable)
    7.2 Bushland, Rangeland or Scattered Tree Vegetation Assessment Scoresheets (to be submitted in Excel format).
    7.3 Flora Species List
    7.4 SEB Management Plan (where applicable)

1. Application information

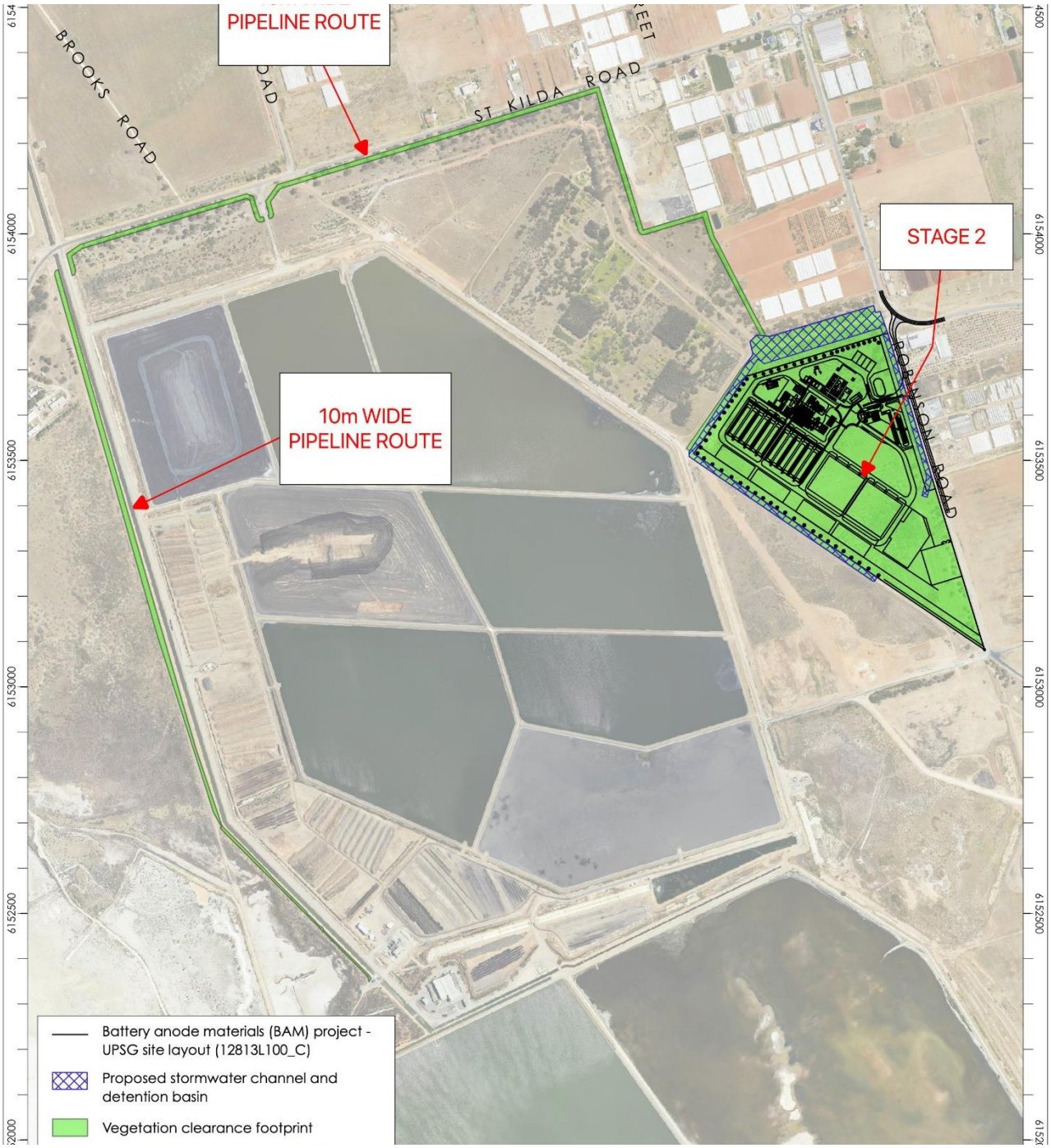
Application Details

Applicant:	Renascor Resources Pty Ltd		
Key contact:	Aaron Maddern, Project Manager, 36 North Terrace, Kent Town, SA, 5067. Email: aaron.maddern@renascor.com.au Mobile: 0404 581 630		
Landowner:	SA Water		
Site Address:	91 Robinson Road, Waterloo Corner, SA, 5110		
Local Government Area:	City of Salisbury	Hundred:	Port Adelaide
Title ID:	CT5723/299 CT5881/409 CT6257/133	Parcel ID	F115108AL3 F115108AL4 H105800SE185 H105800SE186 H105800SE187 H105800SE5017

Summary of proposed clearance

Purpose of clearance	Clearance required for the construction of a Battery Anode Material Facility, stormwater deluge management system and associated pipeline.
Native Vegetation Regulation	Schedule 1 Part 6 Clause 34 – Infrastructure
Description of the vegetation under application	Mixed emergent and degraded samphire and chenopod shrubland as understorey to planted amenity shrubs and trees.
Total proposed clearance - area (ha) and number of trees	A total of 26.72 hectares will be cleared for the project. Of this, 22.22 ha of emergent samphire / chenopod shrubland is proposed to be cleared.
Level of clearance	Level 4
Overlay (Planning and Design Code)	Native Vegetation Overlay

Map of proposed clearance area



Mitigation hierarchy	The project has been designed to minimise clearance of native vegetation where practicable. The stormwater channel runs along the eastern boundary and with its current design, would require some vegetation clearance. However, the stormwater channel design is maturing with ongoing collaboration with stakeholders, including SA Water and Council. Collaboration with the City of Playford Council includes discussions with regard to how stormwater design along Robinson Road can fit within the Councils long term planning for broader stormwater management. Final

	siting and design of the stormwater channel will aim to minimise clearing of native vegetation and maintain the screen along the eastern boundary, where practicable.
SEB Offset proposal	Payment of $160. 541.65

2. Purpose of clearance

2.1 Description

Ecosphere Ecological Solutions (Ecosphere) was engaged by JBS&G on behalf of Renascor Resources Pty Ltd (Renascor) to prepare a clearance proposal for a proposed Battery Anode Material (BAM) Facility located at Bolivar, South Australia (The Project, Figure 1).

The specific objectives of the vegetation assessment were to:

- Record vegetation association and condition values of any vegetation subject to provisions of the *Native Vegetation Act 1991* (NV Act).
- Identify of any flora species of Commonwealth or state significance present or likely to occur within the project site either on a temporary or permanent basis.
- Undertake an opportunistic fauna assessment to determine if any native fauna species, or fauna habitat, may be significantly impacted by the proposed BAM facility.
- Identify any areas where significant ecological constraints may occur and provide preliminary spatial data to describe these areas if relevant.
- Calculate the Significant Environmental Benefit (SEB) requirement to offset any vegetation clearance as part of development of the proposed BAM facility.

2.2 Background

Renascor Resources Pty Ltd (Renascor) is a South Australian based exploration and development company, listed on the Australian Securities Exchange (ASX:RNU) with projects located on the Eyre Peninsula, South Australia. Renascor's flagship project is the Siviour Graphite Project located near Arno Bay in South Australia. Sitting over the world's second largest known Graphite Reserve and operating under Mining Lease (ML) 6495, the mine will produce high quality graphite concentrate products via an open cut mining operation. Critical to the Siviour Graphite Project is the need for a BAM Facility.

The proposed BAM Facility (the project) is located in South Australia, approximately 16 km northwest of the Adelaide CBD and located within the City of Salisbury Council area (Figure 1). The BAM Facility will accept graphite concentrate from the Siviour Graphite Mine and process, refine and package the Purified Spherical Graphite (PSG) product, which will then be transported offsite for export.

The project is anticipated to cover an area of approximately 26.72 hectares (ha) and is comprised of the following components:

- micronisation and spheronisation plant
- water treatment plant
- administration and laboratory facilities
- warehousing
- electrical high voltage (HV) switchyard
- water pipelines
- stormwater channel and detention basin
- access roads.

Figure 2 and Figure 3 show further detail of the project components including the proposed water pipeline, stormwater channel and retention basin and infrastructure layout.

2.3 General location map

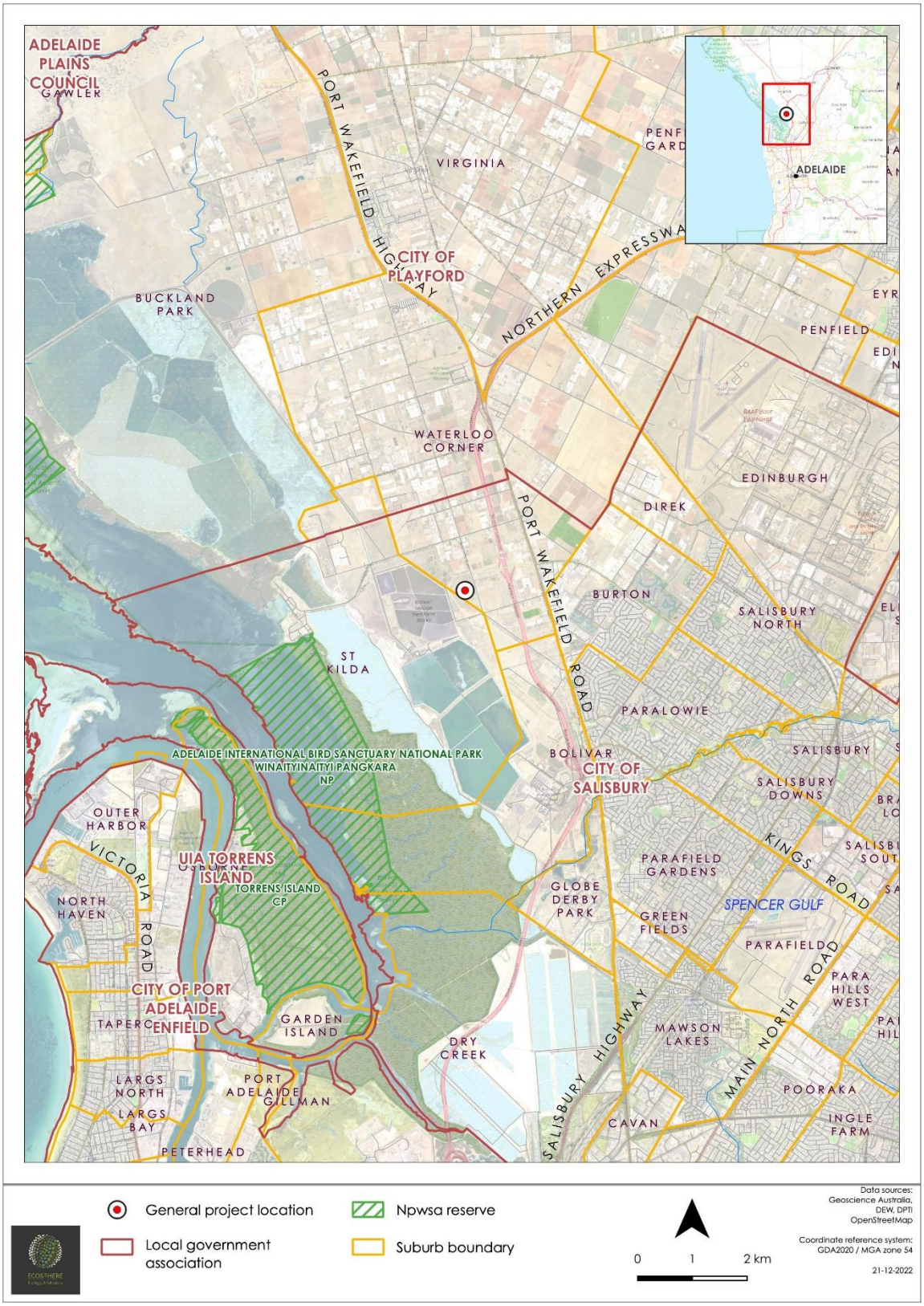


Figure 1. General location of the proposed Renascor BAM facility at Bolivar.

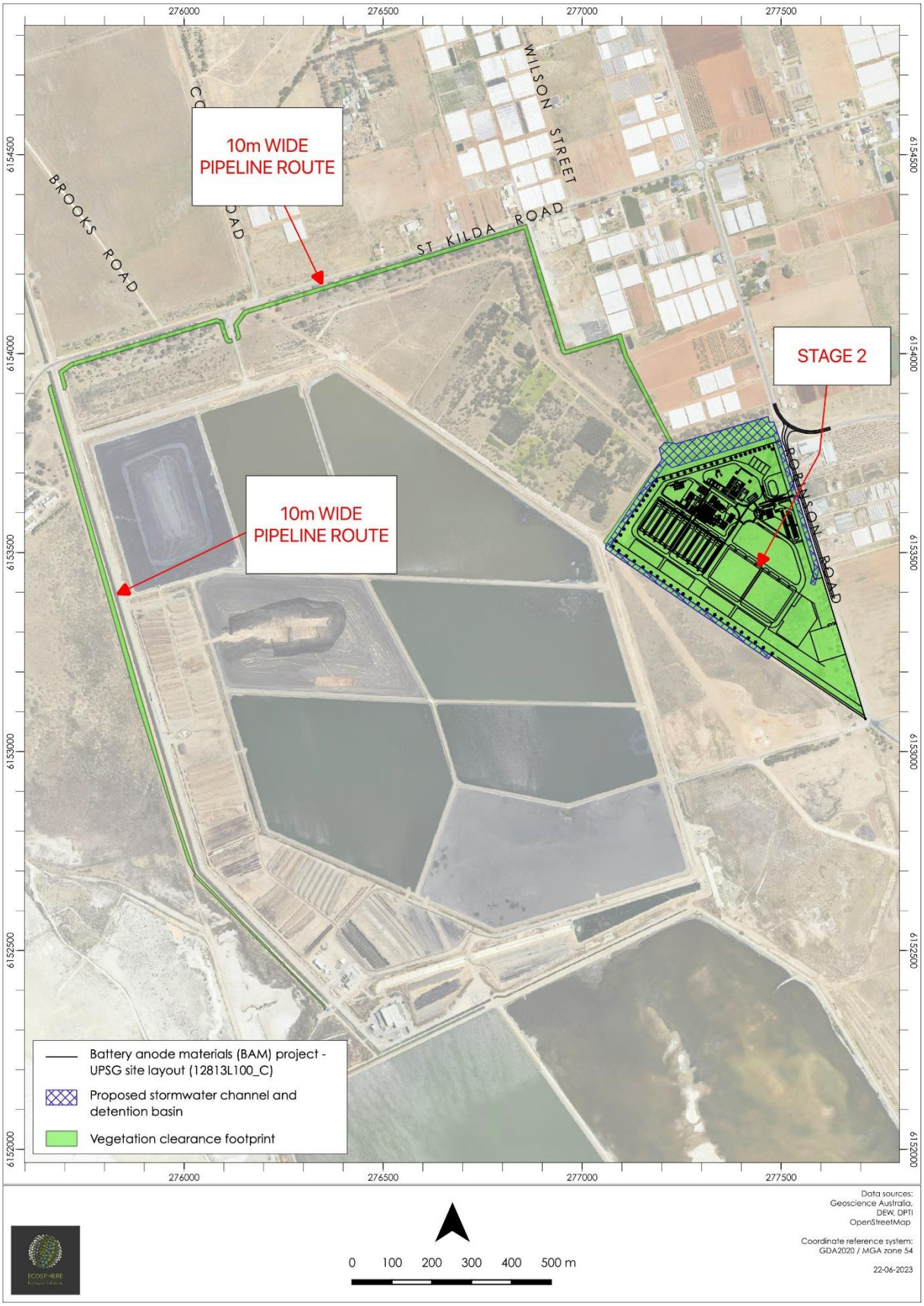


Figure 2. Project boundary and infrastructure layout of BAM facility and pipeline.

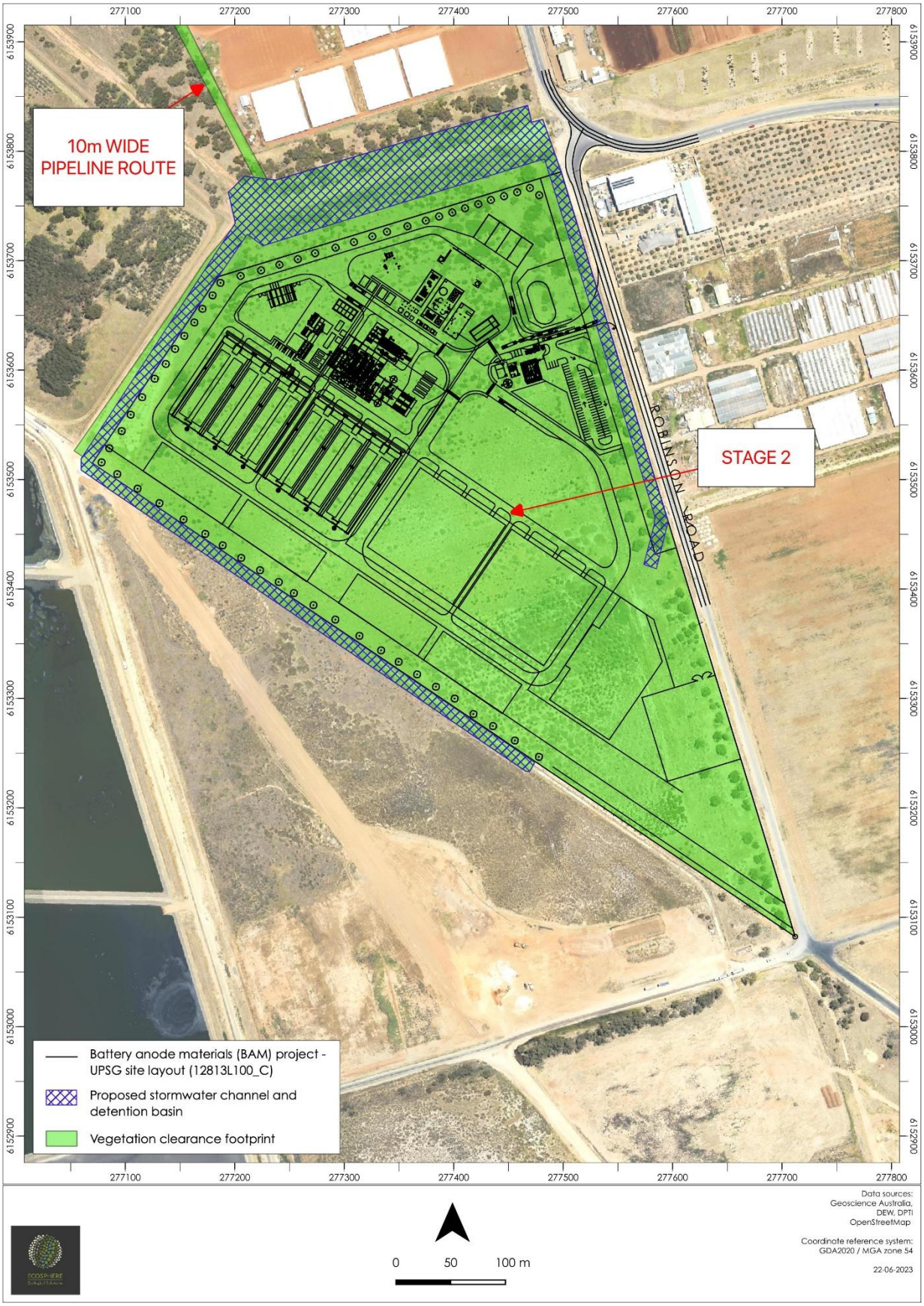


Figure 3. Project boundary and infrastructure layout of BAM facility with detailed stormwater footprint.

2.4 Details of the proposal

The project is anticipated to cover an area of approximately 26.72 hectares (ha) and is comprised of the following components:

- micronisation and spheronisation plant
- water treatment plant
- administration and laboratory facilities
- warehousing
- electrical high voltage (HV) switchyard
- water pipelines
- stormwater channel and detention basin
- access roads.

2.5 Approvals required *or* obtained.

A summary of key legislation relating to flora and fauna consideration and their relevance to the proposed project is provided in Table 1 below.

Table 1. Summary of relevant commonwealth and state legislation.

Legislation	Summary	Relevance
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999	To protect 'matters of national environmental significance' (MNES): • World Heritage properties • National Heritage properties • wetlands of international importance (Ramsar wetlands) • listed threatened species and ecological communities. • migratory species • Commonwealth marine areas • the Great Barrier Reef Marine Park • nuclear actions (including uranium mining). • a water resource, in relation to coal seam gas development and large coal mining development	Where an activity may trigger requirements of the EPBC Act, this legislation must be considered. Any action that has, will have, or is likely to have a significant impact on a matter of national environmental significance requires referral and approval. Significant penalties apply. To determine whether an action is likely to have a significant impact on a matter of national environmental significance, refer to the Significant Impact Guidelines (Commonwealth of Australia 2009) at: http://www.environment.gov.au/epbc/publications/pubs/nes-guidelines.pdf.
South Australia		
National Parks and Wildlife Act 1972	Allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters); provides for the protection of native flora and fauna; identifies flora and fauna species considered to be of conservation significance (under Schedules 7, 8, and 9 of the Act); and provides for the use of approved wildlife through a system of permits allowing certain actions, i.e. keeping and selling (s.58), harvesting (s.60G), farming (s.60C), hunting (s.68A), releasing (s.55) and undertaking scientific	A person must not "take" a native plant, protected animal or the eggs of a protected animal without approval (s.48A). Significant penalties apply. To take a native plant means to remove the plant or part of the plant, from the place in which it is growing; or to damage the plant. To take a protected animal means to remove, hunt, catch, restrain, kill or injure an animal, or attempt to do so. A person may take non-prescribed plant species from private land with the consent of the owner; however, these species may also be covered under the *Native Vegetation Act 1991*.

Legislation	Summary	Relevance
	research (s.53) on/of native fauna species, and for the taking of plants (s.49).	There are several non-complying activities in parks and reserves that result in penalty (parts 4-6).
Native Vegetation Act 1991	To preserve, enhance and manage the State's native vegetation; provide a regulatory framework to control clearance of vegetation; and provide incentives and assistance to landowners to encourage them to preserve and enhance native vegetation. The Act protects all native vegetation that naturally occurs, i.e., vegetation which has not been planted. This includes all naturally occurring local native plants, from small ground covers and native grasses to mallee scrub and tall trees. It does not cover planted trees. Approval is required for the clearance of native vegetation. Clearance is defined as: • the killing or destruction of native vegetation • the removal of native vegetation • the severing of branches, limbs, stems or trunks of native vegetation. • the burning, poisoning and slashing of native vegetation. • any other substantial damage to native vegetation including activities such as the draining for the reclamation of wetlands or flooding of land, grazing land where stock have been excluded for more than ten years.	Persons wanting to clear native vegetation must apply for a permit from the Native Vegetation Council (NVC) (ss.7,14), unless exempt under the regulations. The NVC will consider the impacts of the proposed clearance and may grant consent, refuse consent or grant consent subject to certain conditions (s.29). A net environment benefit is generally conditional on an approval being granted. Significant penalties apply if a person clears native vegetation without the permission of the NVC (s.26). The NVC can also take civil enforcement proceedings in the District Court for an order that the native vegetation be re-instated (s.31). The Act also provides the opportunity for landholders to enter into voluntary "Heritage Agreement(s)" to ensure vegetation on private land is protected for perpetuity (s.23). As the project will be assessed via an EIS under the *Planning, Development and Infrastructure Act 2016*, it is understood that Regulations 12 and 13 of the NV Regulations will apply. Under these Regulations and Schedule 1, Part 4 (clause 27) of the NV Regulations, vegetation clearance for major developments that are approved under an EIS (that was referred to the NVC for comment) is permitted, provided that it is undertaken in accordance with the development consent and an approved management plan (or a payment into the Native Vegetation Fund) which results in a significant environmental benefit.

2.6 Native Vegetation Regulation

Schedule 1 Part 6 Clause 34 – Infrastructure, to allow clearance of vegetation incidental to the construction or expansion of a building or infrastructure (and associated services) where the Minister has declared that the clearance is in the public interest.

2.7 Development Application information (if applicable)

Multiple zones apply to the project site including:

- Infrastructure
- Open Space
- Rural Horticulture
- Resource Extraction

Overlays that apply to the project area include:

- Aircraft Noise Exposure (ANEF 20)
- Airport Building Heights (Regulated) (All structures over 45 metres)
- Building Near Airfields

- Coastal Areas
- Defence Aviation Area (All structures over 45 metres)
- Defence Aviation Area (All structures over 90 metres)
- Gas and Liquid Petroleum Pipelines
- Gas and Liquid Petroleum Pipelines (Facilities)
- Hazards (Flooding)
- Hazards (Flooding - General)
- Limited Land Division
- Major Urban Transport Routes
- Native Vegetation
- Non-stop Corridor
- Prescribed Watercourses
- Prescribed Wells Area
- Regulated and Significant Tree
- Traffic Generating Development
- Water Resources

3. Method

3.1 Desktop Assessment

3.1.1 Protected Matters Search Tool (PMST) – EPBC Act

A PMST report was generated on 23rd November 2022 with an updated report generated on the 29th of May 2023 to identify MNES under the EPBC Act, relevant to the project site (DCCEEW, 2022). The PMST is maintained by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and was used to identify flora and fauna species or ecological communities of national environmental significance that may occur or likely to have suitable habitat within 5km of the project site.

3.1.2 Biological Database of South Australia (BDBSA)

Threatened species listed under the EPBC Act and NPW Act were assessed using the Naturemaps Supertable, obtained through the general query tool on Naturemaps. The dataset was obtained on 16th June 2022 and was used to identify threatened species that have been recorded within 5km of the project site (DEW 2022). Search criteria also included records since 1st January 1995 with a spatial reliability of <1km.

3.1.3 Assessment of the likelihood of occurrence

The likelihood of each threatened flora and fauna species potential of occurring within the project site was assessed. A likelihood of occurrence rating (Highly Likely / Known, Likely, Possible and Unlikely) was assigned to each threatened species identified in the desktop PMST and BDBSA search using the parameters as outlined below in Table 2.

Table 2. Criteria for the likelihood of occurrence of species within the project site.

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is largely intact and falls within the known Project of the species distribution or. The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides species habitat which is largely intact.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area does not provide species habitat which is largely intact. Recorded within 20 -40 years, survey effort is considered adequate, habitat is present and intact, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records within the previous 40 years despite suitable habitat being known to occur in the area. No records despite adequate survey effort.

3.1.4 Desktop study limitations

The content of the desktop study was derived from existing datasets and references from a range of sources. Flora and fauna records were sourced from the Protected Matters Database via the PMST and the BDBSA via Naturemaps. The BDBSA only includes verified flora and fauna records submitted to Department for Environment and Wildlife (DEW) or partner organisations. It is recognised that drawing conclusions can be unreliable within areas that have been underrepresented in terms of biological studies. It is possible, therefore, that significant species occur within the project site that were not reflected by database records.

3.2 Field survey

The original field survey was conducted on 29th June 2022 and a follow up assessment for a refined project area undertaken on the 11th of May 2023 by NVC accredited ecologists Andrew Sinel and Rob Kelman. The field survey included a vegetation survey and passive fauna assessment.

3.2.1 Vegetation survey

The vegetation survey for areas of native vegetation was undertaken in accordance with the NVC endorsed Bushland Assessment Method (BAM).

Vegetation within the individual associations was surveyed for national, state and regionally significant flora species that occurred within the area. A ramble survey method was adopted (i.e., randomly walking through areas of vegetation, attempting to cover different topography and habitats) to ensure best coverage of the individual associations.

- The following information is recorded for any threatened flora observed:
- Location and extent of any populations (hand-held GPS); and
- Vegetation association and additional habitat observations where relevant.

3.2.2 Fauna

A focus of the on-ground fauna assessment was on avian species due to ability to passively identify and record species. For more inconspicuous fauna species, opportunistic observations were recorded, and fauna likelihood based largely on the presence and quality of habitat. The likelihood of specific species occurring within the project site included:

- Reviewing previous field survey results and database records
- Assessing the habitat value of the vegetation during the field survey to determine the fauna species likely to occur within the project site.
- Presence of any areas of significant fauna value such as fallen timber, areas for shelter such as caves or overhangs or permanent or casual water/wetlands.

4. Assessment Outcomes

4.1 Vegetation Assessment

General description of the vegetation, the site and matters of significance.

Field assessments were undertaken within the project site on 29th June 2022 (BAM facility) and 11th May 2023 (Pipeline). The vegetation was comprised of planted indigenous amenity shrub and tree species over an exotic understory with low density emergent native indigenous shrubland vegetation. Plantings of amenity species were comprised of locally indigenous species however were planted in rows and likely to be as a functional stand for water take up or filtration rather than as a habitat area. Sheep were grazing this area as a pasture at the time of the assessment.

Details of the vegetation associates/scattered trees proposed to be impacted.

Ten vegetation associations were recorded within the project site and are summarised below in Table 3. and shown in Figure 5 to Figure 9. These were in poor condition and providing low habitat value being present as emergent naturally regenerating species which are recognised as highly disturbance resistant and grow naturally in areas where high disturbance occurs such as around water points and roadsides.

Table 3. Vegetation association summary.

Assoc #	Description	UBS	Area (ha)
1	*Myoporum insulare* (Boobialla) amenity plantings over exotic grassland and emergent chenopod shrubs.	3.12	0.64
2	Mixed Amenity plantings over emergent chenopod shrubs	6.23	3.41
3	Sparsely planted *Eucalyptus largiflorens* (Black Box), *E. odorata* (Peppermint Box) Woodland +/- planted *Eucalyptus spathulata* (Swamp Mallet) over planted amenity species and emergent *Nitraria billardierei* (Nitre Bush) and *Maireana brevifolia* (Lobe Fruit Bluebush) shrubland	22.23	3.13
4	*Tecticornia pergranulata* (Black See Samphire) emergent under planted *Melaleuca halmaturorum* (Swamp Paperbark) and *Atriplex rhagodioides* (Silver Saltbush)	29.6	0.75
5	Planted *Melaleuca halmaturorum* (Swamp Paperbark) over planted *Atriplex rhagodioides* (Silver Saltbush) and emergent chenopod shrubs	15.15	3.68
6	Mixed amenity shrubs over exotic grassland and emergent chenopod shrubs	7.79	9.65
7	Fallow land used for industrial or storage areas.	N/S*	4.49
8	*Nitraria billardierei* (Nitre Bush) Low Open Shrubland.	17.66	0.21
9	*Myoporum insulare* (boobialla) emergent shrubs over *Threlkeldia diffusa* (Coast Bonefruit) and *Maireana brevifolia* (Short leaved Bluebush)	4.23	0.65
10	*Austrostipa* spp. (Spear Grass), *Chloris truncata* (Windmill Grass) Open Grassland.	7.75	0.10
		Total	**26.72**

*N/S denotes not scored as native vegetation or bushland.

Vegetation Association 1	*Myoporum insulare* (Boobialla) amenity plantings over exotic grassland and emergent chenopod shrubs.

General description	Planted strips of Boobialla exclude almost all other species in a large monoculture. Very high habitat value for bird species due to dense growth. Has low biodiversity score due to contribution made primarily from planted species with low level indigenous regeneration in this site. Understory largely absent due to domination by density of shrub growth.
Threatened species or community	Not conservation significant as a vegetation community but is likely to provide habitat for the following conservation significant species: • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot)

Landscape context score	1.22	Vegetation Condition Score	2.32	Conservation significance score	1.10
Unit biodiversity Score	3.12	Area (ha)	0.64	Total biodiversity Score	1.99

Vegetation association 2	Mixed Amenity plantings over emergent chenopod shrubs

General description	Sparsely planted shrubland and woodland species with emergent chenopod shrubs providing the NVC value as regenerated indigenous species. Species planted as overstorey shrub and tree canopy included: • *Eucalyptus odorata, E. porosa, E. largiflorens, E. camaldulensis* • *Acacia salicina, A. paradoxa, A. ligulata, A. victoriae* • *Melaleuca lanceolata, M. halmaturorum* • *Duma florulenta* • *Santalum lanceolatum* • *Atriplex rhagodioides, A. paludosa, Rhagodia candolleana, R. parabolica* • *Myoporum insulare.*
Threatened species or community	This association is not conservation significant. The following species may possibly utilise the site on an infrequent basis, most probably as a pass-through refuge during movements between more suitable habitats. The variety of overstorey trees is likely to provide food resources at a variety of times for various species. • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle)

Landscape context score	1.22	Vegetation Condition Score	4.64	Conservation significance score	1.10
Unit biodiversity Score	6.23	Area (ha)	2.85	Total biodiversity Score	17.76

Vegetation association 3	Sparsely planted *Eucalyptus largiflorens* (Black Box), *E. odorata* (Peppermint Box) Woodland +/- planted *Eucalyptus spathulata* (Swamp Mallet) over planted amenity species and emergent *Nitraria billardierei* (Nitre Bush) and *Maireana brevifolia* (Lobe Fruit Bluebush) shrubland

General description	The community present in this area consists of planted rows of trees with the outer row *Melaleuca lanceolata* (Moonah) an inner row of *Eucalyptus spathulata* (Swamp Mallet) and then the middle row *Eucalyptus largiflorens / E. odorata*. Emergent *Maireana brevifolia* was present as the dominant understory with declared weed species prevalent.
Threatened species or community	Not conservation significant as a vegetation community and could be best described as a highly disturbance resistant emergent chenopod shrubland of very low ecological value. The following threatened species with records locally may use this area on a temporary or irregular basis: • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle)

Landscape context score	1.22	Vegetation Condition Score	16.56	Conservation significance score	1.10
Unit biodiversity Score	22.23	Area (ha)	2.50	Total biodiversity Score	55.57

Vegetation association 4	*Tecticornia pergranulata* emergent under planted *Melaleuca halmaturorum* and *Atriplex rhagodioides*

General description	Area adjacent semi-intact samphire community and infrequently inundated by rainfall during the winter months. Good cover of samphire and lower weed invasion in this section due to annual wetting drowning many species not tolerant of wet and saline conditions.
Threatened species or community	This community is not conservation significant at regional, state or Federal level. • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle) • *Acanthiza iredalei rosinae* (Samphire Thornbill or Slender-billed Thornbill Gulf St Vincent)

Landscape context score	1.22	Vegetation Condition Score	22.06	Conservation significance score	1.10
Unit biodiversity Score	29.60	Area (ha)	0.75	Total biodiversity Score	22.20

Vegetation association 5	Planted *Melaleuca halmaturorum* over planted *Atriplex rhagodioides* and emergent chenopod shrubs

General description	Fringe community to samphire dominant area and planted vegetation dominated cover however still significant cover of emergent chenopod shrubs. Mix of samphire and *Maireana aphylla* with these species' conservation significant at a regional level, avoidance of these better zones would be prudent as well as easier to manage from a flooding perspective.
Threatened species or community	This community is not conservation significant at regional, state or Federal level due to lack of connectivity to natural processes such as tidal influence. • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle)

Landscape context score	1.22	Vegetation Condition Score	11.29	Conservation significance score	1.10
Unit biodiversity Score	15.15	Area (ha)	3.68	Total biodiversity Score	55.74

Vegetation association 6	Mixed amenity shrubs over exotic grassland and emergent chenopod shrubs

General description	Planted amenity overstorey over exotic cover, heavy clay loams mean that suitable for exotic annual grass and herbaceous species and grazing maintains fresh growth of chenopod shrubs at small stature and height. Most trees and particularly *Atriplex paludosa* (Marsh Saltbush) being heavily grazed.
Threatened species or community	This site is not conservation significant at regional, state or Federal level. It may however provide temporary habitat for the following species: • *Bubulcus ibis coromandus* (Eastern Cattle Egret) • *Cereopsis novaehollandiae* (Cape Barren Goose) • *Melithreptus gularis* (Black-chinned Honeyeater) • *Neophema elegans elegans* (Elegant Parrot) • *Coturnix ypsilophora australis* (Brown Quail) • *Hieraaetus morphnoides* (Little Eagle)

Landscape context score	1.22	Vegetation Condition Score	5.81	Conservation significance score	1.10
Unit biodiversity Score	7.79	Area (ha)	9.52	Total biodiversity Score	74.16

Vegetation association 7	Fallow land / Industrial
General description	Exotic grass and herbaceous species dominated by *Aizoon pubescens* (Carpet Weed) and has no ecological value and no indigenous species present.
Threatened species or community	Not assessed as intact community.

Vegetation association 8	*Nitraria billardierei* (Nitre Bush) Low Open Shrubland.

General description	Semi degraded chenopod shrubland where natural ground level has been altered by the presence of the drain bank. The resultant regrowth in this area id a mix of exotic and indigenous species not resembling a natural stratum and in very poor condition with high levels of exotic grass, herbaceous and woody species.
Threatened species or community	This site is not conservation significant at regional, state or Federal level. Unlikely to support habitat for threatened species. It may potentially provide transient habitat for *Neophema elegans elegans* (Elegant Parrot). The adjacent samphire shrubland has high ecological and conservation value but will not be impacted by this project.

Landscape context score	1.20	Vegetation Condition Score	11.74	Conservation significance score	1.10
Unit biodiversity Score	15.50	Area (ha)	1.52	Total biodiversity Score	23.55

Vegetation association 9	*Myoporum insulare* (boobialla) emergent shrubs over *Threlkeldia diffusa* (Coast Bonefruit) and *Maireana brevifolia* (Short leaved Bluebush)

General description	Area of largely exotic grassland with planted amenity trees but where some regeneration of indigenous disturbance resistant species has occurred resulting in a degraded chenopod shrubland / grassland with a planted overstorey. Historically was likely to be comprised of a mix of *Atriplex paludicola* (Marsh Saltbush) and *Maireana* spp. (Bluebush) Low open Shrubland however these stratums have long been lost and unlikely to persist under today's conditions with high weed cover.
Threatened species or community	This site is not conservation significant at regional, state or Federal level. Has very low potential for threatened species due to proximity to road and poor habitat value other than that provided by amenity plantings.

Landscape context score	1.20	Vegetation Condition Score	3.15	Conservation significance score	1.10
Unit biodiversity Score	4.16	Area (ha)	0.65	Total biodiversity Score	2.70

Vegetation association 10	*Austrostipa* spp. (Spear Grass), *Chloris truncata* (Windmill Grass) Open Grassland.

General description	Small disjunct patch of native grassland surrounded by other areas of very poor condition. Approximately 50% native cover, this area is not contiguous with other intact patches and is therefore likely to not change in condition or spread to other areas.
Threatened species or community	This site is not conservation significant at regional, state or Federal level due to the very small extent and quality of the grassland. Low levels of connectivity to any other intact patches.

Landscape context score	1.20	Vegetation Condition Score	5.78	Conservation significance score	1.10
Unit biodiversity Score	7.62	Area (ha)	0.10	Total biodiversity Score	0.76

Site map showing areas of proposed impact

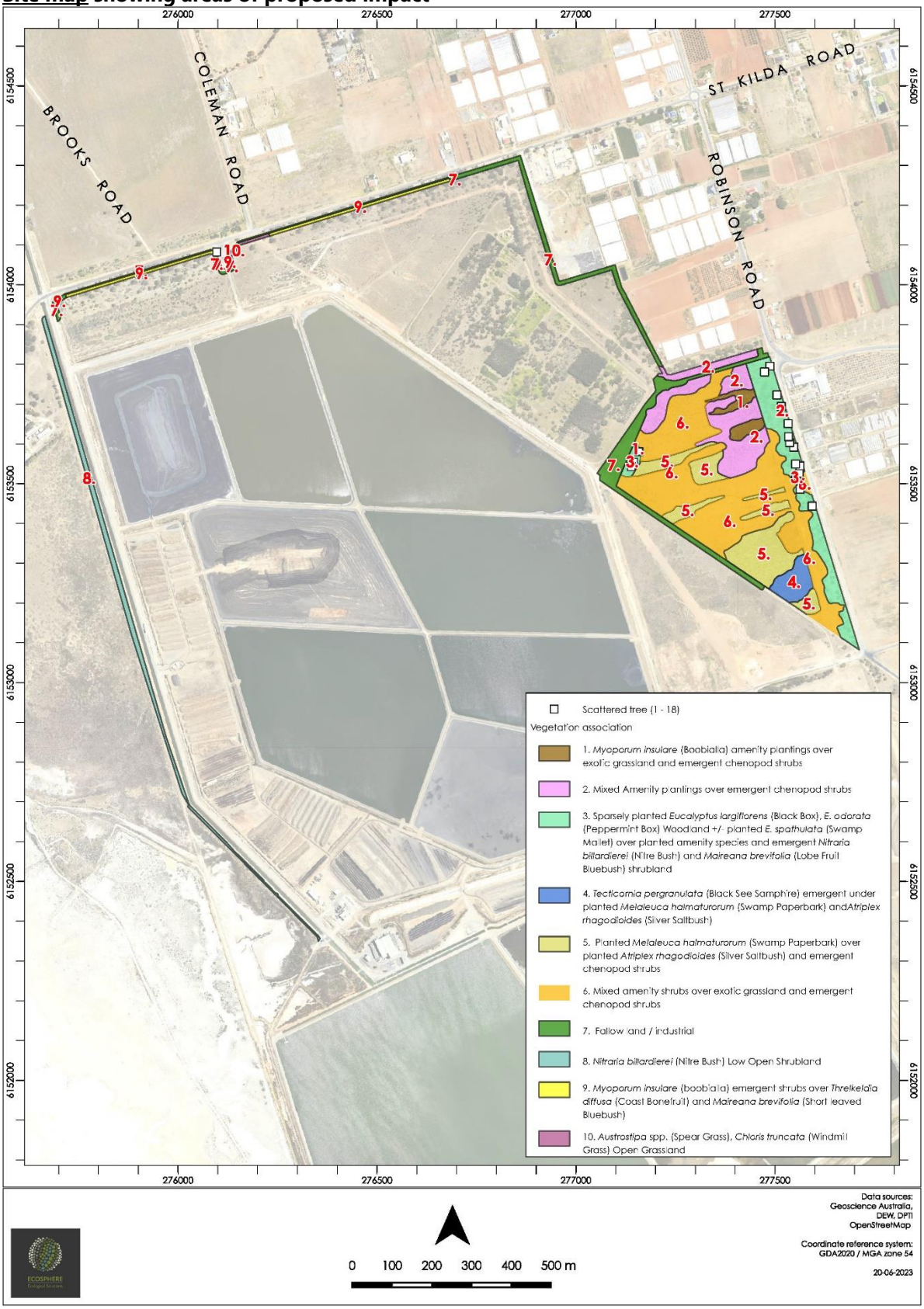


Figure 4. Vegetation associations recorded within the BAM facility and pipeline sites.

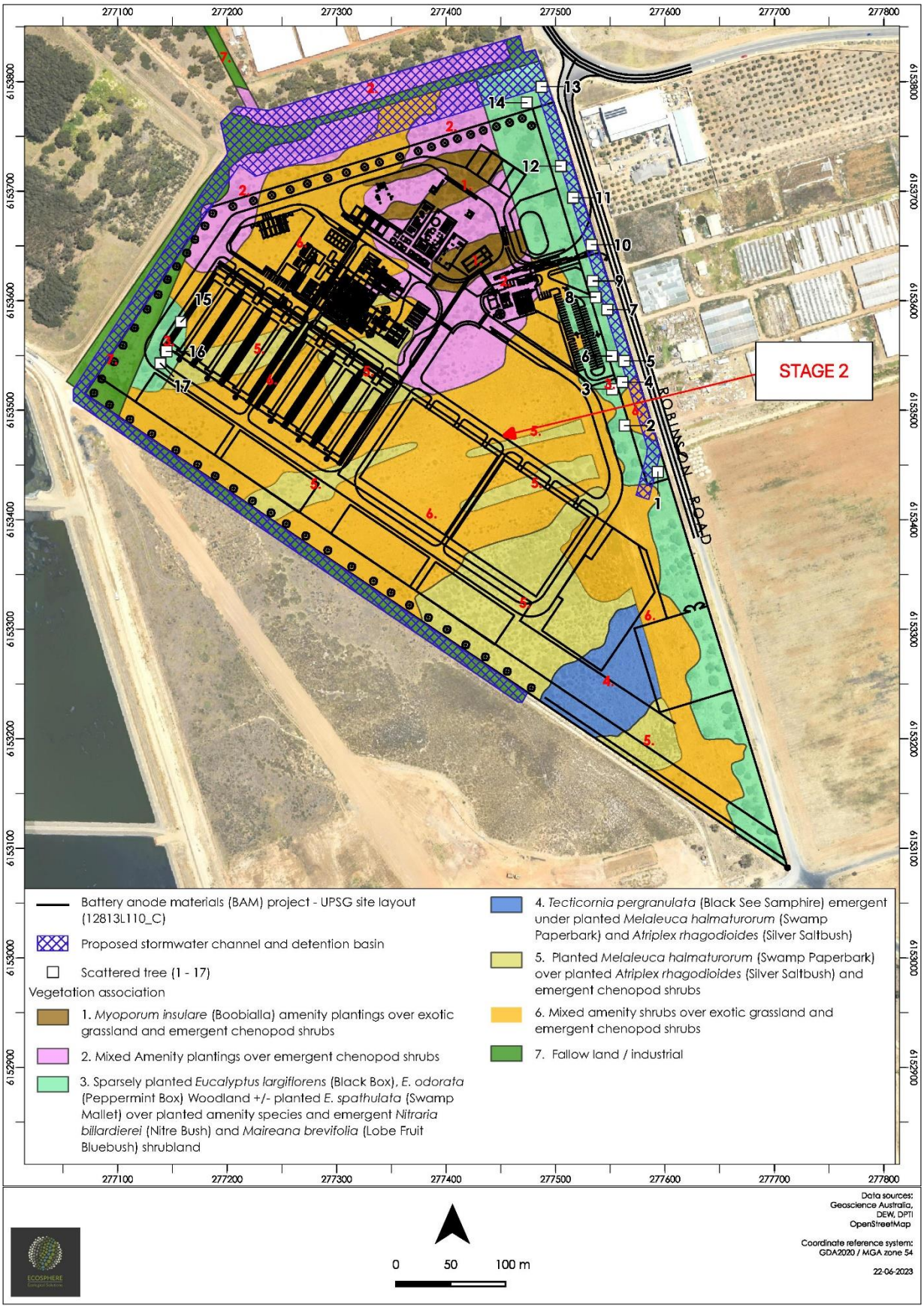


Figure 5. Vegetation associations and amenity scattered trees recorded within the BAM facility site.

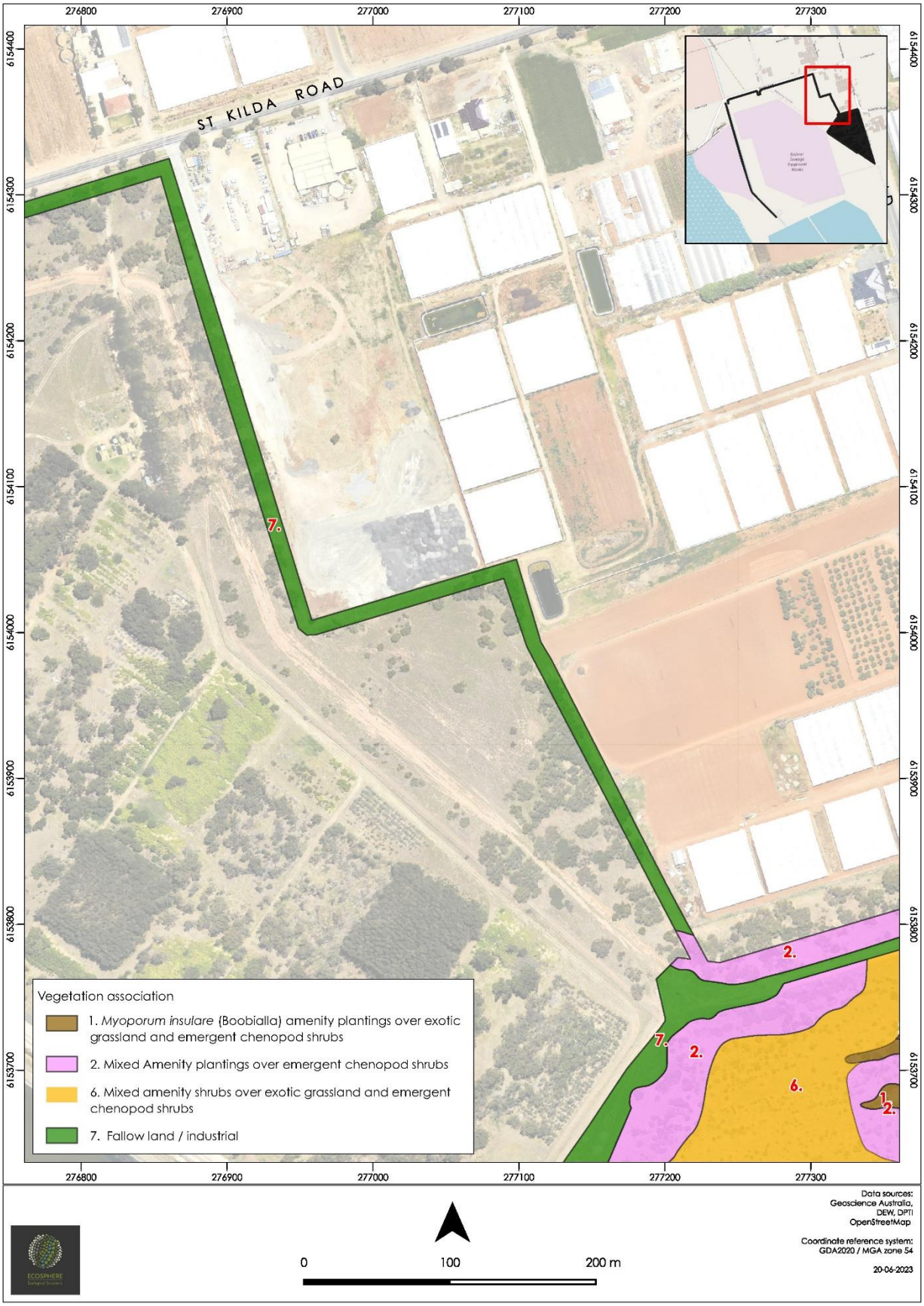


Figure 6. Vegetation associations recorded along the eastern extent of the pipeline site.

Figure 7. Vegetation associations recorded along the north-eastern extent of the pipeline site.

Figure 8. Vegetation associations and amenity scattered tree recorded along the north-western extent of the pipeline site.

Figure 9. Vegetation associations recorded along the western extent of the pipeline site.

4.2 Threatened Species Assessment

4.2.1 Matters of National Significance (MNES)

A total of 48 listed threatened species and 63 migratory species were identified by the EPBC Act PMST report as potentially occurring or having suitable habitat potentially occurring within 5 km of the project site (Table 4) (DECCEW 2023). The relevant MNES protected under the EPBC Act are discussed in detail below. Marine only species were not assessed as part of this desktop work due to a lack of connectivity of the project site to marine environments within the scope of the project option layouts.

Table 4. EPBC Act PMST report results summary (5km buffer).

Search area (5 km buffer)	Matters of national environmental significance under the EPBC Act	Identified within the search area
	World heritage properties	None
	National heritage properties	None
	Wetlands of international importance	None
	Great Barrier Reef marine park	None
	Commonwealth marine area	None
	Threatened ecological communities	2
	Listed Threatened species	48
	Migratory species	63
	Commonwealth land	22
	Commonwealth heritage places	None
	Listed marine species	97
	Whales and other cetaceans	8
	Critical habitats	None
	Commonwealth reserves terrestrial	None
	Commonwealth reserves marine	None
	State and Territory reserves	5
	Regional forest agreements	None
	Nationally important wetlands	2
	Key Ecological Features	None
	Biologically Important Areas	None
	Key ecological features (marine)	None

4.2.2 Threatened Ecological Communities

Two Threatened Ecological Communities (TEC's) were identified in the PMST as potentially occurring within 5 km of the project site. A summary of these communities and comment regarding their likelihood of occurrence in the project site are provided in Table 5 below.

Table 5. The threatened ecological communities identified by the PMST and their likelihood of presence within the project site.

Threatened Ecological Community	EPBC Status	Likelihood of Occurrence in the Project Site
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	The field survey recorded no areas with connectivity to supra tidal conditions. The presence of infrastructure and evaporation ponds associated with the WWTP ensure no flooding from tidal surges can occur within the project site. Tidal influence is a key criterion and therefore rules out the possibility any samphire shrublands in the area can fulfill conditions for the TEC.
Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia	Critically Endangered	No indigenous intact Peppermint Box Woodlands recorded in project site. There were areas of *Eucalyptus odorata* planted within the project site as a screen along the boundary. A lack of understory species richness and intact perennial grass stands meant that any areas of *E. odorata* woodland could not be considered part of the threatened ecological community.

4.2.3 Nationally Threatened Flora

Five flora species listed as threatened under the EPBC Act were identified in the PMST report as potentially occurring or having suitable habitat within the project site (Table 6 and Figure 10). One flora species of national conservation significance had historical records within 5km of the project site, *Tecticornia flabelliformis* (Bead Glasswort, VU: AUS). Bead Glasswort typically occupies a specific niche at the edge of the supra tidal zone where winter inundation from rainfall and storm surges creates a temporary wet zone. This species defoliates during winter and regains leaf cover during summer when surface water is largely not present. The locations of this population occur approximately 2 km west of the project site at St Kilda. No individuals of this species were recorded within the project site nor were they considered likely to occur based on the type and quality of habitat present.

4.2.4 State Threatened Flora

One flora species of state conservation significance had historical records from the BDBSA. *Juncus radula* was considered unlikely due to the lack of permanent water within the project site.

A list of all flora species with records within 5km of the project site is provided in Appendix 2.

Table 6. Threatened flora species potentially or known to occur within the project site identified from the PMST (DCCEEW 2023) and Naturemaps (DEW 2022).

Scientific name	Common name	Conservation status		Source	BDBSA last record (year)	Distribution and preferred habitat	Likelihood of Habitat Use
		Aus.	SA				
Caladenia tensa	Green-comb Spider-orchid	EN	R	1	None	This species is considered to be widespread in SA from the west coast, throughout Eyre Peninsula and adjacent pastoral zone, the Flinders Ranges, rare in the Mt Lofty Ranges and more common in the Murray and upper south-east. The Green-comb Spider-orchid grows on red-brown sandy loams on rises in open woodland dominated by *Eucalyptus leucoxylon* (SA Blue gum) and *Callitris gracilis* (Native Pine).	Unlikely
Juncus radula	Hoary Rush		V	2	24/09/1999	Recorded in depressions and along seasonal drainage lines in a range of vegetation communities. Known to hybridize with *J. subsecundus*.	Unlikely
Prasophyllum pallidum	Pale Leek-orchid	VU	E	1	None	Grows in woodland on slopes and gullies. Limited to intact stratums not subject to disturbance.	Unlikely
Senecio macrocarpus	Large Fruit Fireweed	VU	V	1	None	Occurs in a variety of habitats, including grasslands, sedgelands, shrublands and woodlands, generally on sparsely vegetated sites on sandy loam to heavy clay soils, often in depressions that are waterlogged in winter.	Unlikely
Swainsona pyrophila	Yellow Swainson-pea	VU	R	1	None	Occurs in mallee vegetation communities on a variety of soil types including well-drained sands, sandy loams and heavier clay loams.	Unlikely
Tecticornia flabelliformis	Beaded Glasswort	VU	E	1,2	25/12/2001	Sub tidal and supra tidal zones. Several records within 5km of project site. Not likely to occur outside of known location.	Unlikely

Conservation status: Aus.: Australia (Environment Protection and Biodiversity Conservation Act 1999). SA: South Australia (National Parks and Wildlife Act 1972). Conservation codes: EN/E: Endangered. VU/V: Vulnerable, R: Rare.

Figure 10. BDBSA records for conservation significant flora observations within 5km of project site.

4.2.5 Nationally Threatened Fauna

A total of 43 fauna species listed as threatened under the EPBC Act were identified by the PMST as having suitable habitat potentially occurring within 5 km of the project site (Table 7 and Figure 11). This included three mammals, four reptiles, two fish and a shark with the remaining 33 being avian species. Ten nationally threatened fauna species had historical records since 1995 and within 5km of the project site from the BDBSA. The desktop assessment resulted in three species considered to possibly occur within the project site, these were:

- St Vincent Gulf Slender-billed Thornbill (*Acanthiza iredalei rosinae,* EPBC: VU, SA: V)
- Grey-headed Flying-fox (*Pteropus Poliocephalus,* EPBC: VU, SA: R)
- Blue-winged Parrot (*Neophema chrysostoma,* EPBC: VU, SA: V).

An additional species, the Fairy Tern (*Sternula nereis nereis* EPBC: VU, SA: E) was considered to possible fly over the site periodically but not utilise the habitat within the area.

The St Vincent Gulf **Slender-billed Thornbill** subspecies (*Acanthiza iredalei rosinae*) is known to inhabit samphire shrublands. There was a lack of low compact shrubs within the project site and coupled with the grazing of the area and a planted modified overstorey dominated by *Melaleuca halmaturorum* (Coast Tea-tree), resulted in an unlikely likelihood of this species occupying the project site. Further, a targeted survey did not identify the species within the project site. Based on the degraded quality of the vegetation within the project footprint and land use for sheep grazing, the potential for this species to utilise the habitat is very unlikely.

Grey-headed Flying-fox (*Pteropus Poliocephalus*) are known to roost in the Adelaide Botanic Park and forage over a wide area, with individuals capable of travelling 40 km between their roost and feeding sites in a night (Eby and Law, 2008), which places the project site well within their range. Grey-headed Flying Foxes consume fleshy fruits and blossoms, have been observed feeding on the fruits of the Moreton Bay Fig (*Ficus macrophylla*) and the blossoms of eucalypts (*Eucalyptus* spp. and *Corymbia* sp.). Although the species may fly through the project site, the field survey did not identify any habitat critical to the species within the project site.

Blue-winged Parrot (*Neophema chrysostoma*) are known to inhabit coastal, sub-coastal and inland areas. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. The species is also known to be found in altered environments such as airfields, golf-courses and paddocks. Habitat within the project site is not deemed critical for the species given the project site is a previously degraded and marginally rehabilitated area that is subject to grazing by sheep and incurs ongoing disturbance occurs from heavy vehicles and machinery associated with the WWTP. No records occur within 5km of the project site. However, suitable habitat for the species is present within the wider area and this transient species is considered to possibly move through the project site to access areas of suitable habitat.

4.2.6 State threatened fauna.

A total of 32 state threatened fauna species have historical records within 5 km of the project site (Table 7). Three species were considered as possibly or likely to occur within the project site, these were:

- Elegant Parrot (*Neophema elegans*)
- Little Egret (*Egretta garzetta nigripes*)
- Brown Quail (*Coturnix ypsilophora australis*)

None of these species were considered likely to be impacted by the extent of the project as the **Elegant Parrot** and **Little Egret** are typically transient in nature and do not occupy habitats on a permanent basis (Table 7) and the **Brown Quail** requires dense undergrowth which is not present within the project site. A list of all fauna species with historical records within 5 km of the project site is provided in Appendix 4.

4.2.7 Commonwealth listed migratory species.

Sixty-three migratory species were highlighted as part of the search (Table 7) and most of these species were associated with the Adelaide International Bird Sanctuary National Park - Winaityinaityi Pangkara. The park is located at the southern end of the East Asian-Australasian Flyway (EAAF) which is used by more than 5 million birds every year. 27,000 of these birds stop and rest in the Adelaide International Bird Sanctuary (DEW 2022). Most of these species are unlikely to utilise the project site other than as a brief flyover as a result of the surrounding land use and high levels of disturbance from machinery and heavy vehicles.

4.2.8 Nationally listed marine species

Ninety-seven listed marine species listed under the EPBC Act were identified in the PMST as potentially occurring or having suitable habitat potentially occurring within 5 km of the project site. Thirty-two of these were marine mammals fish and reptiles and were not considered as part of this assessment being entirely terrestrial in nature. The remaining 65 avian species were likely to fly over the area or utilise saltmarsh areas associated with the gulf mangrove systems. The project site was considered unsuitable for migratory bird species due to a lack of foraging and coastal saltmarsh habitat.

Table 7. Threatened and migratory fauna species potentially or known to occur within the project site identified from the PMST (DCCEEW 2023) and Naturemaps (DEW 2022).

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Habitat Use
		Aus.	SA				
BIRDS							
Acanthiza iredalei rosinae	Slender-billed Thornbill	VU	V	1, 2	06/11/2020	Open Chenopod shrublands and samphire shrublands. Historical record well north of project site associated with intact samphire shrublands however the project site itself is a previously degraded and marginally rehabilitated area that is subject to grazing by sheep. The samphire shrubland stands have only very low cover and height and are mixed with planted coastal Tea-tree. The habitat within the project site is overall not suitable for this species and coupled with the existing land use and ongoing disturbance from heavy vehicles and machinery associated with the WWTP it is considered unlikely that the project site supports any suitable habitat for this species.	Unlikely
Aphelocephala leucopsis	Southern Whiteface	VU		1	None	Open woodlands and shrublands where there is an understored of grasses or shrubs, or both. Favours habitat with low tree densities and herbaceous understory litter cover.	Unlikely
Actitis hypoleucos	Common Sandpiper	Mi (W)	R	1, 2	13/12/2014	Coastal tidal salt marshes	Unlikely
Anhinga novaehollandiae	Australasian Darter		R	2	02/12/2012	Freshwater Wetlands	Unlikely
Apus pacificus	Fork-tailed Swift	Mi (M), Ma		1	None	Migratory and aerial species will roost in large tress	Unlikely
Ardea intermedia plumifera	Plumed Egret		R	2	19/01/2012	Wetlands and open grazing country	Unlikely
Ardenna carneipes	Flesh-footed Shearwater	Mi.		1	None	Marine species, comes to islands to nest.	Unlikely
Ardenna grisea	Sooty Shearwater	Mi.		1	None	Marine species, comes to islands to nest.	Unlikely
Arenaria interpres	Ruddy Turnstone	MI (W)	R	1,2	26/02/2006	Coastal shorebird often found around high tide mark amongst wrack on beach	Unlikely
Biziura lobata menziesii	Musk Duck		R	2	13/12/2014	Freshwater wetland species	Unlikely
Botaurus poiciloptilus	Australasian Bittern	EN	E	1,2	25/08/2007	Freshwater wetland species, inhabits swamps and wetlands, largely nocturnal	Unlikely
Bubulcus ibis coromandus	Eastern Cattle Egret		R	2	08/08/2006	Wetlands and open paddocks	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Habitat Use
		Aus.	SA				
Calidris acuminata	Sharp-tailed Sandpiper	Mi (W)		1	None	Wading shorebird	Unlikely
Calidris alba	Sanderling	Mi (W)		1	None	Wading shorebird	Unlikely
Calidris canutus	Red Knot	EN, Mi (W)	E	1, 2	08/02/1998	Wading shorebird	Unlikely
Calidris ferruginea	Curlew Sandpiper	CE, Mi (W)		1,2	02/12/2012	Wading shorebird	Unlikely
Calidris melanotus	Pectoral Sandpiper	Mi (W)	R	1, 2	13/10/2015	Wading shorebird	Unlikely
Calidris pugnax	Ruff		R	2	13/01/2011	Wading shorebird	Unlikely
Calidris ruficollis	Red-necked Stint	Mi (W)		1	None	Wading shorebird	Unlikely
Calidris subminuta	Long-toed Stint	MI (W)	R	1,2	17/01/2006	Wading shorebird	Unlikely
Calidris tenuirostris	Great Knot	CE, Mi (W)	R	1	None	Wading shorebird	Unlikely
Cereopsis novaehollandiae	Cape Barren Goose		R	2	20/03/2004	Cape Barren Goose prefers offshore islands with scrub or pasture, ocean beaches, headlands, margins of lakes, swamps, farm pastures. Cape Barren geese live mostly on small, windswept and generally uninhabited offshore islands	Unlikely
Charadrius bicinctus	Double-banded Plover	Mi (W)		1	None	Wading shorebird	Unlikely
Charadrius leschenaultii	Greater Sand Plover	VU, Mi (W)	R	1	None	Wading shorebird	Unlikely
Charadrius mongolus	Lesser Sand Plover	EN, Mi (W)	R	1	None	Wading shorebird	Unlikely
Charadrius veredus	Oriental Plover	Mi (W)		1	None	Wading shorebird	Unlikely
Cladorhynchus leucocephalus	Banded Stilt		V	2	20/12/2015	Wading shorebird	Unlikely
Coturnix ypsilophora australis	Brown Quail		V	2	13/12/2014	Open flats and grassy plains	Possible
Diomedea antipodensis	Antipodean Albatross	VU, Mi		1	None	Pelagic marine species	Unlikely
Diomedea epomophora	Southern Royal Albatross	VU, Mi	V	1	None	Pelagic marine species	Unlikely
Diomedea exulans	Wandering Albatross	VU, Mi	V	1	None	Pelagic marine species	Unlikely
Diomedea sanfordi	Northern Royal Albatross	EN, Mi		1	None	Pelagic marine species	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Habitat Use
		Aus.	SA				
Egretta garzetta nigripes	Little Egret		R	2	14/10/2020	Wading bird, nearby record within samphire shrublands.	Possible
Falco hypoleucos	Grey Falcon	VU	R	1	None	Distributed sparsely over Australia's arid and semi-arid zones.	Unlikely
Falco subniger	Black Falcon		R	2	14/08/2007	sparsely spread in the inland and across northern, eastern, southern and central Australia. The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas.	Unlikely
Gallinago hardwickii	Latham's Snipe	Mi (W)	R	1,2	23/09/2006	Wading bird, likely in salt fields areas but no samphire shrubland	Unlikely
Gallinago megala	Swinhoe's Snipe	Mi (W)		1	None	Wading bird	Unlikely
Gallinago stenura	Pin-tailed Snipe	Mi (W)		1	None	Wading bird	Unlikely
Grantiella picta	Painted Honeyeater	VU	V	1	None	Wading bird	Unlikely
Haematopus fuliginosus fuliginosus	Sooty Oystercatcher		R	2	26/11/2014	Coastal shorebird, likely to occur along coastal fringe and around nearby Torrens Island. Unlikely within project site.	Unlikely
Haematopus longirostris	Pied Oystercatcher		R	2	26/11/2014	Coastal shorebird, likely to occur along coastal fringe and around Torrens Island	Unlikely
Hieraaetus morphnoides	Little Eagle		V	2	19/06/2005	The Little Eagle is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest.	Unlikely
Hirundapus caudacutus	White-throated Needletail	VU, Mi	V	1	None	Largely aerial species, may roost locally in large trees	Unlikely
Limicola falcinellus	Broad-billed Sandpiper	Mi (W)		1	None	Wading species, likely in salt pan areas	Unlikely
Limosa lapponica baueri	Bar Tailed Godwit	VU, Mi (W)	R	1, 2	28/03/2010	Wading species, likely in salt pan areas	Unlikely
Limosa limosa	Black-tailed Godwit	Mi (W)	R	1,2	02/04/2011	Wading species, likely in salt pan areas	Unlikely
Macronectes giganteus	Southern Giant Petrel	EN, Mi	V	1	None	Pelagic marine species	Unlikely
Macronectes halli	Northern Giant Petrel	VU, Mi		1	None	Pelagic marine species	Unlikely
Melanodryas cucullata cucullata	South-eastern Hooded Robin	EN	R	1	None	Prefer dry eucalypt and acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer. Sometimes occur in tall, dense heaths with scattered open areas.	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Habitat Use
		Aus.	SA				
Melithreptus gularis gularis	Black-chinned Honeyeater		V	2	11/09/2007	Occupies mostly upper levels of drier open forests or woodlands dominated by box bark Eucalypts,	Unlikely
Motacilla cinerea	Grey Wagtail	Mi (T),		1	None	Vagrant only	Unlikely
Motacilla flava	Yellow Wagtail	Mi (T),		1	None	Vagrant only	Unlikely
Myiagra cyanoleuca	Satin Flycatcher	Mi (T)		1	None	Recorded in woodlands	Unlikely
Neophema chrysogaster	Orange-bellied Parrot	CE	E	1	None	Formerly widespread along coastal margins and samphire marshes now only recorded along the southern Victorian coastline mostly around the Bellarine Peninsula and breeding areas at Melaleuca Tasmania. Remnants important in the event that population recovers.	Unlikely
Neophema chrysostoma	Blue-winged Parrot	VU	V	1	None	Inhabit a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. Can also be seen in altered environments such as airfields, golf-courses and paddocks.	Possible
Neophema elegans elegans	Elegant Parrot		R	2	13/01/2011	Occupies woodlands, mallee and open shrublands	Likely
Numenius madagascariensis	Eastern Curlew	CE, Mi (W)	E	1,2	02/12/2012	Coastal Shorebird	Unlikely
Numenius minutus	Little Whimbrel	Mi (W)		1	None	Coastal Shorebird	Unlikely
Numenius phaeopus	Whimbrel	Mi (W)	R	1,2	26/02/2006	Coastal Shorebird records in proximity to project site on samphire shrubland community.	Unlikely
Oxyura australis	Blue-billed Duck		R	2	02/12/2012	Wetlands	Unlikely
Pachyptila turtur subantarctica	Fairy Prion	VU		1	None	Pelagic marine species	Unlikely
Pandion haliaetus	Osprey	Mi (W),	E	1	None	Ospreys require extensive areas of open fresh, brackish or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes.	Unlikely
Pedionomus torquatus	Plains-wanderer	CE	E	1	None	Open plains in arid and semi-arid areas	Unlikely
Pezoporus occidentalis	Night Parrot	EN	E	1	None	Extinct in area	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Habitat Use
		Aus.	SA				
Phalaropus lobatus	Red-necked Phalarope	Mi (W)		1	None	Migratory wetland species	Unlikely
Philomachus pugnax	Ruff (Reeve)	Mi (W)		1	None	Migratory wetland species	Unlikely
Phoebetria fusca	Sooty Albatross	VU, Mi	E	1	None	Pelagic marine species	Unlikely
Plegadis falcinellus	Glossy Ibis		R	2	01/12/2004	The Glossy Ibis requires shallow water and mudflats, so is found in well-vegetated wetlands, floodplains, mangroves and rice fields	Unlikely
Pluvialis fulva	Pacific Golden Plover	Mi (W)	R	1,2	25/01/2007	Migratory wetlands species likely in adjacent salt pans and saline wetlands	Unlikely
Pluvialis squatarola	Grey Plover	Mi (W)		1	None	Migratory wetlands species likely in adjacent salt pans and saline wetlands	Unlikely
Podiceps cristatus cristatus	Great Crested Grebe		R	2	13/12/2014	Wetlands from rivers and lakes to estuaries and sheltered bays, but favours large, deep, open bodies of fresh water	Unlikely
Rostratula australis	Australian Painted Snipe	EN, Ma	E	1, 2	22/11/2004	Migratory wetlands species likely in adjacent salt pans and saline wetlands	Unlikely
Spatula rhynchotis	Australasian Shoveler		R	2	09/04/2016	Wetland's species	Unlikely
Stagonopleura guttata	Diamond Firetail	VU	V	2	02/12/2012	Open grassy woodland, heath and farmland or grassland with scattered trees.	Unlikely
Sternula albifrons	Little Tern	Mi		1, 2	24/11/2005	The Little Tern is mainly coastal, being found on beaches, sheltered inlets, estuaries, lakes, sewage farms, lagoons, river mouths and deltas	Possible, as fly over
Sternula nereis nereis	Australian Fairy Tern	VU	E	1,2	02/12/2012	Found on coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries and lagoons. It favours both fresh and saline wetlands and near-coastal terrestrial wetlands, including lakes and salt-ponds.	Possible, as fly over
Stictonetta naevosa	Freckled Duck		V	2	09/09/2017	Freshwater wetlands	Unlikely
Thalassarche carteri	Indian Yellow-nosed Albatross	VU, Mi		1	None	Pelagic marine species	Unlikely
Thalassarche cauta	Shy Albatross	EN, Mi	V	1	None	Pelagic marine species	Unlikely
Thalassarche impavida	Campbell Albatross,	VU, Mi		1	None	Pelagic marine species	Unlikely
Thalassarche melanophris	Black-browed Albatross	VU, MI	ssp.	1	None	Pelagic marine species	Unlikely

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Habitat Use
		Aus.	SA				
Thalassarche steadi	White-capped Albatross	VU, Mi	V	1	None	Pelagic marine species	Unlikely
Thinornis cucullatus cucullatus	Hooded Plover	VU	V	1	None	Occurs mainly on sandy ocean beaches, just on the tide line. Total population in SA is approx. 540 birds.	Unlikely
Tringa brevipes	Grey-tailed Tattler	Mi (W)	R	1, 2	20/03/2004	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
Tringa glareola	Wood Sandpiper	Mi (W)	R	1,2	18/03/2006	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
Tringa nebularia	Common Greenshank	Mi (W)		1	None	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
Tringa stagnatilis	Marsh Sandpiper	Mi (W)		1	None	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
Xenus cinereus	Terek Sandpiper	Mi (W)	R	1,2	04/04/2012	Migratory wetlands species, likely in salt pans and tidal salt marsh	Unlikely
REPTILES							
Caretta caretta	Loggerhead Turtle	EN, Mi (Ma)	E	1	None	Marine Species	Unlikely
Chelonia mydas	Green Turtle	VU, Mi (Ma)	V	1,2	22/12/2008	Marine Species	Unlikely
Dermochelys coriacea	Leatherback Turtle	EN, MI (Ma)	V	1	None	Marine Species	Unlikely
Tiliqua adelaidensis	Pygmy Blue-tongue Lizard	EN	E	1	None	Remnant native grassland or grassy woodland with a sparse overstorey of trees.	Unlikely
MAMMALS							
Balaenoptera edeni	Bryde's Whale	Mi (M)		1	None	Marine Species	Impossible
Caperea marginata	Pygmy Right Whale	Mi (M)		1	None	Marine Species	Impossible
Eubalaena australis	Southern Right Whale	EN	V	1	None	Marine Species	Impossible
Lagenorhynchus obscurus	Dusky Dolphin	Mi (M)		1	None	Marine Species	Impossible
Megaptera novaeangliae	Humpback Whale	VU, Mi (Ma)	V	1	None	Marine Species	Impossible

Scientific name	Common name	Conservation status		Source	Last record (year)	Distribution and habitat preferences	Likelihood of Habitat Use
		Aus.	SA				
Neophoca cinerea	Australian Sea-lion,	VU	V	1	None	About 80 per cent of the world's Australian Sea-lion population occurs in SA. These animals travel large distances to find food but return to the same places to rest on land.	Unlikely
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R	1,2	25/02/2020	The distribution of the Grey-headed Flying Fox has contracted in the north of Australia, and expanded in the south, with the roosting colony at Botanic Park first recorded in 2010. Grey-headed Flying Foxes forage over a wide area, with individuals capable of travelling 40 km between their roost and feeding sites in a night feeding on flowers fruits and nectar.	Possible
SHARKS							
Carcharodon carcharias	Great White Shark	VU, Mi (Ma)		1	None	Marine Species	Impossible
Lamna nasus	Mackerel Shark	Mi (MA)		1	None	Marine Species	Impossible
FISH							
Thunnus maccoyii	Southern Bluefin Tuna	CD		1	None	Marine Species	Impossible
Seriolella brama	Blue Warehou	CD		1	None	Marine Species	Impossible

Conservation status: Aus.: Australia (Environment Protection and Biodiversity Conservation Act 1999). SA: South Australia (National Parks and Wildlife Act 1972). Conservation codes: CD: Conservation Dependent. CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. Mi: Migratory, Ma: Marine, T: Terrestrial, W: Wetland species.

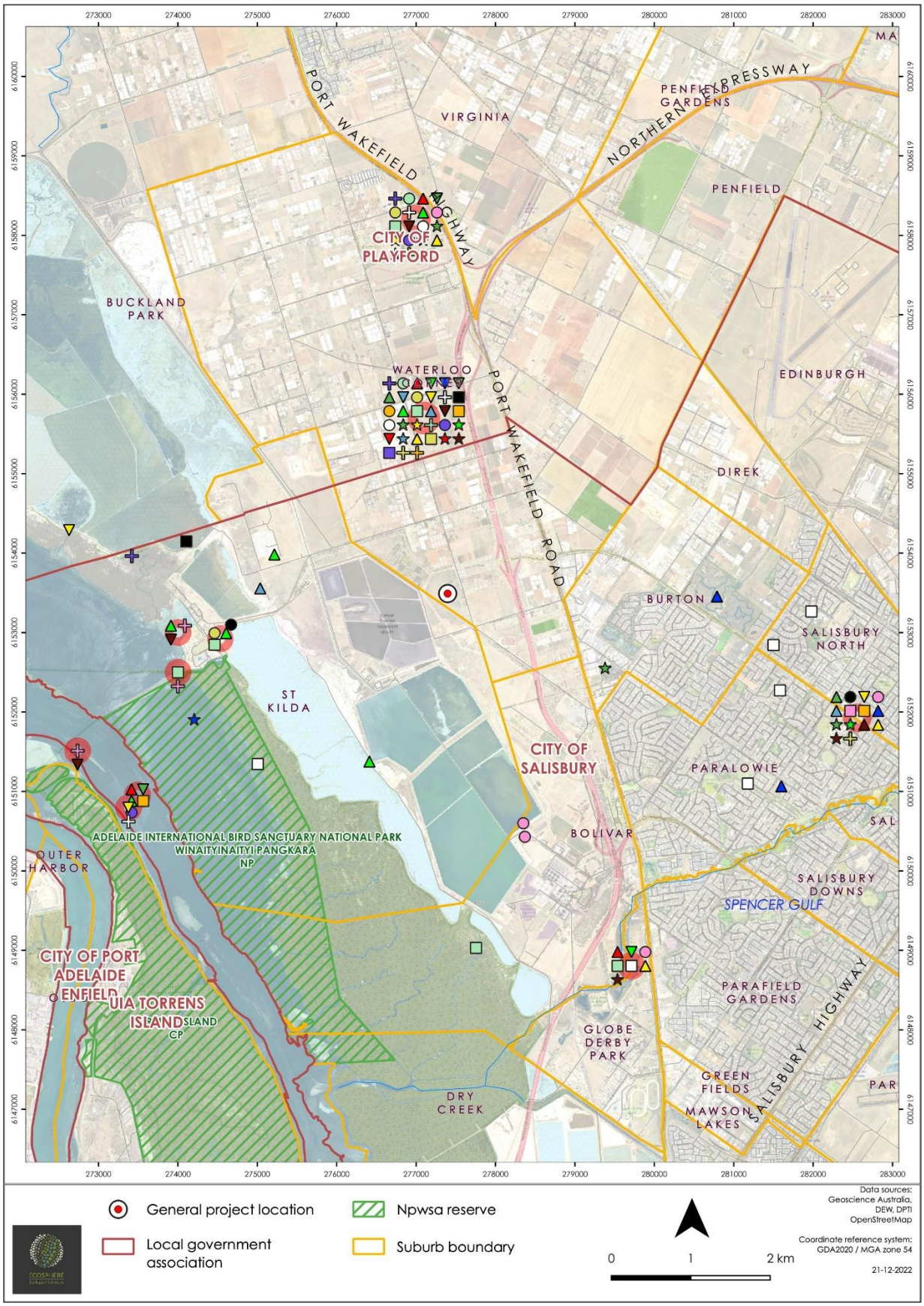


Figure 11. National and state conservation significant fauna observations within 5km of project site.

Over lapping data cluster origin

Threatened fauna (BDBSA records, number of records per point not represented)

- Australasian Bittern (*Botaurus poiciloptilus*) AUS : EN, SA : E
- Australasian Darter (*Anhinga novaehollandiae novaehollandiae*) SA : R
- Australasian Shoveler (*Spatula rhynchotis*) SA : R
- Australian Painted-snipe (*Rostratula australis*) AUS : EN, SA : E
- Banded Stilt (*Cladorhynchus leucocephalus*) SA : V
- Black Falcon (*Falco subniger*) SA : R
- Black-chinned Honeyeater (*Melithreptus gularis*) SA : R
- Black-tailed Godwit (*Limosa limosa melanuroides*) SA : R
- Blue-billed Duck (*Oxyura australis*) SA : R
- Brown Quail (*Coturnix ypsilophora australis*) SA : V
- Cape Barren Goose (*Cereopsis novaehollandiae novaehollandiae*) SA : R
- Common Sandpiper (*Actitis hypoleucos*) SA : R
- Curlew Sandpiper (*Calidris ferruginea*) AUS : CR, SA : E
- Eastern Cattle Egret (*Bubulcus ibis coromandus*) SA : R
- Elegant Parrot (*Neophema elegans elegans*) SA : R
- Fairy Tern (*Sternula nereis nereis*) AUS : VU, SA : E
- Far Eastern Curlew (*Numenius madagascariensis*) AUS : CR, SA : E
- Freckled Duck (*Stictonetta naevosa*) SA : V
- Glossy Ibis (*Plegadis falcinellus*) SA : R
- Great Crested Grebe (*Podiceps cristatus australis*) SA : R
- Green Sea Turtle (*Chelonia mydas*) AUS : VU, SA : V
- Grey-headed Flying-fox (*Pteropus poliocephalus*) AUS : VU, SA : R
- Grey-tailed Tattler (*Tringa brevipes*) SA : R
- Latham's Snipe (*Gallinago hardwickii*) SA : R
- Little Eagle (*Hieraaetus morphnoides*) SA : V
- Little Egret (*Egretta garzetta nigripes*) SA : R
- Little Tern (*Sternula albifrons sinensis*) SA : E
- Long-toed Stint (*Calidris subminuta*) SA : R
- Musk Duck (*Biziura lobata menziesi*) SA : R
- Pacific Golden Plover (*Pluvialis fulva*) SA : R
- Pectoral Sandpiper (*Calidris melanotos*) SA : R
- Pied Oystercatcher (*Haematopus longirostris*) SA : R
- Plumed Egret (*Ardea intermedia plumifera*) SA : R
- Red Knot (ssp. rogersi) (*Calidris canutus rogersi*) SA : E
- Ruddy Turnstone (*Arenaria interpres interpres*) SA : R
- Ruff (*Calidris pugnax*) SA : R
- Samphire Thornbill or Slender-billed Thornbill Gulf St Vincent) (*Acanthiza iredalei rosinae*) AUS : VU, SA : V
- Sooty Oystercatcher (*Haematopus fuliginosus fuliginosus*) SA : R
- Terek Sandpiper (*Xenus cinereus*) SA : R
- Whimbrel (*Numenius phaeopus variegatus*) SA : R
- Wood Sandpiper (*Tringa glareola*) SA : R

Figure 12. Threatened fauna species legend.

4.3 Cumulative impact

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must consider the potential cumulative impact, both direct and indirect, that is reasonably likely to result from a proposed clearance activity.

Under the current proposal the entirety of the project site is included for clearance accounting for cumulative impacts associated with the operation of an industrial plant. Offsite impacts such as dust etc would only drift onto other areas used for industrial purposes and the WWTP. No cumulative impacts area expected from this proposal.

4.4 Address the Mitigation Hierarchy

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.

a) Avoidance – outline measures taken to avoid clearance of native vegetation.

The project has been designed to minimise clearance of native vegetation where practicable. The stormwater channel runs along the eastern boundary and with its current design, would require some vegetation clearance. However, the stormwater channel design is maturing with ongoing collaboration with stakeholders, including SA Water and Council. Collaboration with the City of Playford Council includes discussions with regard to how stormwater design along Robinson Road can fit within the Councils long term planning for broader stormwater management. Final siting and design of the stormwater channel will aim to minimise clearing of native vegetation and maintain the screen along the eastern boundary, where practicable.

b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).

The surrounding land use means that adjoining vegetation is largely disturbed and that disturbance to surrounding areas is not likely to place added pressure on areas of vegetation.

c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.

Any vegetation outside of the project footprints will be retained and managed for weeds and enhanced in the absence of grazing pressure from sheep.

d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.

The NVC will only consider an offset once avoidance, minimization and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.

4.5 Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

Principle of clearance	Considerations
Principle 1a - it comprises a high level of diversity of plant species	Relevant information Very low species richness with only highly disturbance resistant species emergent as understorey to amenity shrub and tree plantings. Association 4 (native species diversity score: 16) has a higher coverage of samphire and lower weed invasion due to annual wetting drowning many species not tolerant of wet and saline conditions.
	Assessment against the principles Association 4 is at variance with this principle
	Moderating factors that may be considered by the NVC. Only a small patch (0.75ha) of habitat is present which is surrounded by highly disturbed land use.
Principle 1b - significance as a habitat for wildlife	Relevant information A total of 42 fauna species had historical BDBSA records within and surrounding the project site. No species of conservation significance were recorded during field assessments within the project footprint over two survey periods. Three species of national conservation significance were considered to possibly occur within the project site. • Grey-headed Flying-fox (*Pteropus Poliocephalus*) • Blue-winged Parrot (*Neophema chrysostoma*) • Fairy Tern (*Sternula nereis nereis*) (Flyover only) A further three species of state conservation significance were considered to possibly occur within the project site. • Elegant Parrot (*Neophema elegans*) • Little Egret (*Egretta garzetta nigripes*) • Brown Quail (*Coturnix ypsilophora australis*) Threatened Fauna Score – The threatened fauna score for all associations was 0.1. Unit biodiversity Scores ranged from 32.07 down to 3.12.
	Assessment against the principles Seriously at Variance Vegetation associations 4, 5, 6, 8, 9, 10 were seriously at variance with this principle.
	Moderating factors that may be considered by the NVC. While the area may provide habitat for some threatened fauna species it is likely to be as a transient period only. The surrounding land use of a WWTP and horticulture means that there is a very low remnancy surrounding the area and that species moving through the area are likely to preferentially use even degraded zones such as the project site despite it being grazed as a farming allotment and little care shown for its ongoing maintenance as a vegetation stratum. There is another large, vegetated area to the north of the project site and provided this is retained in the longer term, development of the project site is not likely to lead to a long-term decline in threatened species populations.
Principle 1c - plants of a rare,	Relevant information No threatened flora recorded or likely to ever utilise this area while being used as a farming allotment.

vulnerable or endangered species	Assessment against the principles Not At Variance
	Moderating factors that may be considered by the NVC
***Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered*:**	Relevant information No threatened ecological communities were recorded within the project site. The area has been subject to long term degradation and the only remnant communities within the local area are samphire and Mangroves associated with the coastal fringe. Threatened Community Score – 0, No threatened communities present.
	Assessment against the principles Not at variance
	Moderating factors that may be considered by the NVC
Principle 1e - it is significant as a remnant of vegetation in an area which has been extensively cleared.	Relevant information Remnancy in the St Vincent IBRA Subregion is 8%. Remnancy in the Mallala Environmental Association is 3% and, in the Parham, Environmental Association is 44%. Total Biodiversity Score – Total biodiversity score 232.99
	Assessment against the principles The clearance of vegetation within the Project is considered Seriously at Variance
	Moderating factors that may be considered by the NVC. This site has historically been mostly cleared and used for farming. The regeneration of disturbance resistant species is not unusual for areas such as this where heavy saline soils will grow little else other than annual grasses during winter.
Principle 1f - it is growing in, or in association with, a wetland environment.	Relevant information Prior to this area being highly modified through evaporation and salt pans, the project site was likely to be right at the edge of the supra tidal Zone. A 'sort of' wetland remains in the southern section of the project site however this is from rainfall collecting and having nowhere to naturally drain.
	Assessment against the principles Seriously at Variance Vegetation association 4 is theoretically a wetland and is evidenced by the persistence of Tecticornia shrubland that is the only species that can persist longer term in the area dependent on how wet each year is. The wetland composition is likely to flux from year-to-year dependent on the water depth and length of time that water remains in the wetland.
	Moderating factors that may be considered by the NVC. The wetland provides little to no habitat value as with the grazing that occurs in the site the bare ground is mud and is likely to provide little foraging value for wetland species.
Principle 1g - it contributes significantly to the amenity of the area in which it is growing or is situated.	Relevant information The boundary screen provides good amenity value however the useful lifespan of many of these trees is nearing completion with many trees either falling over or shedding limbs.
	N/A
	Moderating factors that may be considered by the NVC. The primary amenity value is provided by planted trees rather than the native vegetation which does not present as an attractive community.

4.6 Risk Assessment

Determine the level of risk associated with the application.

Total clearance	No. of trees	n/a
	Area (ha)	22.22
	Total biodiversity Score	253.18
Seriously at variance with principle 1(b), 1(c) or 1 (d)		1(b)
Risk assessment outcome		Level 4

4.7 NVC Guidelines

Provide any other information that demonstrates that the clearance complies with any relevant NVC guidelines related to the activity.

5. Clearance summary

Clearance Area(s) Summary Table

Block	Site	Species Diversity Score	Threatened Ecological Community Score	Threatened Plant Score	Threatened Fauna Score	UBS	Area (Ha)	Total Biodiversity Score	Loss Factor	Loadings	Reductions	SEB Points Required	SEB Payment	Admin Fee
1	1	6	1	0	0.1	3.12	0.64	2.00	1			2.10	$1,200.17	$66.01
1	2	6	1	0	0.1	6.23	3.41	21.24	1			22.31	$12,768.77	$702.28
1	3	8	1	0	0.1	22.23	3.13	69.58	1			73.06	$41,820.61	$2,300.13
1	4	16	1	0	0.1	29.6	0.75	22.20	1			23.31	$13,343.19	$733.88
1	5	10	1	0	0.1	15.15	3.68	55.75	1			58.54	$33,509.43	$1,843.02
1	6	6	1	0	0.1	7.79	9.65	75.17	1			78.93	$45,182.61	$2,485.04
1	8	10	1	0	0.1	17.66	0.21	3.71	1			3.89	$2,229.03	$122.60
1	9	10	1	0	0.1	4.23	0.65	2.75	1			2.89	$1,652.57	$90.89
1	10	6	1	0	0.1	7.75	0.1	0.78	1			0.81	$465.81	$25.62
						Total	22.22	**253.1796**				**265.84**	**$152,172.18**	**$8,369.47**

Totals Summary Table

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	253.18	265.84	$152,172.18	$8,369.47	$160,541.65

Economies of Scale Factor	0.5
Rainfall (mm)	428

6. Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

☐ Establish a new SEB Area on land owned by the proponent.

☐ Use SEB Credit that the proponent has established. Provide the SEB Credit Ref. No. _____

☐ Apply to have SEB Credit assigned from another person or body. The application form needs to be submitted with this Data Report.

☐ Apply to have an SEB to be delivered by a Third Party. The application form needs to be submitted with this Data Report.

☒ Pay into the Native Vegetation Fund.

PAYMENT SEB

If a proponent proposes to achieve the SEB by paying into the Native Vegetation Fund, summary information must be provided on the amount required to be paid and the manner of payment:

Payment of $151,172.18 into the Native Vegetation Fund plus an administration fee of $8,369.47 totalling $160,541.65.

7. Appendices

Appendix 1. Bushland, Rangeland or Scattered Tree Vegetation Assessment Scoresheets associated with the proposed clearance and SEB Area (to be submitted in Excel format)

Appended.

Appendix 2. Flora Species List

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Acacia acinacea	Wreath Wattle			26/09/2010
Acacia cyclops	Western Coastal Wattle			14/02/2018
Acacia ligulata	Umbrella Bush			24/11/1999
Acacia sp.	Wattle			25/12/1997
Acacia victoriae ssp.	Elegant Wattle			20/08/2010
Aeonium arboreum	Tree Aeonium			18/04/2011
Aizoon pubescens	Coastal Galenia			14/02/2018
Aizoon sp.	Galenia			30/11/1999
Anredera cordifolia	Madeira Vine			11/04/2022
Arctotheca calendula	Cape Weed			28/09/2010
Arundo donax	Giant Reed			24/11/1999
Asphodelus fistulosus	Onion Weed			16/02/1999
Atriplex paludosa ssp.	Marsh Saltbush			20/08/2010
Atriplex paludosa ssp. cordata	Marsh Saltbush			24/11/1999
Atriplex paludosa ssp. paludosa	Marsh Saltbush			20/08/2010
Atriplex prostrata	Creeping Saltbush			14/02/2018
Atriplex semibaccata	Berry Saltbush			14/02/2018
Atriplex suberecta	Lagoon Saltbush			20/08/2010
Austrostipa nitida	Balcarra Spear-grass			26/09/2010
Austrostipa nodosa	Tall Spear-grass			20/08/2010
Austrostipa puberula	Fine-hairy Spear-grass			14/11/1996
Austrostipa scabra ssp.	Rough Spear-grass			28/09/2010
Austrostipa sp.	Spear-grass			23/11/1999
Avena barbata	Bearded Oat			30/11/1999
Avena sp.	Oat			14/02/2018
Avicennia marina ssp. marina	Grey Mangrove			27/11/2018
Brassica sp.				16/02/1999
Brassica tournefortii	Wild Turnip			20/08/2010
Bromus diandrus	Great Brome			10/11/2013
Bromus sp.	Brome			16/02/1999
Casuarinaceae sp.	Sheoak Family			16/02/1999
Cenchrus ciliaris	Buffel Grass			20/03/2015
Cenchrus clandestinus	Kikuyu			24/11/1999
Chenopodium album	Fat Hen			18/04/2011
Chenopodium sp.	Goosefoot			24/11/1999

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Chloris truncata	Windmill Grass			13/08/2010
Compositae sp.	Daisy Family			25/12/1997
Convolvulus erubescens complex				20/08/2010
Conyza canadensis var. canadensis	Canadian Fleabane			20/08/2010
Critesion sp. (NC)	Barley-grass			17/12/1997
Cynara cardunculus ssp. flavescens	Artichoke Thistle			25/06/2021
Cynodon dactylon (NC)	Couch			24/11/1999
Cynodon sp.	Couch			14/02/2018
Cyperus eragrostis	Drain Flat-sedge			18/04/2011
Danthonia sp. (NC)	Wallaby-grass			10/02/1999
Dichanthium sericeum ssp.	Silky Blue-grass			20/08/2010
Dichanthium sericeum ssp. sericeum	Silky Blue-grass			24/08/2010
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface			14/11/1996
Echinochloa crus-galli	Common Barnyard Grass			18/04/2011
Echium plantagineum	Salvation Jane			30/11/1999
Elytrigia repens	Twitch Grass			3/02/1996
Enchylaena tomentosa var.	Ruby Saltbush			20/08/2010
Enchylaena tomentosa var. tomentosa	Ruby Saltbush			14/02/2018
Enteropogon acicularis	Umbrella Grass			23/11/1999
Eragrostis cilianensis	Stink Grass			18/04/2011
Erodium cicutarium	Cut-leaf Heron's-bill			20/08/2010
Erodium moschatum	Musky Herons-bill			28/09/2010
Eucalyptus camaldulensis ssp. camaldulensis	River Red Gum			14/02/2018
Eucalyptus leucoxylon ssp.	South Australian Blue Gum			14/02/2018
Eucalyptus porosa	Mallee Box			14/02/2018
Eucalyptus sp.				14/02/2018
Eucalyptus torquata	Coral Gum			14/02/2018
Frankenia pauciflora var. gunnii	Southern Sea-heath			14/11/1996
Fraxinus angustifolia ssp. angustifolia	Narrow-leaved Ash			14/02/2018
Gahnia filum	Thatching Grass			14/11/1996
Gazania linearis	Gazania			18/04/2011
Glandularia aristigera	Mayne's Pest			23/11/1999
Gramineae sp.	Grass Family			25/12/1997
Halosarcia sp. (NC)	Samphire			16/02/1999
Heliotropium europaeum	Common Heliotrope			14/02/2018
Hemichroa pentandra	Trailing Hemichroa			23/11/2018
Hordeum glaucum	Blue Barley-grass			17/12/1997
Hordeum marinum	Sea Barley-grass			20/08/2010
Hordeum vulgare	Barley			30/11/1999
Hordeum vulgare ssp. (NC)				10/02/1999
Hornungia procumbens	Oval Purse			14/11/1996
Isolepis marginata	Little Club-rush			14/02/2018
Juncus acutus	Sharp Rush			14/02/2018

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Juncus bufonius	Toad Rush			14/11/1996
Juncus radula	Hoary Rush		V	24/09/1999
Lactuca serriola (NC)	Prickly Lettuce			24/11/1999
Lactuca sp.	Lettuce			14/02/2018
Lepidium africanum	Common Peppercress			20/08/2010
Limonium companyonis	Sea-lavender			18/04/2011
Limonium diffusum				3/02/1996
Limonium lobatum	Winged Sea-lavender			20/08/2010
Limonium sinuatum	Notch-leaf Sea-lavender			3/02/1996
Lolium rigidum	Wimmera Ryegrass			18/04/2011
Lolium sp.	Ryegrass			10/02/1999
Lomandra multiflora ssp. dura	Hard Mat-rush			23/11/1999
Lycium ferocissimum	African Boxthorn			22/01/2022
Lythrum sp.	Loosestrife			20/08/2010
Maireana aphylla	Cotton-bush			27/05/2022
Maireana brevifolia	Short-leaf Bluebush			14/02/2018
Maireana oppositifolia	Salt Bluebush			29/11/2018
Maireana sp.	Bluebush/Fissure-plant			25/12/1997
Marrubium vulgare	Horehound			15/06/2021
Marsilea drummondii	Common Nardoo			27/05/2022
Medicago polymorpha	Burr-medic			28/09/2010
Mesembryanthemum crystallinum	Common Iceplant			16/02/1999
Mesembryanthemum nodiflorum	Slender Iceplant			14/11/1996
Nitraria billardierei	Nitre-bush			14/02/2018
Olea europaea ssp.	Olive			14/02/2018
Olea europaea ssp. europaea	Olive			4/06/2021
Onopordum acanthium	Scotch Thistle			14/02/2018
Opuntia sp. (NC)	Prickly Pear			23/11/1999
Opuntia spp.	Prickly Pear			4/06/2021
Panicum decompositum var. decompositum	Native Millet			20/08/2010
Panicum hillmanii	Witch-grass			18/04/2011
Parapholis incurva	Curly Ryegrass			14/11/1996
Paspalum vaginatum	Salt-water Couch			16/02/1999
Phalaris sp.	Canary Grass			23/11/1999
Pinus sp.	Pine			17/12/1997
Piptatherum miliaceum	Rice Millet			16/02/1999
Plantago lanceolata var. lanceolata	Ribwort			28/09/2010
Plantago major	Greater Plantain			10/02/1999
Plantago sp.	Plantain			30/11/1999
Polygonum aviculare	Wireweed			14/02/2018
Polygonum aviculare (NC)	Wireweed			16/02/1999
Polypogon monspeliensis	Annual Beard-grass			19/10/2017
Puccinellia distans	Reflexed Poa			2/02/1995

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Raphanus raphanistrum	Wild Radish			28/09/2010
Rapistrum rugosum ssp. rugosum	Turnip Weed			18/04/2011
Rumex sp.	Dock			24/11/1999
Rytidosperma caespitosum (NC)	Common Wallaby-grass			20/08/2010
Rytidosperma pilosum	Velvet Wallaby-grass			28/09/2010
Salicornia quinqueflora ssp. quinqueflora	Beaded Samphire			27/03/2020
Salsola australis	Buckbush			14/02/2018
Scabiosa atropurpurea	Pincushion			10/02/1999
Sclerolaena muricata var.	Five-spine Bindyi			27/05/2022
Sclerostegia sp. (NC)	Samphire			16/02/1999
Secale cereale	Rye			14/02/2018
Senecio glossanthus	Annual Groundsel			21/10/2013
Senecio glossanthus (NC)	Annual Groundsel			14/11/1996
Senecio sp.	Groundsel			10/02/1999
Setaria jubiflora	Warrego Summer-grass			20/08/2010
Sisymbrium orientale	Indian Hedge Mustard			20/08/2010
Sisymbrium sp.	Wild Mustard			24/11/1999
Solanum elaeagnifolium	Silver-leaf Nightshade			11/03/2022
Sonchus oleraceus	Common Sow-thistle			14/11/1996
Sonchus sp.	Sow-thistle			10/02/1999
Sorghum halepense	Johnson Grass			18/04/2011
Spergularia marina	Salt Sand-spurrey			14/11/1996
Spergularia marina (NC)	Salt Sand-spurrey			14/11/1996
Sphenopus divaricatus	Wedge-foot Grass			14/11/1996
Suaeda australis	Austral Seablite			27/03/2020
Suaeda baccifera	Seablite			27/03/2020
Tamarix aphylla	Athel Pine			14/02/2018
Tamarix aphylla (NC)	Athel Pine			25/12/1997
Tecticornia arbuscula	Shrubby Samphire			29/11/2018
Tecticornia flabelliformis	Bead Samphire	VU	V	25/12/2001
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire			14/11/1996
Tecticornia indica ssp. bidens	Brown-head Samphire			14/11/1996
Tecticornia pergranulata ssp.	Black-seed Samphire			14/02/2018
Tecticornia pergranulata ssp. pergranulata	Black-seed Samphire			14/11/1996
Tecticornia syncarpa	Fused Samphire			14/11/1996
Tribulus terrestris	Caltrop			19/04/2022
Trifolium arvense var. arvense	Hare's-foot Clover			26/09/2010
Trifolium sp.	Clover			25/12/1997
Unidentified sp.				17/12/1997
Vicia sativa ssp.	Common Vetch			28/09/2010
Vittadinia cervicularis var. cervicularis	Waisted New Holland Daisy			20/08/2010
Vulpia bromoides	Squirrel-tail Fescue			20/08/2010

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Vulpia myuros f. myuros	Rat's-tail Fescue			14/11/1996
Wilsonia humilis	Silky Wilsonia			29/11/2018

Appendix 3. Fauna Species List (where applicable)

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Acanthiza iredalei	Slender-billed Thornbill	ssp	ssp	25/01/2007
Acanthiza iredalei rosinae	Samphire Thornbill or Slender-billed Thornbill Gulf St Vincent)	VU	V	6/11/2020
Actitis hypoleucos	Common Sandpiper		R	13/12/2014
Anhinga novaehollandiae novaehollandiae	Australasian Darter		R	2/12/2012
Ardea intermedia plumifera	Plumed Egret		R	19/01/2012
Arenaria interpres interpres	Ruddy Turnstone		R	26/02/2006
Biziura lobata menziesi	Musk Duck		R	13/12/2014
Botaurus poiciloptilus	Australasian Bittern	EN	E	25/08/2007
Bubulcus ibis coromandus	Eastern Cattle Egret		R	8/08/2006
Calidris canutus rogersi	Red Knot (ssp. rogersi)	sp	E	8/02/1998
Calidris ferruginea	Curlew Sandpiper	CR	E	2/12/2012
Calidris melanotos	Pectoral Sandpiper		R	13/10/2015
Calidris pugnax	Ruff		R	13/01/2011
Calidris subminuta	Long-toed Stint		R	17/01/2006
Cereopsis novaehollandiae novaehollandiae	Cape Barren Goose		R	20/03/2004
Chelonia mydas	Green Sea Turtle	VU	V	22/12/2008
Cladorhynchus leucocephalus	Banded Stilt		V	12/10/2015
Coturnix ypsilophora australis	Brown Quail		V	13/12/2014
Egretta garzetta nigripes	Little Egret		R	14/10/2020
Falco subniger	Black Falcon		R	1/08/2007
Gallinago hardwickii	Latham's Snipe		R	23/09/2006
Haematopus fuliginosus fuliginosus	Sooty Oystercatcher		R	26/11/2014
Haematopus longirostris	Pied Oystercatcher		R	26/11/2014
Hieraaetus morphnoides	Little Eagle		V	19/06/2005
Limosa lapponica	Bar-tailed Godwit	ssp	ssp	28/03/2010
Limosa limosa melanuroides	Black-tailed Godwit		R	2/04/2011
Melithreptus gularis	Black-chinned Honeyeater		ssp	11/09/2007
Neophema elegans elegans	Elegant Parrot		R	19/11/2021
Numenius madagascariensis	Far Eastern Curlew	CR	E	2/12/2012
Numenius phaeopus variegatus	Whimbrel		R	26/02/2006
Oxyura australis	Blue-billed Duck		R	2/12/2012
Plegadis falcinellus	Glossy Ibis		R	1/12/2004
Pluvialis fulva	Pacific Golden Plover		R	25/01/2007
Podiceps cristatus australis	Great Crested Grebe		R	13/12/2014
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R	25/02/2020
Rostratula australis	Australian Painted-snipe	EN	E	22/11/2004

Species Name	Common Name	EPBC Act	NPW Act	Most Recent Sighting
Spatula rhynchotis	Australasian Shoveler		R	9/04/2016
Sternula albifrons sinensis	Little Tern		E	24/11/2005
Sternula nereis nereis	Fairy Tern	VU	E	2/12/2012
Stictonetta naevosa	Freckled Duck		V	9/09/2017
Tringa brevipes	Grey-tailed Tattler		R	20/03/2004
Tringa glareola	Wood Sandpiper		R	18/03/2006
Xenus cinereus	Terek Sandpiper		R	4/04/2012

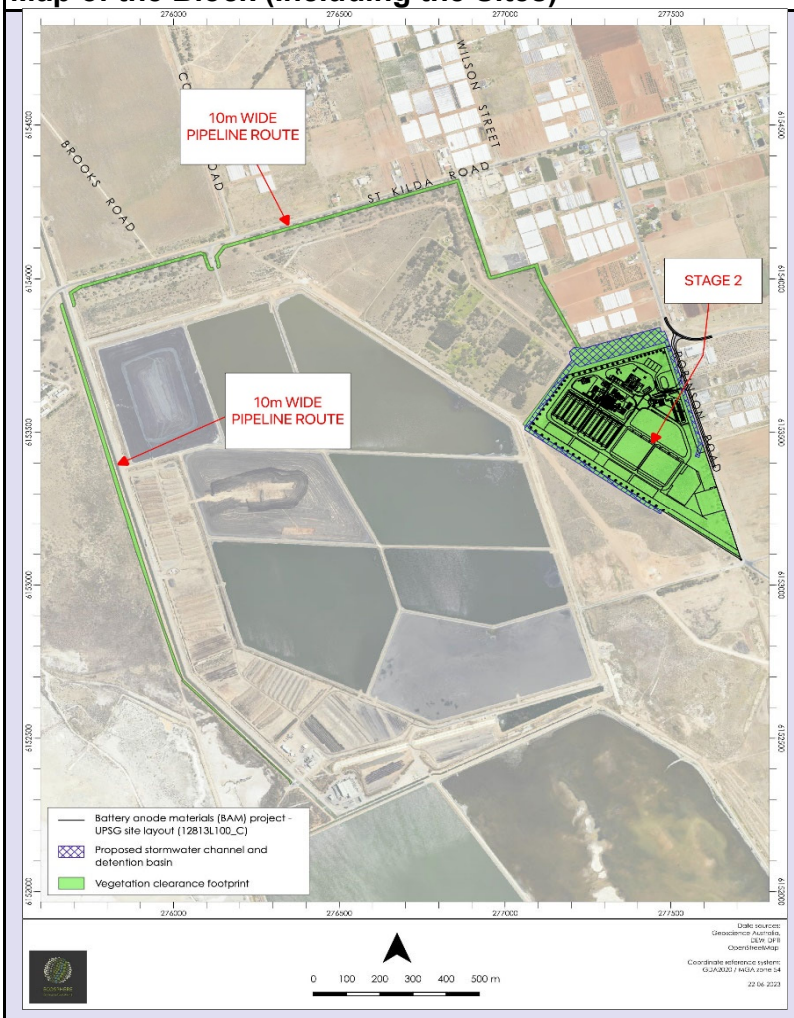
Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor PSG Facility
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	29/06/2022

Map of the Block (Including the Sites)



Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	22
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Aizoon pubescens	Coastal Galenia						*
Enchylaena tomentosa var.	Ruby Saltbush						
Maireana brevifolia	Short-leaf Bluebush						
Maireana aphylla	Cotton-bush						
Avena barbata	Bearded Oat						*
Atriplex suberecta	Lagoon Saltbush						
Lycium ferocissimum	African Boxthorn						*
Arctotheca calendula	Cape Weed						*
Oxalis pes-caprae	Soursob						*
Mesembryanthemum crystallinum	Common Iceplant						*
Moraea setifolia	Thread Iris						*
Lolium perenne	Perennial Ryegrass						*

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	Common Name	EPBC	SA	Past Record	Observed	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Pluvialis fulva	Pacific Golden Plover		R			
Podiceps cristatus	Great Crested Grebe		R			
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R			
Rostratula australis	Australian Painted-snipe	EN	E			
Spatula rhynchotis	Australasian Shoveler		R			
Stagonopleura guttata	Diamond Firetail		V			
Sternula albifrons	Little Tern		E			
Sternula nereis	Fairy Tern	VU	E			
Stictonetta naevosa	Freckled Duck		V			
Tringa brevipes	Grey-tailed Tattler		R			
Tringa glareola	Wood Sandpiper		R			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Actitis hypoleucos	Common Sandpiper		R			
Anhinga novaehollandiae	Australasian Darter		R			
Ardea intermedia	Intermediate Egret		R			
Arenaria interpres	Ruddy Turnstone		R			
Biziura lobata menziesi	Musk Duck		R			
Botaurus poiciloptilus	Australasian Bittern	EN	E			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Calidris canutus rogersi	Red Knot	sp	E			
Calidris ferruginea	Curlew Sandpiper	CR	E			
Calidris melanotos	Pectoral Sandpiper		R			
Calidris pugnax	Ruff		R			
Calidris subminuta	Long-toed Stint		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Chelonia mydas	Green Sea Turtle	VU	V			
Cladorhynchus leucocephalus	Banded Stilt		V			
Coturnix ypsilophora australis	Brown Quail					
Egretta garzetta	Little Egret		R			
Falco subniger	Black Falcon		R			
Gallinago hardwickii	Latham's Snipe		R			
Haematopus fuliginosus	Sooty Oystercatcher		R			
Haematopus longirostris	(Australian) Pied Oystercatche		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	RENPSG01
BCM COMMUNITY	SMLR Co 8.3 – Coastal Swamp Paperbark Low Open Forests & Tall Shrublands of Saline Swamps
VEGETATION ASSOCIATION DESCRIPTION	Myoporum insulare Tall Shrubland
SIZE OF SITE (Ha)	0.64

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	4
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**6.0**
Number of regenerating native species	0
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**0**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Galenia pubescens var. pubescens	3	2	6
Avena spp.	3	2	6
Arctotheca calendula	3	2	6
Mesembryanthemum crystallinum	2	2	4
Lycium ferocissimum	1	3	3
	Cover x Threat		25
Weed Score (max 15) from benchmark community			**3**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	
Shrubs < 0.5	1
Forbs	1
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	2
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**2.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**0**

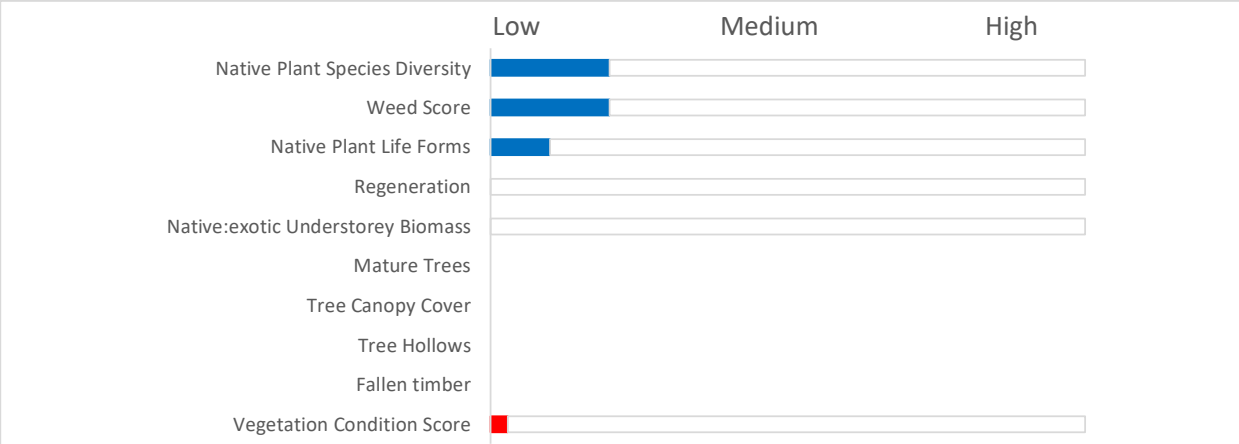
Is the community naturally treeless?	☐
Tree attributes not scored for treeless communities or communities with only emergent trees	

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	10.32
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	62.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**2.32**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	23
State **Vulnerable** species observed or locally recorded (2.5 pt each)	4
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	4
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	3
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**138**
Threatened Fauna Score	**0.1**
CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**2.32**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	3.12
Total Biodiversity Score (Biodiversity Score x hectares)	1.99

Photo Point and Vegetation Survey Location

Direction of the Photo	
South	
GPS Reference	
Datum	GDA94
Zone (52, 53 or 54)	54
Easting (6 digits)	
Northing (7 digits)	
Description	
Complete domination by planted species. Very little cover provided by chenopod shrubs.	

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**2.09**

Approximate hectares required	0.26
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$1,190.27**
Administration fee (GST Inclusive)	**$65.46**

Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor PSG Facility
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	29/06/2022

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	22
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Aizoon pubescens	Coastal Galenia						*
Enchylaena tomentosa var.	Ruby Saltbush						
Maireana brevifolia	Short-leaf Bluebush						
Maireana aphylla	Cotton-bush						
Avena barbata	Bearded Oat						*
Atriplex suberecta	Lagoon Saltbush						
Lycium ferocissimum	African Boxthorn						*
Malva parviflora	Small-flower Marshmallow						*
Moraea setifolia	Thread Iris						*
Lolium perenne	Perennial Ryegrass						*
Mesembryanthemum crystallinum	Common Iceplant						*
Oxalis pes-caprae	Soursob						*
Arctotheca calendula	Cape Weed						*

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	Common Name	EPBC	SA	Past Record	Observed	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Pluvialis fulva	Pacific Golden Plover		R			
Podiceps cristatus	Great Crested Grebe		R			
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R			
Rostratula australis	Australian Painted-snipe	EN	E			
Spatula rhynchotis	Australasian Shoveler		R			
Stagonopleura guttata	Diamond Firetail		V			
Sternula albifrons	Little Tern		E			
Sternula nereis	Fairy Tern	VU	E			
Stictonetta naevosa	Freckled Duck		V			
Tringa brevipes	Grey-tailed Tattler		R			
Tringa glareola	Wood Sandpiper		R			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Actitis hypoleucos	Common Sandpiper		R			
Anhinga novaehollandiae	Australasian Darter		R			
Ardea intermedia	Intermediate Egret		R			
Arenaria interpres	Ruddy Turnstone		R			
Biziura lobata menziesi	Musk Duck		R			
Botaurus poiciloptilus	Australasian Bittern	EN	E			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Calidris canutus rogersi	Red Knot	sp	E			
Calidris ferruginea	Curlew Sandpiper	CR	E			
Calidris melanotos	Pectoral Sandpiper		R			
Calidris pugnax	Ruff		R			
Calidris subminuta	Long-toed Stint		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Chelonia mydas	Green Sea Turtle	VU	V			
Cladorhynchus leucocephalus	Banded Stilt		V			
Coturnix ypsilophora australis	Brown Quail					
Egretta garzetta	Little Egret		R			
Falco subniger	Black Falcon		R			
Gallinago hardwickii	Latham's Snipe		R			
Haematopus fuliginosus	Sooty Oystercatcher		R			
Haematopus longirostris	(Australian) Pied Oystercatche		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	RENPSG02
BCM COMMUNITY	SMLR Co 8.3 – Coastal Swamp Paperbark Low Open Forests & Tall Shrublands of Saline Swamps
VEGETATION ASSOCIATION DESCRIPTION	Mixed amenity plantings over emergent Maireana aphylla
SIZE OF SITE (Ha)	3.41

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	4
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**6.0**
Number of regenerating native species	0
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**0**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Galenia pubescens var. pubescens	3	2	6
Avena spp.	3	2	6
Arctotheca calendula	3	2	6
Moraea setifolia	1	2	2
Lycium ferocissimum	1	3	3
	Cover x Threat		23
Weed Score (max 15) from benchmark community			**3**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	
Shrubs < 0.5	1
Forbs	1
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	2
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**2.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**1**

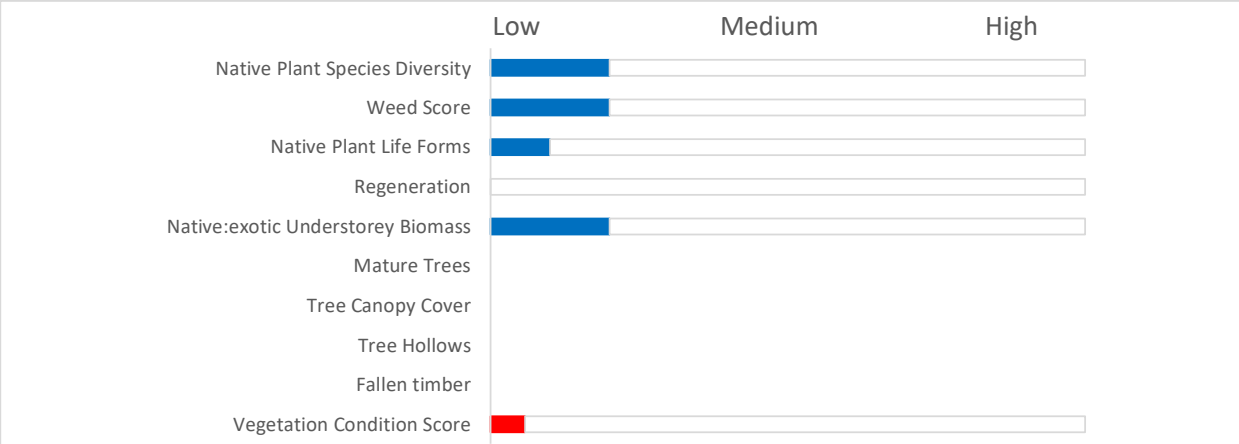
Is the community naturally treeless?	☐
Tree attributes not scored for treeless communities or communities with only emergent trees	

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms
Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	10.32
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	44.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**4.64**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	23
State **Vulnerable** species observed or locally recorded (2.5 pt each)	4
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	4
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	3
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**138**
Threatened Fauna Score	**0.1**
CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**4.64**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	6.23
Total Biodiversity Score (Biodiversity Score x hectares)	21.25

Photo Point and Vegetation Survey Location

Direction of the Photo	
South	
GPS Reference	
Datum	GDA94
Zone (52, 53 or 54)	54
Easting (6 digits)	
Northing (7 digits)	
Description	
Mixed amneity plantings including Euc porosa, E. odorata, E. largiflorens,E. camaldulensis, Acacia salicina, A. paradoxa, A. ligulata, Melaleuca lanceolata, M. halmaturorum, Santalum lanceolatum, Atriplex rhagodioides,	

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**22.31**

Approximate hectares required	2.79
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$12,683.84**
Administration fee (GST Inclusive)	**$697.61**

Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor PSG Facility
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	29/06/2022

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	22
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Aizoon pubescens	Coastal Galenia						*
Enchylaena tomentosa var.	Ruby Saltbush						
Maireana brevifolia	Short-leaf Bluebush				Yes		
Maireana aphylla	Cotton-bush				Yes		
Avena barbata	Bearded Oat						*
Atriplex suberecta	Lagoon Saltbush						
Solanum elaeagnifolium	Silver-leaf Nightshade						*
Tecticornia pergranulata ssp.	Black-seed Samphire				Yes		
Lycium ferocissimum	African Boxthorn						*
Oxalis pes-caprae	Soursob						*
Nitraria billardierei	Nitre-bush						

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	Common Name	EPBC	SA	Past Record	Observed	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Pluvialis fulva	Pacific Golden Plover		R			
Podiceps cristatus	Great Crested Grebe		R			
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R			
Rostratula australis	Australian Painted-snipe	EN	E			
Spatula rhynchotis	Australasian Shoveler		R			
Stagonopleura guttata	Diamond Firetail		V			
Sternula albifrons	Little Tern		E			
Sternula nereis	Fairy Tern	VU	E			
Stictonetta naevosa	Freckled Duck		V			
Tringa brevipes	Grey-tailed Tattler		R			
Tringa glareola	Wood Sandpiper		R			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Actitis hypoleucos	Common Sandpiper		R			
Anhinga novaehollandiae	Australasian Darter		R			
Ardea intermedia	Intermediate Egret		R			
Arenaria interpres	Ruddy Turnstone		R			
Biziura lobata menziesi	Musk Duck		R			
Botaurus poiciloptilus	Australasian Bittern	EN	E			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Calidris canutus rogersi	Red Knot	sp	E			
Calidris ferruginea	Curlew Sandpiper	CR	E			
Calidris melanotos	Pectoral Sandpiper		R			
Calidris pugnax	Ruff		R			
Calidris subminuta	Long-toed Stint		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Chelonia mydas	Green Sea Turtle	VU	V			
Cladorhynchus leucocephalus	Banded Stilt		V			
Coturnix ypsilophora australis	Brown Quail					
Egretta garzetta	Little Egret		R			
Falco subniger	Black Falcon		R			
Gallinago hardwickii	Latham's Snipe		R			
Haematopus fuliginosus	Sooty Oystercatcher		R			
Haematopus longirostris	(Australian) Pied Oystercatche		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	RENPSG03
BCM COMMUNITY	SMLR 3.2 Box Bark Gum and Small Tree Woodlands with an Open Shrub and Grassy Understorey
VEGETATION ASSOCIATION DESCRIPTION	Eucalyotus largiflorens, E. odorata +/- Mixed amenity plantings over emerg
SIZE OF SITE (Ha)	3.13

Benchmarked attributes

(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	6
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**8.0**
Number of regenerating native species	3
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**6**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Galenia pubescens var. pubescens	3	2	6
Avena spp.	3	2	6
Oxalis pes-caprae	3	4	12
Solanum elaeagnifolium	1	2	2
Lycium ferocissimum	1	3	3
	Cover x Threat		29
Weed Score (max 15) from benchmark community			**6**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	2
Shrubs 0.5 - 2m	3
Shrubs < 0.5	2
Forbs	2
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	9
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**8.0**

Non-Benchmarked Attributes

(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**2**

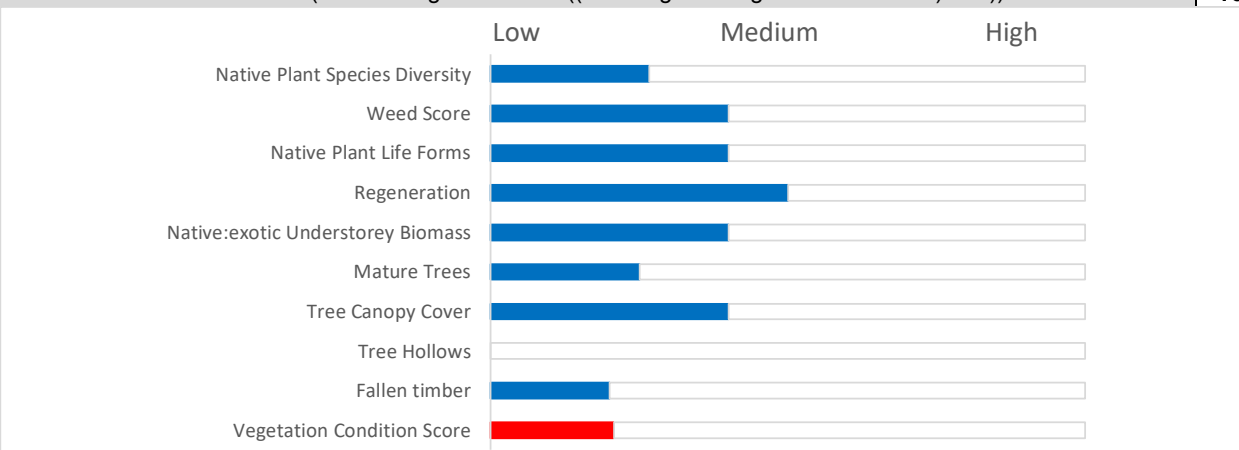
Is the community naturally treeless?	☐
Fallen Timber/Debris (max 5)	**1**
Hollow-bearing trees Score (max 5)	**0**
Mature Tree Score (max 8)	**2**
Tree Canopy Cover Score (max 5)	**2**

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	25.00
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - Biomass score - Tree Canopy Cover Score)exp2/2)	27.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**16.56**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	23
State **Vulnerable** species observed or locally recorded (2.5 pt each)	4
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	4
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	3
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**138**
Threatened Fauna Score	**0.1**

CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**16.56**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	22.23
Total Biodiversity Score (Biodiversity Score x hectares)	69.57

Photo Point and Vegetation Survey Location

Direction of the Photo	
South	
GPS Reference	
Datum	GDA94
Zone (52, 53 or 54)	54
Easting (6 digits)	
Northing (7 digits)	
Description	
Mixed amenity plantings including Euc porosa, E. odorata, E. largiflorens,E. camaldulensis, Acacia salicina, A. victoriaea, A. paradoxa, A. ligulata, Melaleuca lanceolata, Allocasuarina verticillata, Nitraria billardierei, Myoporum	

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**73.05**

Approximate hectares required	9.13
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$41,521.64**
Administration fee (GST Inclusive)	**$2,283.69**

Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor PSG Facility
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	29/06/2022

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	22
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Aizoon pubescens	Coastal Galenia						*
Enchylaena tomentosa var.	Ruby Saltbush						
Tecticornia pergranulata ssp.	Black-seed Samphire						
Maireana aphylla	Cotton-bush						
Crassula sp.	Crassula/Stonecrop						
Rhagodia candolleana ssp.	Sea-berry Saltbush						
Atriplex suberecta	Lagoon Saltbush						

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	Common Name	EPBC	SA	Past Record	Observed	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Pluvialis fulva	Pacific Golden Plover		R			
Podiceps cristatus	Great Crested Grebe		R			
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R			
Rostratula australis	Australian Painted-snipe	EN	E			
Spatula rhynchotis	Australasian Shoveler		R			
Stagonopleura guttata	Diamond Firetail		V			
Sternula albifrons	Little Tern		E			
Sternula nereis	Fairy Tern	VU	E			
Stictonetta naevosa	Freckled Duck		V			
Tringa brevipes	Grey-tailed Tattler		R			
Tringa glareola	Wood Sandpiper		R			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Actitis hypoleucos	Common Sandpiper		R			
Anhinga novaehollandiae	Australasian Darter		R			
Ardea intermedia	Intermediate Egret		R			
Arenaria interpres	Ruddy Turnstone		R			
Biziura lobata menziesi	Musk Duck		R			
Botaurus poiciloptilus	Australasian Bittern	EN	E			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Calidris canutus rogersi	Red Knot	sp	E			
Calidris ferruginea	Curlew Sandpiper	CR	E			
Calidris melanotos	Pectoral Sandpiper		R			
Calidris pugnax	Ruff		R			
Calidris subminuta	Long-toed Stint		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Chelonia mydas	Green Sea Turtle	VU	V			
Cladorhynchus leucocephalus	Banded Stilt		V			
Coturnix ypsilophora australis	Brown Quail					
Egretta garzetta	Little Egret		R			
Falco subniger	Black Falcon		R			
Gallinago hardwickii	Latham's Snipe		R			
Haematopus fuliginosus	Sooty Oystercatcher		R			
Haematopus longirostris	(Australian) Pied Oystercatche		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	RENPSG05
BCM COMMUNITY	SMLR Co 8.3 – Coastal Swamp Paperbark Low Open Forests & Tall Shrublands of Saline Swamps
VEGETATION ASSOCIATION DESCRIPTION	Tecticornia spp. Low Open Shrubland
SIZE OF SITE (Ha)	3.68

Benchmarked attributes

(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	6
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**10.0**
Number of regenerating native species	0
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**0**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Galenia pubescens var. pubescens	3	2	6
Arctotheca calendula	2	2	4
Oxalis pes-caprae	2	4	8
Mesembryanthemum crystallinum	2	2	4
Lycium ferocissimum	1	3	3
	Cover x Threat		25
Weed Score (max 15) from benchmark community			**3**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	
Shrubs < 0.5	3
Forbs	1
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	4
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**4.0**

Non-Benchmarked Attributes

(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**2**

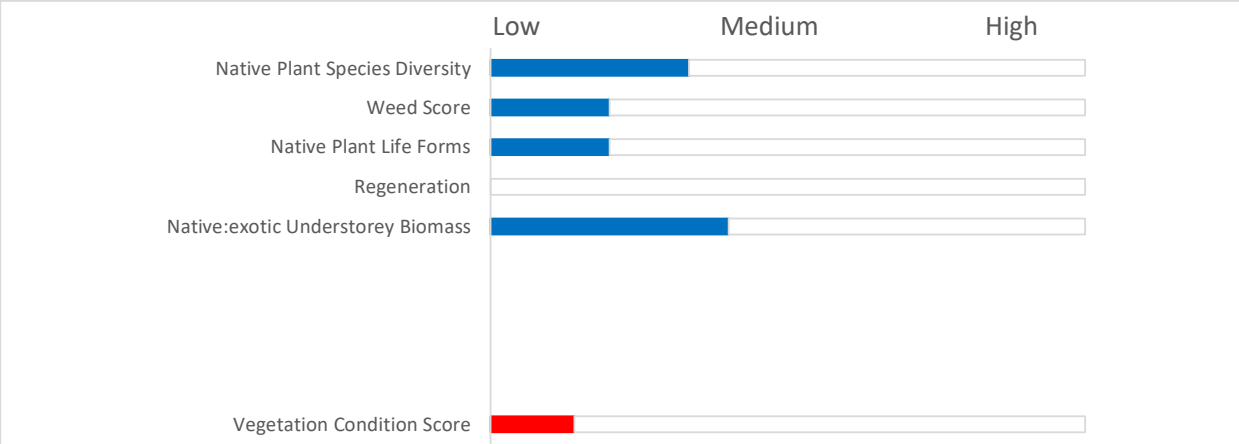
Is the community naturally treeless?	☑
Tree attributes not scored for treeless communities or communities with only emergent trees	

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	18.06
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	30.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**11.29**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	23
State **Vulnerable** species observed or locally recorded (2.5 pt each)	4
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	4
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	3
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**138**
Threatened Fauna Score	**0.1**

CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**11.29**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	15.15
Total Biodiversity Score (Biodiversity Score x hectares)	55.74

Photo Point and Vegetation Survey Location	Direction of the Photo
	South
	GPS Reference
	Datum: GDA94
	Zone (52, 53 or 54): 54
	Easting (6 digits):
	Northing (7 digits):
	Description
	Mixed amenity plantings of Atrplex rahgodioides and Melaleuca halmaturorum over emergent indigenous vegetation.

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**58.53**

Approximate hectares required	7.32
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$33,269.77**
Administration fee (GST Inclusive)	**$1,829.84**

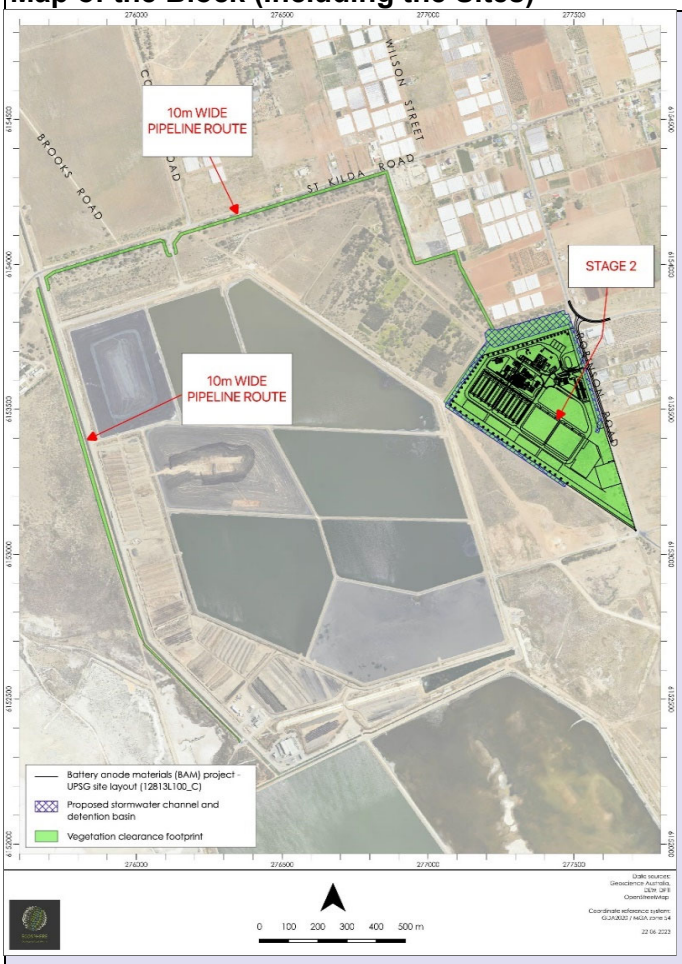
Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor PSG Facility
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	29/06/2022

Map of the Block (Including the Sites)



Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	22
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Maireana aphylla	Cotton-bush						
Enchylaena tomentosa var.	Ruby Saltbush						
Maireana brevifolia	Short-leaf Bluebush						
Atriplex suberecta	Lagoon Saltbush						

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	**Common Name**	**EPBC**	**SA**	**Past Record**	**Observed**	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Stagonopleura guttata	Diamond Firetail		V			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Coturnix ypsilophora australis	Brown Quail					
Falco subniger	Black Falcon		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	RENPSG06
BCM COMMUNITY	SMLR Co 8.3 – Coastal Swamp Paperbark Low Open Forests & Tall Shrublands of Saline Swamps
VEGETATION ASSOCIATION DESCRIPTION	Maireana aphylla Low Open Shrubland +/- planted M. halmaturorum
SIZE OF SITE (Ha)	9.52

Benchmarked attributes

(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	4
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**6.0**
Number of regenerating native species	0
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**0**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Galenia pubescens var. pubescens	3	2	6
Arctotheca calendula	2	2	4
Oxalis pes-caprae	2	4	8
Avena spp.	2	2	4
Lycium ferocissimum	1	3	3
	Cover x Threat		25
Weed Score (max 15) from benchmark community			**3**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	
Shrubs < 0.5	3
Forbs	1
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	4
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**4.0**

Non-Benchmarked Attributes

(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**1**

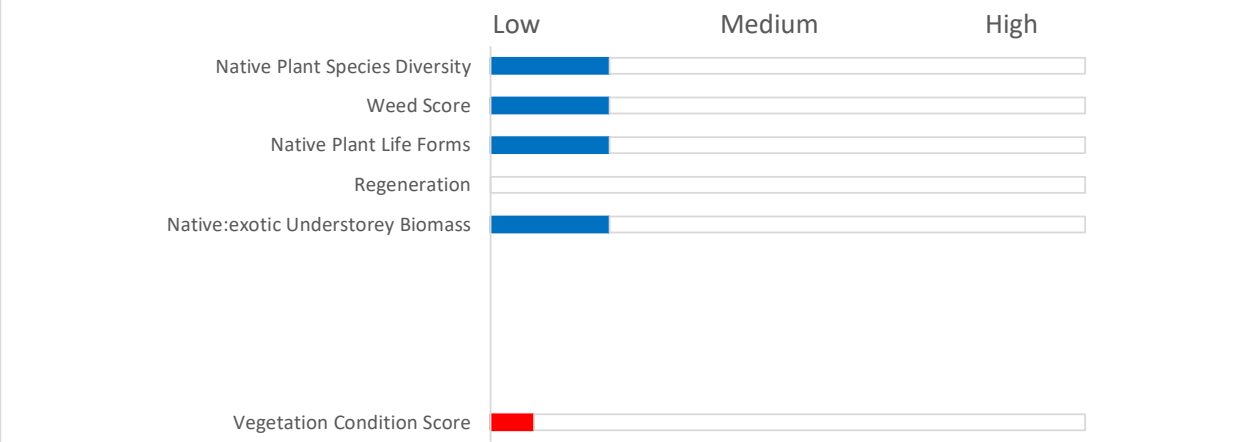
Is the community naturally treeless?	☑
Tree attributes not scored for treeless communities or communities with only emergent trees	

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	12.90
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	44.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**5.81**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	6
State **Vulnerable** species observed or locally recorded (2.5 pt each)	2
State **Endangered** species observed or locally recorded (5 pt each)	0
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	1
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	0
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**21**
Threatened Fauna Score	**0.1**
CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**5.81**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	7.79
Total Biodiversity Score (Biodiversity Score x hectares)	74.16

Photo Point and Vegetation Survey Location	Direction of the Photo
	South
	GPS Reference
	Datum: GDA94
	Zone (52, 53 or 54): 54
	Easting (6 digits):
	Northing (7 digits):
	Description
	Open shrubland over extic grass and herbaceous species with sparsely scattered planted oversotrey of Melaleuca halmaturorum. Very poor. Sheep grazing planted species intensively.

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**77.87**

Approximate hectares required	9.73
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$44,263.26**
Administration fee (GST Inclusive)	**$2,434.48**

Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor PSG Facility
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	29/06/2022

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	22
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Aizoon pubescens	Coastal Galenia						*
Enchylaena tomentosa var.	Ruby Saltbush						
Tecticornia pergranulata ssp.	Black-seed Samphire						
Maireana aphylla	Cotton-bush						
Crassula sp.	Crassula/Stonecrop					Yes	
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface						
Atriplex suberecta	Lagoon Saltbush						

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	Common Name	EPBC	SA	Past Record	Observed	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Pluvialis fulva	Pacific Golden Plover		R			
Podiceps cristatus	Great Crested Grebe		R			
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R			
Rostratula australis	Australian Painted-snipe	EN	E			
Spatula rhynchotis	Australasian Shoveler		R			
Stagonopleura guttata	Diamond Firetail		V			
Sternula albifrons	Little Tern		E			
Sternula nereis	Fairy Tern	VU	E			
Stictonetta naevosa	Freckled Duck		V			
Tringa brevipes	Grey-tailed Tattler		R			
Tringa glareola	Wood Sandpiper		R			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Actitis hypoleucos	Common Sandpiper		R			
Anhinga novaehollandiae	Australasian Darter		R			
Ardea intermedia	Intermediate Egret		R			
Arenaria interpres	Ruddy Turnstone		R			
Biziura lobata menziesi	Musk Duck		R			
Botaurus poiciloptilus	Australasian Bittern	EN	E			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Calidris canutus rogersi	Red Knot	sp	E			
Calidris ferruginea	Curlew Sandpiper	CR	E			
Calidris melanotos	Pectoral Sandpiper		R			
Calidris pugnax	Ruff		R			
Calidris subminuta	Long-toed Stint		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Chelonia mydas	Green Sea Turtle	VU	V			
Cladorhynchus leucocephalus	Banded Stilt		V			
Coturnix ypsilophora australis	Brown Quail					
Egretta garzetta	Little Egret		R			
Falco subniger	Black Falcon		R			
Gallinago hardwickii	Latham's Snipe		R			
Haematopus fuliginosus	Sooty Oystercatcher		R			
Haematopus longirostris	(Australian) Pied Oystercatche		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	RENPSG04
BCM COMMUNITY	SMLR Co 8.2 – Coastal Samphire / Saltbush, Bluebush Shrublands with Infrequent Inundation/Lower Salinity
VEGETATION ASSOCIATION DESCRIPTION	Tecticornia spp. Low Open Shrubland
SIZE OF SITE (Ha)	0.75

Benchmarked attributes

(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	5
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**16.0**
Number of regenerating native species	0
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**0**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Galenia pubescens var. pubescens	3	2	6
Arctotheca calendula	2	2	4
Oxalis pes-caprae	2	4	8
Mesembryanthemum crystallinum	2	2	4
Lycium ferocissimum	1	3	3
	Cover x Threat		25
Weed Score (max 15) from benchmark community			**0**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	2
Shrubs < 0.5	1
Forbs	1
Mat Plants	1
Grasses > 0.2m	
Grasses < 0.2m	
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	5
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**8.0**

Non-Benchmarked Attributes

(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**3**

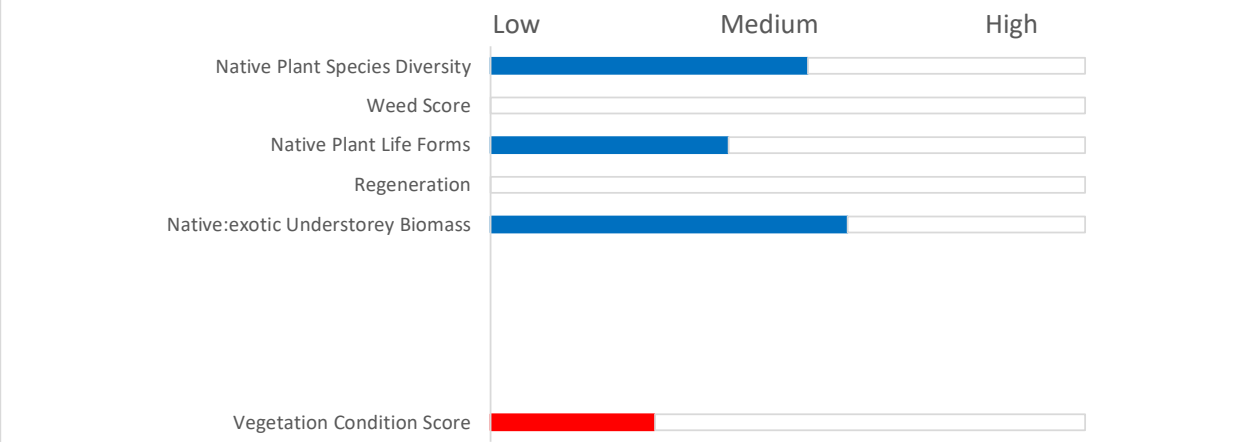
Is the community naturally treeless?	☑
Tree attributes not scored for treeless communities or communities with only emergent trees	

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	30.96
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	23.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**22.06**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	23
State **Vulnerable** species observed or locally recorded (2.5 pt each)	4
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	4
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	3
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**138**
Threatened Fauna Score	**0.1**

CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**22.06**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	29.60
Total Biodiversity Score (Biodiversity Score x hectares)	22.20

Photo Point and Vegetation Survey Location

Direction of the Photo	
South	
GPS Reference	
Datum	GDA94
Zone (52, 53 or 54)	54
Easting (6 digits)	
Northing (7 digits)	
Description	
Mixed amenity plantings of Atrplex rahgodioides and Melaleuca halmaturorum over emergent indigenous vegetation.	

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**23.31**

Approximate hectares required	2.91
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$13,251.08**
Administration fee (GST Inclusive)	**$728.81**

Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor - Pipeline
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	11.05.2023

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	13
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Melaleuca halmaturorum	Swamp Paper-bark						
Myoporum insulare	Common Boobialla						
Maireana brevifolia	Short-leaf Bluebush						
Nitraria billardierei	Nitre-bush						
Aizoon pubescens	Coastal Galenia						*
Lycium ferocissimum	African Boxthorn						*
Paspalum sp.							*
Cenchrus clandestinus	Kikuyu						*
Rumex sp.	Dock						
Olea europaea ssp.	Olive						*
Vulpia sp.	Fescue						*
Parapholis incurva	Curly Ryegrass						*
Sonchus oleraceus	Common Sow-thistle						*
Livistona australis	#N/A	#N/A	#N/A				#N/A
Thinopyrum elongatum	Tall Wheat-grass						*
Oxalis pes-caprae	Soursob						*
Plantago coronopus ssp.	Bucks-horn Plantain						*
Threlkeldia diffusa	Coast Bonefruit						

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	Common Name	EPBC	SA	Past Record	Observed	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Pluvialis fulva	Pacific Golden Plover		R			
Podiceps cristatus	Great Crested Grebe		R			
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R			
Rostratula australis	Australian Painted-snipe	EN	E			
Spatula rhynchotis	Australasian Shoveler		R			
Stagonopleura guttata	Diamond Firetail		V			
Sternula albifrons	Little Tern		E			
Sternula nereis	Fairy Tern	VU	E			
Stictonetta naevosa	Freckled Duck		V			
Tringa brevipes	Grey-tailed Tattler		R			
Tringa glareola	Wood Sandpiper		R			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Actitis hypoleucos	Common Sandpiper		R			
Anhinga novaehollandiae	Australasian Darter		R			
Ardea intermedia	Intermediate Egret		R			
Arenaria interpres	Ruddy Turnstone		R			
Biziura lobata menziesi	Musk Duck		R			
Botaurus poiciloptilus	Australasian Bittern	EN	E			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Calidris canutus rogersi	Red Knot	sp	E			
Calidris ferruginea	Curlew Sandpiper	CR	E			
Calidris melanotos	Pectoral Sandpiper		R			
Calidris pugnax	Ruff		R			
Calidris subminuta	Long-toed Stint		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Chelonia mydas	Green Sea Turtle	VU	V			
Cladorhynchus leucocephalus	Banded Stilt		V			
Coturnix ypsilophora australis	Brown Quail					
Egretta garzetta	Little Egret		R			
Falco subniger	Black Falcon		R			
Gallinago hardwickii	Latham's Snipe		R			
Haematopus fuliginosus	Sooty Oystercatcher		R			
Haematopus longirostris	(Australian) Pied Oystercatche		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	Renascor - Association 9
BCM COMMUNITY	SMLR 3.2 Box Bark Gum and Small Tree Woodlands with an Open Shrub and Grassy Understorey
VEGETATION ASSOCIATION DESCRIPTION	*Myoporum insulare* over exotic herbaceous species and *Threlkeldia diffu*
SIZE OF SITE (Ha)	0.65

Benchmarked attributes

(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	7
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**10.0**
Number of regenerating native species	0
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**0**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Oxalis pes-caprae	3	4	12
Paspalum dilatatum	2	3	6
Thinopyrum elongatum	2	3	6
Parapholis incurva	2	1	2
Sonchus sp.	2	1	2
	Cover x Threat		28
Weed Score (max 15) from benchmark community			**6**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	2
Shrubs < 0.5	2
Forbs	
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	4
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**2.0**

Non-Benchmarked Attributes

(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**0**

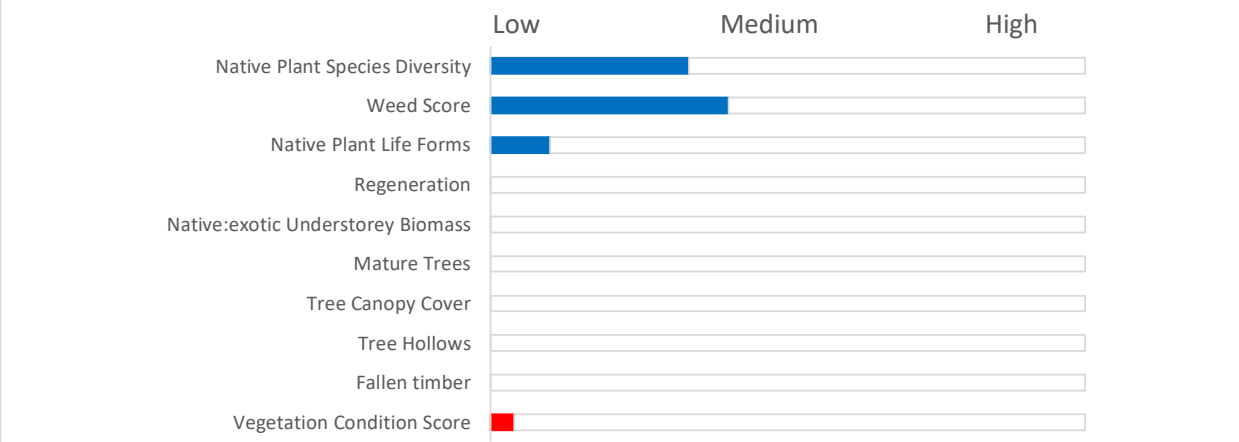
Is the community naturally treeless?	☐
Fallen Timber/Debris (max 5)	**0**
Hollow-bearing trees Score (max 5)	**0**
Mature Tree Score (max 8)	**0**
Tree Canopy Cover Score (max 5)	**0**

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	12.00
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - Biomass score - Tree Canopy Cover Score)exp2/2)	59.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**3.15**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	23
State **Vulnerable** species observed or locally recorded (2.5 pt each)	4
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	4
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	3
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**138**
Threatened Fauna Score	**0.1**

CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**3.15**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	4.23
Total Biodiversity Score (Biodiversity Score x hectares)	2.75

Photo Point and Vegetation Survey Location

Direction of the Photo	
South-west	
GPS Reference	
Datum	GDA94
Zone (52, 53 or 54)	54
Easting (6 digits)	276848
Northing (7 digits)	6154316
Description	
Previously cleared area with emergent shrubs between fenceline and planted trees (planted trees located 6-8metres from fence).	

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**2.89**

Approximate hectares required	0.36
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$1,639.94**
Administration fee (GST Inclusive)	**$90.20**

Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor Pipeline
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	11.05.2023

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	13
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Nitraria billardierei	Nitre-bush						
Enchylaena tomentosa var.	Ruby Saltbush						
Tecticornia arbuscula	Shrubby Samphire						
Maireana brevifolia	Short-leaf Bluebush						
Atriplex paludosa ssp.	Marsh Saltbush						
Atriplex semibaccata	Berry Saltbush						
Myoporum insulare	Common Boobialla						
Lolium perenne	Perennial Ryegrass						*
Conyza bonariensis	Flax-leaf Fleabane						*
Sonchus oleraceus	Common Sow-thistle						*
Solanum elaeagnifolium	Silver-leaf Nightshade						*
Aizoon pubescens	Coastal Galenia						*
Oxalis pes-caprae	Soursob						*
Diplotaxis tenuifolia	Lincoln Weed						*
Lycium ferocissimum	African Boxthorn						*
Solanum nigrum	Black Nightshade						*
Acacia saligna	Golden Wreath Wattle						*
Heliotropium sp.	Heliotrope						
Lactuca serriola f.	Prickly Lettuce						*

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	Common Name	EPBC	SA	Past Record	Observed	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Pluvialis fulva	Pacific Golden Plover		R			
Podiceps cristatus	Great Crested Grebe		R			
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R			
Rostratula australis	Australian Painted-snipe	EN	E			
Spatula rhynchotis	Australasian Shoveler		R			
Stagonopleura guttata	Diamond Firetail		V			
Sternula albifrons	Little Tern		E			
Sternula nereis	Fairy Tern	VU	E			
Stictonetta naevosa	Freckled Duck		V			
Tringa brevipes	Grey-tailed Tattler		R			
Tringa glareola	Wood Sandpiper		R			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Actitis hypoleucos	Common Sandpiper		R			
Anhinga novaehollandiae	Australasian Darter		R			
Ardea intermedia	Intermediate Egret		R			
Arenaria interpres	Ruddy Turnstone		R			
Biziura lobata menziesi	Musk Duck		R			
Botaurus poiciloptilus	Australasian Bittern	EN	E			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Calidris canutus rogersi	Red Knot	sp	E			
Calidris ferruginea	Curlew Sandpiper	CR	E			
Calidris melanotos	Pectoral Sandpiper		R			
Calidris pugnax	Ruff		R			
Calidris subminuta	Long-toed Stint		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Chelonia mydas	Green Sea Turtle	VU	V			
Cladorhynchus leucocephalus	Banded Stilt		V			
Coturnix ypsilophora australis	Brown Quail					
Egretta garzetta	Little Egret		R			
Falco subniger	Black Falcon		R			
Gallinago hardwickii	Latham's Snipe		R			
Haematopus fuliginosus	Sooty Oystercatcher		R			
Haematopus longirostris	(Australian) Pied Oystercatche		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	Renascor - Association 8
BCM COMMUNITY	SMLR Co 7.2 Coastal Shrublands & Tall Shrublands
VEGETATION ASSOCIATION DESCRIPTION	*Nitraria billardierei* low open shrubland.
SIZE OF SITE (Ha)	0.21

Benchmarked attributes

(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	8
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**10.0**
Number of regenerating native species	0
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**0**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Galenia pubescens var. pubescens	3	2	6
Avena spp.	3	2	6
Vulpia spp.	3	2	6
Solanum elaeagnifolium	2	2	4
Lycium ferocissimum	2	3	6
	Cover x Threat		28
Weed Score (max 15) from benchmark community			**4**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	3
Shrubs < 0.5	3
Forbs	
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	6
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**6.0**

Non-Benchmarked Attributes

(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**2**

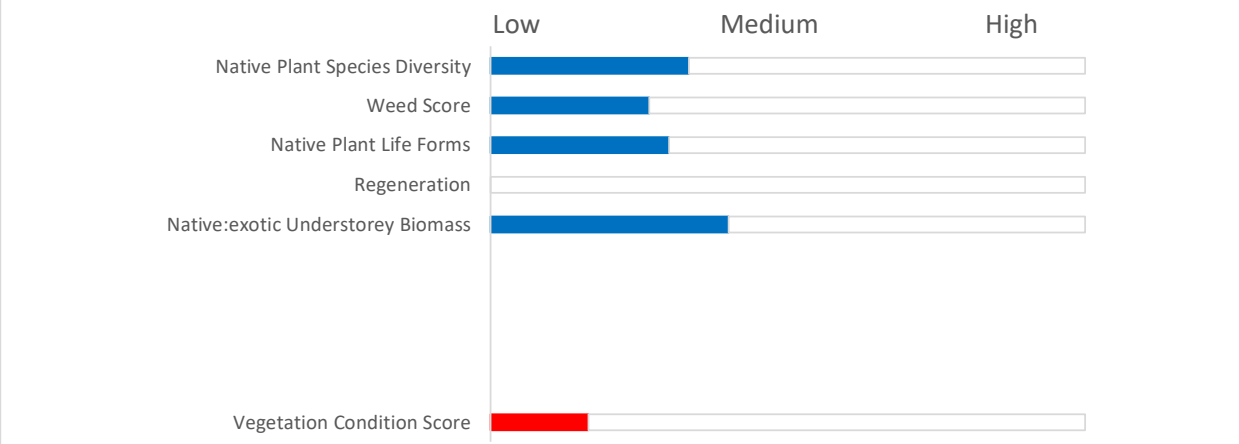
Is the community naturally treeless?	☑
Tree attributes not scored for treeless	~~0~~
communities or communities with only	~~0~~
emergent trees	~~0~~
	~~0~~

Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29*

	20.64
Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - (Biomass score x 2))exp2/2)	29.00
VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80))	**13.16**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	23
State **Vulnerable** species observed or locally recorded (2.5 pt each)	4
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	4
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	3
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**138**
Threatened Fauna Score	**0.1**
CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**13.16**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	17.66
Total Biodiversity Score (Biodiversity Score x hectares)	3.71

Photo Point and Vegetation Survey Location

Direction of the Photo	
North-west	
GPS Reference	
Datum	GDA94
Zone (52, 53 or 54)	54
Easting (6 digits)	276345
Northing (7 digits)	6152354
Description	
Previously disturbed low shrubland alongside concrete drainage channel with a maintained clearance buffer for access.	

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**3.89**

Approximate hectares required	0.49
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$2,213.16**
Administration fee (GST Inclusive)	**$121.72**

Bushland Assessment Scoresheets

(Version - 22 Oct 2021)

Block	Renascor Pipeline
Size of Block (Ha)	26.720
Landscapes Region	Green Adelaide
BCM Region	Southern Mount Lofty Ranges
IBRA Association	Mallala
IBRA Subregion	St Vincent

ASSESSOR(S)	Ecosphere Ecological Solutions
DATE OF ASSESSMENT	11.05.2023

Map of the Block (Including the Sites)

Landscape Context Scores

% native veg. remaining in IBRA Assoc.	3
% native veg. remaining in IBRA subregion	8
0 - 10% = 0.05 pts; >10-20% = 0.04 pts; >20-30% = 0.03 pts; >30-60% = 0.02 pts; > 60 = 0 pts **Score**	0.1

Score received for both IBRA assoc. and subregion then summed

Percent Vegetation Cover (5km radius) (%)	13
0-5% = 0 pts; >5-10% = 0.02 pts; >10-25% = 0.04 pts; >25-50% = 0.06 pts; >50-75% = 0.03 pt; >75-100% = 0 pts **Score**	0.04

% native veg. protected IBRA Assoc.	2
0-10% = 0.03 pts; >10-20% = 0.02 pts; >20-40% = 0.01 pt; >40% = 0 **Score**	0.03

Block Shape Cleared perimeter:Area (km/km2)	
Cleared Perimeter (m) =	2056
Cleared Perimeter to area ratio	7.69
<6 = 0.03 pts; 6 to <12 = 0.02 pts; 12 to <18 = 0.01 pt **Score**	0.02

Wetland or Riparian Habitat present	
Riparian zone present (Yes/No) = 0.02 pt	No
Swamp/wetland present (Yes/No) = 0.03 pts	Yes
(Swamp/wetland may be +/- riparian zone) **Score**	0.03

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1.22**

Plant Species Recorded (Native and Introduced)		Listed Species			Natives only		
Species	**Common Name**	**EPBC**	**SA**	**Not in quadrat**	**Regen**	**Annual Herbs** Spring survey	**Introduced Species**
Chloris truncata	Windmill Grass						
Maireana brevifolia	Short-leaf Bluebush				Yes		
Austrostipa sp.	Spear-grass						
Threlkeldia diffusa	Coast Bonefruit						
Avena barbata	Bearded Oat						*
Conyza bonariensis	Flax-leaf Fleabane						*
Sonchus oleraceus	Common Sow-thistle						*
Vulpia sp.	Fescue						*
Aizoon pubescens	Coastal Galenia						*

Threatened or Introduced Animal Species Recorded or Observed (Native and Introduced)		Threatened Species				Introduced Species
Species	Common Name	EPBC	SA	Past Record	Observed	
Melithreptus gularis	Black-chinned Honeyeater		R			
Neophema elegans	Elegant Parrot		R			
Plegadis falcinellus	Glossy Ibis		R			
Pluvialis fulva	Pacific Golden Plover		R			
Podiceps cristatus	Great Crested Grebe		R			
Pteropus poliocephalus	Grey-headed Flying-fox	VU	R			
Rostratula australis	Australian Painted-snipe	EN	E			
Spatula rhynchotis	Australasian Shoveler		R			
Stagonopleura guttata	Diamond Firetail		V			
Sternula albifrons	Little Tern		E			
Sternula nereis	Fairy Tern	VU	E			
Stictonetta naevosa	Freckled Duck		V			
Tringa brevipes	Grey-tailed Tattler		R			
Tringa glareola	Wood Sandpiper		R			
Acanthiza iredalei rosinae	Slender-billed Thornbill (Gulf S	VU	V			
Actitis hypoleucos	Common Sandpiper		R			
Anhinga novaehollandiae	Australasian Darter		R			
Ardea intermedia	Intermediate Egret		R			
Arenaria interpres	Ruddy Turnstone		R			
Biziura lobata menziesi	Musk Duck		R			
Botaurus poiciloptilus	Australasian Bittern	EN	E			
Bubulcus ibis coromandus	Eastern Cattle Egret		R			
Calidris canutus rogersi	Red Knot	sp	E			
Calidris ferruginea	Curlew Sandpiper	CR	E			
Calidris melanotos	Pectoral Sandpiper		R			
Calidris pugnax	Ruff		R			
Calidris subminuta	Long-toed Stint		R			
Cereopsis novaehollandiae novaehollandi	Cape Barren Goose		R			
Chelonia mydas	Green Sea Turtle	VU	V			
Cladorhynchus leucocephalus	Banded Stilt		V			
Coturnix ypsilophora australis	Brown Quail					
Egretta garzetta	Little Egret		R			
Falco subniger	Black Falcon		R			
Gallinago hardwickii	Latham's Snipe		R			
Haematopus fuliginosus	Sooty Oystercatcher		R			
Haematopus longirostris	(Australian) Pied Oystercatche		R			
Hieraaetus morphnoides	Little Eagle		V			

Vegetation Condition Scores

SITE:	Renascor - Association 10
BCM COMMUNITY	SMLR 3.2 Box Bark Gum and Small Tree Woodlands with an Open Shrub and Grassy Understorey
VEGETATION ASSOCIATION DESCRIPTION	Open grassland
SIZE OF SITE (Ha)	0.1

Benchmarked attributes
(Scores determined by comparing to a Benchmark community)

Number of Native Species (Minus herbaceous annuals for spring Surveys)	4
Native Plant Species Diversity Score (max 30) from benchmark score *weighted by a factor of 2*	**6.0**
Number of regenerating native species	1
Regeneration Score (max 12) from benchmark community weighted by a factor of 1.5	**3**

Weed species (Top 5 Cover x Invasiveness)	Cover (max 6)	Weed Threat Rating (max 5)	C x I
Avena spp.	3	2	6
Conyza sp.	3	2	6
Sonchus oleraceus	2	1	2
Vulpia spp.	3	2	6
			0
	Cover x Threat		20
Weed Score (max 15) from benchmark community			**9**

Native Plant Life Forms	**Cover rating**
Trees > 15m	
Trees 5 - 15 m	
Trees < 5m	
Mallee > 5m	
Mallee < 5m	
Shrubs > 2m	
Shrubs 0.5 - 2m	
Shrubs < 0.5	
Forbs	
Mat Plants	
Grasses > 0.2m	
Grasses < 0.2m	3
Sedges > 1m	
Sedges < 1m	
Hummock grasses	
Vines, scramblers	
Mistletoe	
Ferns	
Grass-tree	
Total	3
Native Plant Life Forms (max 20) from benchmark score *weighted by a factor of 2*	**2.0**

Non-Benchmarked Attributes
(Scores determined from direct field observations)

Native:exotic Understorey biomass Score (max 5)	**2**

Is the community naturally treeless?	☐
Fallen Timber/Debris (max 5)	**0**
Hollow-bearing trees Score (max 5)	**0**
Mature Tree Score (max 8)	**0**
Tree Canopy Cover Score (max 5)	**0**

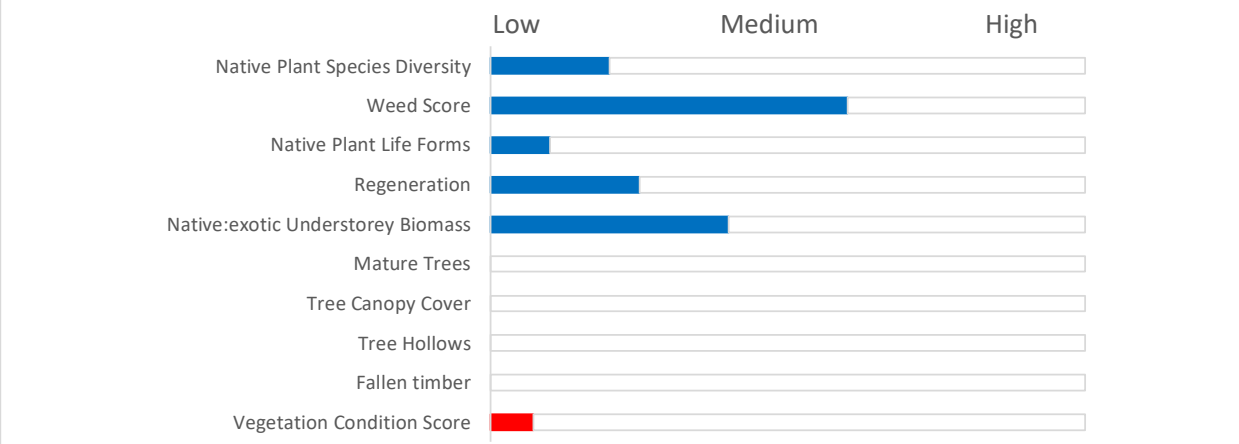
Vegetation Condition Score calculation

Positive Vegetation Attributes Score = Native species diversity + Regeneration + Native Plant Life Forms
Fallen timber/debris + Hollow-bearing trees

- *If the community Score is Not Benchmarked (SNB) for regeneration this score is multiplied 1.24*
- *If the community is naturally treeless this score is multiplied by 1.29* — 11.00

Negative Vegetation Attributes Score = (15 - Weeds) + ((10 - Biomass score - Tree Canopy Cover Score)exp2/2) — 38.00

VEGETATION CONDITION SCORE (Positive veg attributes x ((80 - Negative vegetation attributes) / 80)) — **5.78**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) V**ulnerable** community (0.35 pts)	☐
Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note; all sites will score a minimum Conservation Significance Score of 1 **Threatened Community Score**	1

Number of Threatened Flora Species recorded for the site (within the site)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	**0**
Threatened Flora Score	0

Potential habitat for Threatened Fauna Species (number observed or previously recorded)	Number
**If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.*	
State **Rare** species observed or locally recorded (1 pt each)	23
State **Vulnerable** species observed or locally recorded (2.5 pt each)	4
State **Endangered** species observed or locally recorded (5 pt each)	1
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	4
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	3
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	**138**
Threatened Fauna Score	**0.1**
CONSERVATION SIGNIFICANCE SCORE	**1.1**

Total Scores for the Site

	Score
LANDSCAPE CONTEXT SCORE	**1.22**
VEGETATION CONDITION SCORE	**5.78**
CONSERVATION SIGNIFICANCE SCORE	**1.10**

Vegetation Condition x Landscape Context x Conservation Significance = **UNIT BIODIVERSITY SCORE**	7.75
Total Biodiversity Score (Biodiversity Score x hectares)	0.78

Photo Point and Vegetation Survey Location

Direction of the Photo	
North-east	
GPS Reference	
Datum	GDA94
Zone (52, 53 or 54)	54
Easting (6 digits)	276145
Northing (7 digits)	6154094
Description	
Open mixed native/non-native grassland.	

What is the purpose of Assessment? Clearance SEB Area Other

Assessment for Clearance

Loss Factor	1.0
Loadings for clearance of protected areas	
Reductions for rehabilitation of impact site	
SEB Points required	**0.81**

Approximate hectares required	0.10
Economies of Scale Factor	0.5
Mean Annual rainfall for the site (mm)	425
Payment into the fund (GST Exclusive)	**$462.55**
Administration fee (GST Inclusive)	**$25.44**

Clearance summary Table - Agricultural region

Bushland assessment

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
1	1	6	1	0	0.1	3.12	0.64	2.00	1			2.10	$1,200.17	$66.01
1	2	6	1	0	0.1	6.23	3.41	21.24	1			22.31	$12,768.77	$702.28
1	3	8	1	0	0.1	22.23	3.13	69.58	1			73.06	$41,820.61	$2,300.13
1	4	16	1	0	0.1	29.6	0.75	22.20	1			23.31	$13,343.19	$733.88
1	5	10	1	0	0.1	15.15	3.68	55.75	1			58.54	$33,509.43	$1,843.02
1	6	6	1	0	0.1	7.79	9.65	75.17	1			78.93	$45,182.61	$2,485.04
1	8	10	1	0	0.1	17.66	0.21	3.71	1			3.89	$2,229.03	$122.60
1	9	10	1	0	0.1	4.23	0.65	2.75	1			2.89	$1,652.57	$90.89
1	10	6	1	0	0.1	7.75	0.1	0.78	1			0.81	$465.81	$25.62
Insert additional rows into the table as required.						**Total**	**22.22**	**253.1796**				**265.84**	**$152,172.18**	**$8,369.47**

Scattered Tree assessment

Tree or Cluster ID	Number of trees	Fauna Habitat score	Threatened flora score	Biodiversity score	Loss factor	SEB Points required	SEB Payment	Admin Fee
Total	**0**			**0**		**0.00**	**$0.00**	**$0.00**

Insert additional rows into the table as required.

IBRA Association percent vegetation remnancy (%)	3
IBRA Subregion percent vegetation remnancy (%)	8
Is the vegetation associated with a Wetland	Yes
Economies of Scale Factor	0.5
Rainfall (mm)	428

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	253.18	265.84	$152,172.18	$8,369.47	$160,541.65

Risk level
Level 2, 3 or 4

4

Principle	Seriously at variance	Vegetation Assocation	Trees
a - Plant species diversity			
b - Wildlife habitat	Yes	11, 12, 13, 14, 15, 16,	
c - Rare plant species			
d - Rare plant communities			
e - Remnancy	Yes	All	
f - Wetland	Yes	Associated vegetation	

At variance	Vegetation Assocation	Trees
Yes	14	

Appendix 10 Surface Water Modelling

Robinson Road Development Drainage Advice

Input into EIS

Renascor Resources

22 March 2024
Ref: 221223R003C

tonkin

Building exceptional
outcomes together

Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
A	Draft	TAK	JW	TAK	25/5/23
B	Updated draft	TAK	WG	TAK	29/2/24
C	Update draft	TAK	JW	TAK	22/3/24

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Contents

Project: Robinson Road Development Drainage Advice | Input into EIS
Client: Renascor Resources
Ref: 221223R003C

1 Introduction 4

2 Development Application Guidelines input 5

2.1 CCRE1 Climate Change Adaptation 5

2.2 HR2 – Flooding 5

2.3 PE3 – Surface Water 6

Figures

Figure 1: Typical example of a stormwater biofiltration system, image source: Water Sensitive SA 9

Figure 2: Typical section of eastern channel 9

Figure 3: Eastern channel extents 10

Figure 4: Site Stormwater Management Plan 13

Appendices

Appendix A – Flood maps

1 Introduction

Renascor Resources ('Renascor') are considering leasing land from SA Water to the west of Robinson Road, Bolivar as it is a strategic fit for the requirements that they need to operate. However, the site is currently flood prone due to it being downstream of two large drainage culverts that pass under Robinson Road. Tonkin have previously provided high-level drainage advice for the site and have produced a number of flood mapping outputs based on various potential onsite scenarios.

Renascor have therefore engaged Tonkin to undertake further flood modelling of the site and preliminary design work to support their internal site level design and assist them in preparing a development application.

This report provides advice to support Renascor with a development application for the development of the site.

It should be noted that flood maps that are shown in the appendix of this report are extracts from other reports and have retained their original figure labelling.

2 Development Application Guidelines input

2.1 CCRE1 Climate Change Adaptation

The proposed site will be built up such that it will be above adjacent modelled 1% AEP flood levels, based on TUFLOW modelling of the area. Flood waters approach the site via two culverts that pass under Robinson Road on the site's eastern boundary. It is proposed to have flows from both culverts pass along the site's northern boundary towards St Kilda Road. In the event that the system was to be overloaded, the breach point in the stormwater system would be from southern of the two culverts that pass under Robinson Road at a level of around 5.8mAHD. From there floodwaters would spill to lower lying land to the south of the site.

It is predicted that rainfall intensities will increase as a part of climate change and that this is likely to increase the peak flow rates that drain towards the site via the Robinson Road culverts. While the mapping undertaken for Renascor has been based on current climate conditions, a future climate map was prepared for the State Governments flood hazard project. The results of the mapping only showed fairly minimal changes in flood extents in the vicinity of the Renascor site as is evident from a comparison between Map 5.2 and 14.2 in Appendix A. However, the site will be built up above adjacent site levels and there is significant flood storage in the surrounding areas. As such, increases in flood flows draining towards the site are not likely to materially increase flood levels.

The site is far enough elevated from the coastline that it is not likely to be impacted by raising sea levels given that flood levels in the area are in the vicinity of 5.5mAHD, compared to 2100 peak tide levels predicted to be in the vicinity of 4.0mAHD .

2.2 HR2 – Flooding

2.2.1 Vulnerability of developed site to flooding

The site is currently flood prone with shallow water spilling through the site from north to south (refer Scenario 1 and Map 5.2 in Appendix A). However, once the site is filled, the floodwaters move around the site such that it is no longer flood prone. The final flood plain mapping of the area will be subject to which long-term drainage scheme is implemented for the area. Mapping is shown for Scenario 11 which is on the basis of new drainage channels along the site's eastern and western boundaries and a new outfall channel to the north, towards St Kilda Road (refer Scenario 11, Appendix A). This is the likely medium term drainage scenario for the area. Even with no works external to the site, the property would not be subject to flooding (refer Scenario 3, Appendix A) due to the proposed site filling.

2.2.2 Historical flooding in vicinity of the site

The site is towards the downstream end of a large relatively undeveloped upstream catchment. The flooding regime of the area has been changed in recent years since the construction of the Northern Connector. Floodplain mapping of the area, prior to the construction of the Northern Connector showed shallow surface flooding through the site, but no areas subject to deep flooding. The historical flooding regime has broadly been replicated post the construction of the Northern Connector. There is no known history of flooding at the site, but it is likely to have had shallow surface flows passing through the site and shallow ponding of water on the site following large rainfall events.

2.2.3 Potential for future upstream development to increase flood risk

Future runoff from the upstream catchment will be limited by the capacity of the drainage infrastructure that passes under the Northern Connector. Until a formal outfall drain is built to the coast (downstream of Robinson Road), future runoff that passes under the Northern Connector towards the two culverts that pass under Robinson Road will have the potential to increase flood risk at the site. However, as outlined in Section 2.2.1, site filling would provide the site with immunity to increased flows.

Development that would feed into the northern culvert crossing under Robinson Road will be heavily controlled, until such time as a formal outfall to the coast has been constructed. Currently there is no formal discharge path for these flows, other than the minor channel that has been constructed to the north of the Renascor site.

2.2.4 Impacts due to increases in rainfall intensity due to climate change

External flows arriving at the site from the upstream catchment will increase due to increased rainfall intensities. However, the flows getting to the site are governed by the capacity of the drainage system that will convey flow to the culverts that pass under Robinson Road.

The internal drainage system within the site should make allowance for increased rainfall intensities, based on current guidelines (typically in the order of 20% to allow for 2090 climate conditions). They will therefore be able to meet the required design standard in the future.

2.2.5 On site flood risk minimisation

The main flood minimisation strategy for the site is the large amounts of site filling that are proposed. The site filling will raise the site above surrounding natural ground levels and above the predicted 1% AEP flood levels, based on interrogation of the TUFLOW modelling of the area. A number of flood plain mapping scenarios have been undertaken using TUFLOW, which show that the proposed site filling levels and associated drainage works (including the perimeter channels and detention basin) provide the site with adequate flood protection. The modelling has shown that the site is free of inundation, even with allowing for climate change as well as the very conservative assumption that the basins are all full at the start of the event (refer Scenario 18, Appendix A).

Runoff generated by the site will grade either to the eastern or western drainage channels. There are no proposed trapped low spots within the proposed design which will therefore allow for the unobstructed flow of runoff across the site.

2.3 PE3 – Surface Water

2.3.1 Existing surface water conditions in vicinity of the site

As is evident from the existing flood mapping of area (refer Scenario 1 of Appendix A) shallow flood flows pass through the site during large flood events. They pass through the site from north to south. Deeper areas of ponding occurs, typically to the south of the property. Some shallow areas of ponding also occur across the site based on local depressions that are not free draining.

The two sources of surface water to the site are via the 2 culverts that pass under Robinson Road at the north-eastern corner of the site and mid-way along the site's eastern boundary. The drains take runoff from large predominantly pervious catchments and as such do not convey much flow other than in larger rainfall events. However, given the large size of the upstream catchments, the volume of flow conveyed by them is significant during large rainfall events. The northern culvert has a small channel that conveys flows towards St Kilda Road. However, the central culverts do not currently have an outlet and spill across the site as surface flows.

2.3.2 Site pollutant generation

During construction a large amount of channel excavation and site filling is proposed which will be susceptible to erosion. During this time erosion control will need to be managed through carefully managed implementation of a soil erosion and drainage management plan. In the interim, the perimeter drainage system will act as a retention system (have no gravity draining outlet). This perimeter drainage will therefore act to intercept pollutants generated by the site.

In operations, one of the main sources of pollutant generation by the site will be at the site's main car park area. This is likely to produce suspended solids, hydrocarbons and heavy metals.

Areas with chemical reagents, including storage areas and process areas / buildings where they are used (e.g. the kiln, leaching and filtration areas) will be bunded and/or be covered by building structures.

2.3.3 How the development will impact on surface water flows

Currently, surface waters spill through the site from north to south, towards lower lying land to the south of the site. These flows approach the site via two sets of culverts that pass under Robinson Road. The proposed site filling will obstruct these flows from passing through the site. The impact of this will depend on the regional drainage solution that is adopted for the area.

Large open channels that are proposed on the western and eastern side of the site as well as a basin to the north will provide a significant amount of storage that will offset the additional runoff generated by the development of the site.

The most likely long-term drainage scenario is for the construction of a new drainage outfall to the north of the site, which will include the large northern basin. In collaboration with Council, this solution will intercept flows that pass under both sets of culverts under Robinson Road via a channel on the eastern side of the site. The flows will eventually make their way out to the Barker Inlet, but the construction of this outfall is a multi-million-dollar proposition that is not currently funded and could take many years before it is constructed. It is part of a broader drainage Council drainage strategy to provide an outfall for the Greater Edinburgh Parks area. The long-term drainage works is a Council project and is not the responsibility of Renascor to implement, nor is it required for the Renascor development to proceed.

In the interim, the most likely scenario is the construction of the perimeter drainage channels and a large basin to the north of the site. These systems will not have any outlet and will therefore act as retention storage. Water that drains into them will only be lost through evaporation and seepage. Should they reach capacity, they would initially spill via the existing shallow channel that grades towards St Kilda Road and in large flood events are also likely to spill to the south.

Stormwater runoff within the site will be adequately treated before it drains into the perimeter channels and basin (refer Section 2.3.4). Up to the point of spill (at a level of around 5.7mAHD) the proposed channels and basins will have a storage volume of approximately 24ML. The site is estimated to have approximately 120,000m^2 of impervious area that would drain into the retention system. In isolation, the losses through evaporation and infiltration from the system are comparable to inflow volumes and therefore the system would rarely reach capacity and spill. However, the perimeter channels are connected into the two culverts that pass under Robinson Road, as discussed in Section 2.3.1, which serve large upstream catchments. During large flood events the volume of runoff coming into the proposed channels and basins from these external catchments would be significantly larger than the volume of flow discharged by the Renascor site. As such they are likely to reach capacity following large rainfall events when the upstream (mostly pervious) catchment produces runoff. In the future the volumes of runoff from the external catchments are likely to increase as development occurs within the catchment.

The flood extents and changes in flood depths based on the conservative assumption that the perimeter drainage channels and basin are 100% full at the start of the 1% AEP rainfall event is presented as Scenario 16 in Appendix A. The flood impacts of this scenario are a slight increase in flood risk for the land to the south of the site.

Another potential interim solution is the construction of a portion of the main outfall channel towards St Kilda Road, downstream of the detention basin to the north of the site. This provides the system described above with an outlet, but as the existing channel downstream of the upgraded channel does not have adequate capacity to take the large flows, the increase in flood risk is transferred from the south of the site to the area south of St Kilda Road. This is shown in Scenario 11 within Appendix A.

The localised increases in flood risk will only be removed once the Council's proposed new trunk regional drainage system is constructed all the way to the coast.

2.3.4 Mitigation measures to manage on-site water quality

A whole range of measures are proposed on the site to manage on-site water quality. The measures will either ensure that any potentially hazardous chemicals are not able to leave the site or that runoff that does leave the site has passed through a suitable treatment train prior to discharge. Based on the various treatment measures outlined below, the risk of off-site contamination is low, as only treated clean water will be leaving the site.

2.3.4.1 Car parking area

The primary source of pollutant generation on the site is likely to be via the main on-site carparking area. This area is to be provided with a pit and pipe drainage system such that it can be directed to a proprietary water quality treatment device (e.g an oil/grease separator) before it discharges into the perimeter drainage channel. This area is shaded in red in Figure 4.

2.3.4.2 Internal roadways and minor hardstand areas

Areas of the site that are not either bunded or captured for on-site reuse will drain into the earth lined drainage channels to the east or west of the site. These are the areas that aren't shaded within Figure 4. Prior to discharge into these channels, the flows will pass through stormwater biofiltration systems (refer Figure 1). These systems will provide a high level of water quality improvement before the flows enter the channels. The proposed locations of the biofiltration systems are shown in Figure 4.

The earth lined drainage channels will have flat longitudinal grades, which will encourage infiltration. They will also be vegetated, which will provide for additional filtering of the runoff. Furthermore, a vegetated buffer strip is proposed around the majority of the site's perimeter. Any minor sheet flows that are not directed into biofiltration systems will still be conveyed through this buffer strip, which will help to treat the water prior to it draining into the perimeter drainage channels.

While not shown on the plans, the eastern channel grades against the natural grade from south to north and therefore gets deeper and wider to the north with depths ranging from 0.7 to 2.0m. As such, the entirety of the channel is not needed for hydraulic conveyance purposes and a portion at the top of the channel (~2-4 m width) on both its eastern and western banks can be more heavily vegetated to act as a green buffer, particularly towards the northern end. A rough sketch of the channel profile is shown in Figure 2, with the extents of the channel shown in Figure 3. The channel is proposed to have an 8m base width and 1 in 4 batters, making the total channel width vary from between 15 and 25m. It has invert levels that range between 4.7mAHD at the southern end to 4.6mAHD at the northern end.

The northern basin is proposed to have an invert of between 3.9 and 4.0mAHD which will make it approximately 2.2m below ground level and 1.0m below the invert of the existing shallow channel that has already been constructed.

The western channel that will drain northward into the northern basin has inverts that range between 4.6mAHD at the southern end to 4.4mAHD at the northern end. This makes it between 0.4m and 1.4m below existing surface levels.

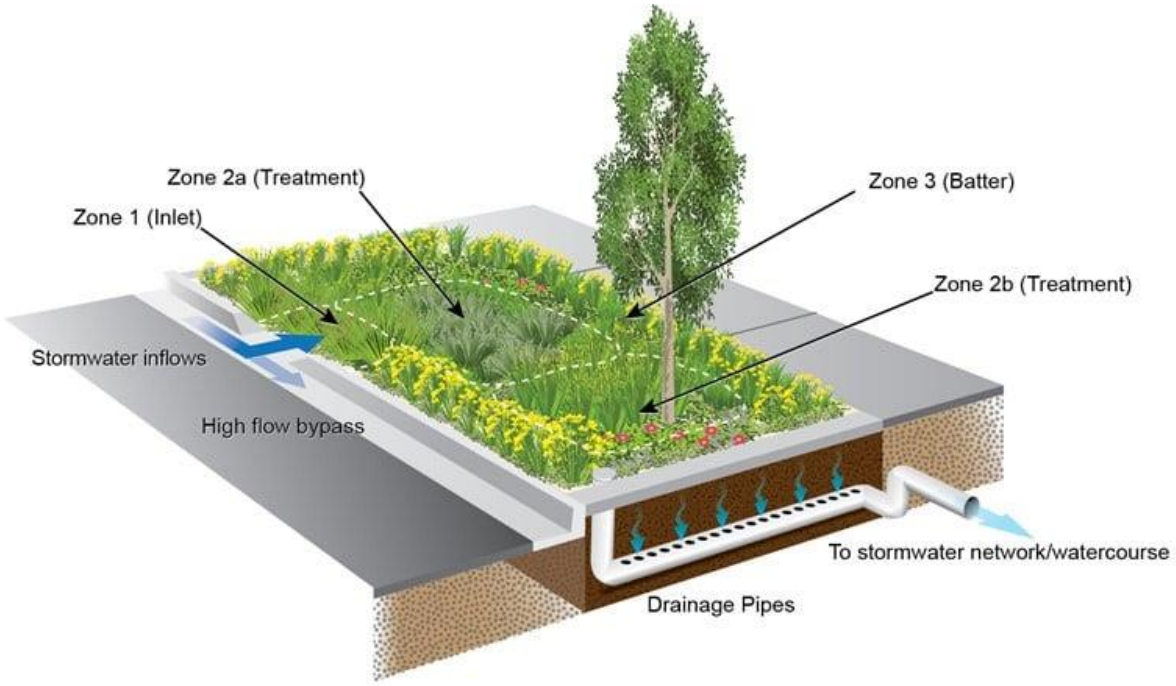


Figure 1: Typical example of a stormwater biofiltration system, image source: Water Sensitive SA

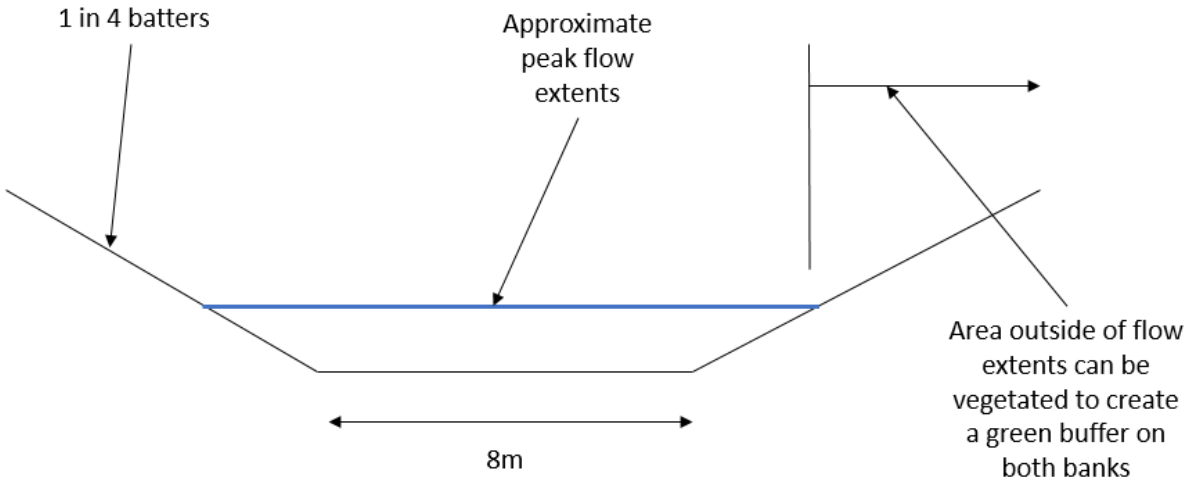


Figure 2: Typical section of eastern channel

Figure 3: Eastern channel extents

2.3.4.3 Roof runoff capture

Roof water from some large roof areas will be collected and reused on-site for non-potable uses. It will pass through the site's demineralised water treatment plant and be used as process water. This will help to partially separate clean roof water from other sources of stormwater runoff and will reduce the amount of runoff generated by the site. These regions are shown shaded in orange within Figure 4.

2.3.4.4 Waste water treatment, raw water treatment and purification process areas

Areas shaded in yellow in Figure 4 are the areas of plant where waste water treatment, raw water treatment and purifications processes will occur. Locations where any chemicals are stored, handled or used will be bunded to capture any spills. The bunded areas will either be undercover such there is no interaction with stormwater or will be designed such that any stormwater produced by these areas will be captured inside the bunds and pumped to the site's waste water treatment facility for treatment.

2.3.4.5 Dry waste storage

The areas shaded in green within Figure 4 will be for dry waste storage, which is associated with the site's wastewater treatment facility. These areas will either have a canopy or be bunded, with the water from the bund pumped to the site's waste water treatment facility for treatment

2.3.4.6 Chemical storage and unloading points

The purple shaded areas on Figure 4 are the chemical storage and unloading points. Any storage tanks that are not under a sheltered area will be bunded to capture, segregate and treat any stormwater runoff through the site's waste water treatment facility.

Where truck unloading activities will occur, local spill containment will be designed such that the spills can be captured, controlled and cleaned up without any intermixing with runoff from any other areas.

2.3.4.7 Graphite concentrate unloading

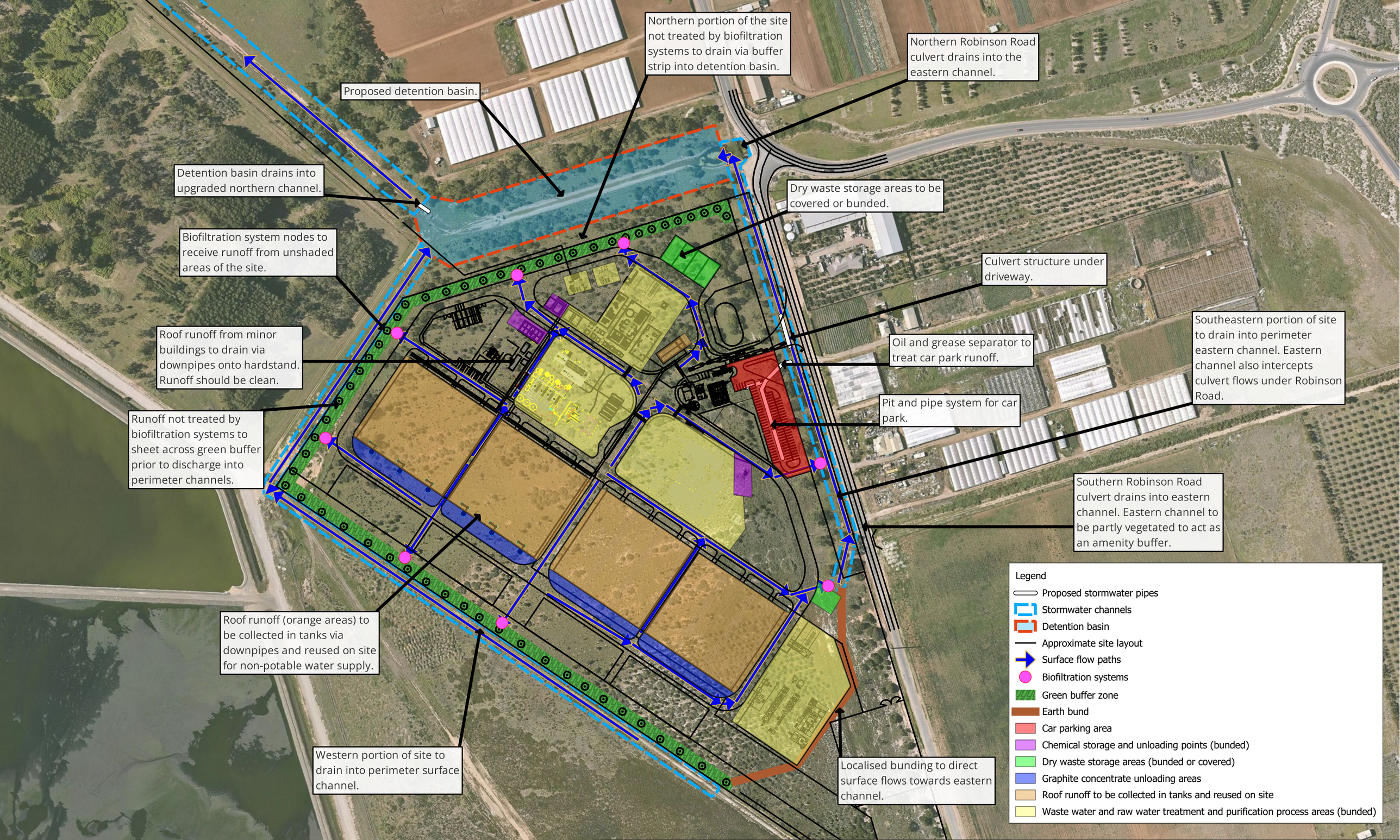
This area is where trucks will load graphite concentrate. It will be carried out on a hardstand surface with localised spill trays under any transfer points. The loading activity is pneumatic, so that dust generation through the activity will be minimal. Any local spills will be cleaned up using an industrial vacuum or broom and pan. Runoff from these areas will also be treated by the proposed biofiltration systems. The graphite concentrate unloading areas are shaded in blue within Figure 4.

2.3.5 Overall site stormwater plan

An overall site stormwater management plan is shown in Figure 4. It shows the following elements:

- The large perimeter open channels to the east and west of the site
- The large detention basin to the north of the site
- The location of a water quality treatment device for the main car park
- The location of biofiltration systems
- A preliminary pit and pipe layout to serve the car park
- The location of roofs that will be captured for on-site reuse
- The chemical storage and unloading points
- The dry waste storage areas
- The waste water treatment, raw water treatment and purification process areas
- The general site grading plans towards the open channels or detention basin
- The vegetated buffer strip

It should be noted that the regional scale drainage strategy, which includes the large northern detention basin and eastern drainage channel that grades to the north, is still only in the early stages of development and that the details of the scheme are still subject to refinement. The elements that could still be modified and optimised are the channel batters, and the position and geometry of the northern basin.



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Job Number: 221223
Filename: 221223 Renascor SMP
Revision: Rev B
Date: 2024-03-05 08:26
Drawn: JW / WG

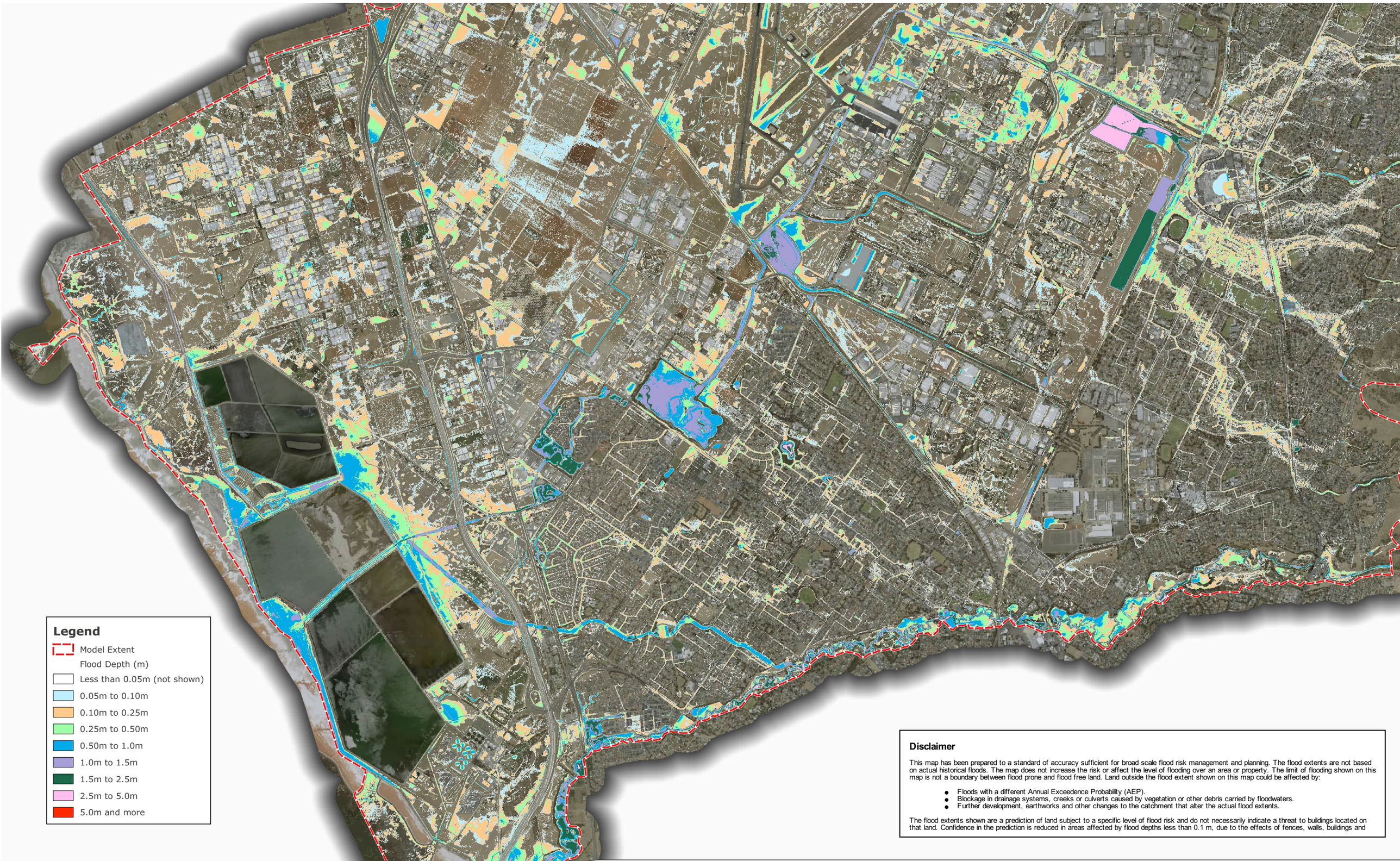
Data Acknowledgement:
Metromap (2024)

Renascor Resources

Renascor - Robinson Road Site
Stormwater Management Plan

Figure 4

Appendix A – Flood maps



Legend

- Model Extent
- Flood Depth (m)
- Less than 0.05m (not shown)
- 0.05m to 0.10m
- 0.10m to 0.25m
- 0.25m to 0.50m
- 0.50m to 1.0m
- 1.0m to 1.5m
- 1.5m to 2.5m
- 2.5m to 5.0m
- 5.0m and more

Disclaimer

This map has been prepared to a standard of accuracy sufficient for broad scale flood risk management and planning. The flood extents are not based on actual historical floods. The map does not increase the risk or affect the level of flooding over an area or property. The limit of flooding shown on this map is not a boundary between flood prone and flood free land. Land outside the flood extent shown on this map could be affected by:

- Floods with a different Annual Exceedence Probability (AEP).
- Blockage in drainage systems, creeks or culverts caused by vegetation or other debris carried by floodwaters.
- Further development, earthworks and other changes to the catchment that alter the actual flood extents.

The flood extents shown are a prediction of land subject to a specific level of flood risk and do not necessarily indicate a threat to buildings located on that land. Confidence in the prediction is reduced in areas affected by flood depths less than 0.1 m, due to the effects of fences, walls, buildings and

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0 1,000 2,000 3,000 m

Job Number: 211715
Filename: Flood_Maps.qpz
Revision: A
Date: 20-12-2022
Drawn: KS

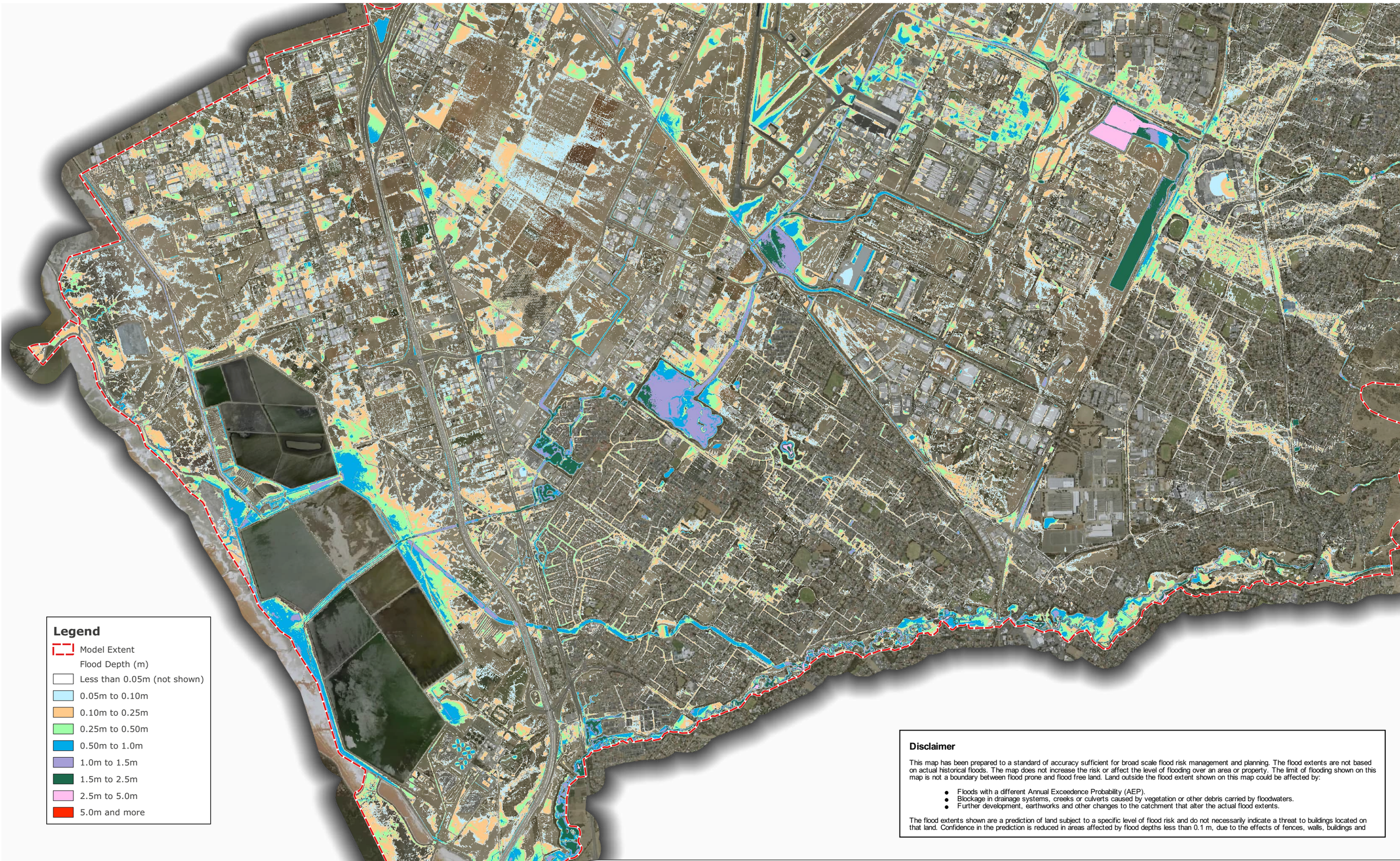
Data Acknowledgement:
Aerial imagery from MetroMap, 2021
Roads and railways from Data SA, 2018

N

Department for Trade and Investment
Planning and Land Use Services

FLOOD HAZARD MAPPING AND ASSESSMENT PROJECT
ADAMS CREEEK AND LOWER LITTLE PARA CATCHMENT
1% AEP FLOOD INUNDATION MAP (SOUTH)
EXISTING DEVELOPMENT AND CLIMATE

Map 5.2



Legend

- Model Extent
- Flood Depth (m)
  - Less than 0.05m (not shown)
  - 0.05m to 0.10m
  - 0.10m to 0.25m
  - 0.25m to 0.50m
  - 0.50m to 1.0m
  - 1.0m to 1.5m
  - 1.5m to 2.5m
  - 2.5m to 5.0m
  - 5.0m and more

Disclaimer

This map has been prepared to a standard of accuracy sufficient for broad scale flood risk management and planning. The flood extents are not based on actual historical floods. The map does not increase the risk or affect the level of flooding over an area or property. The limit of flooding shown on this map is not a boundary between flood prone and flood free land. Land outside the flood extent shown on this map could be affected by:

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- Blockage in drainage systems, creeks or culverts caused by vegetation or other debris carried by floodwaters.
- Further development, earthworks and other changes to the catchment that alter the actual flood extents.

The flood extents shown are a prediction of land subject to a specific level of flood risk and do not necessarily indicate a threat to buildings located on that land. Confidence in the prediction is reduced in areas affected by flood depths less than 0.1 m, due to the effects of fences, walls, buildings and

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0 1,000 2,000 3,000 m

Job Number: 211715
Filename: Flood_Maps.qpz
Revision: A
Date: 20-12-2022
Drawn: KS

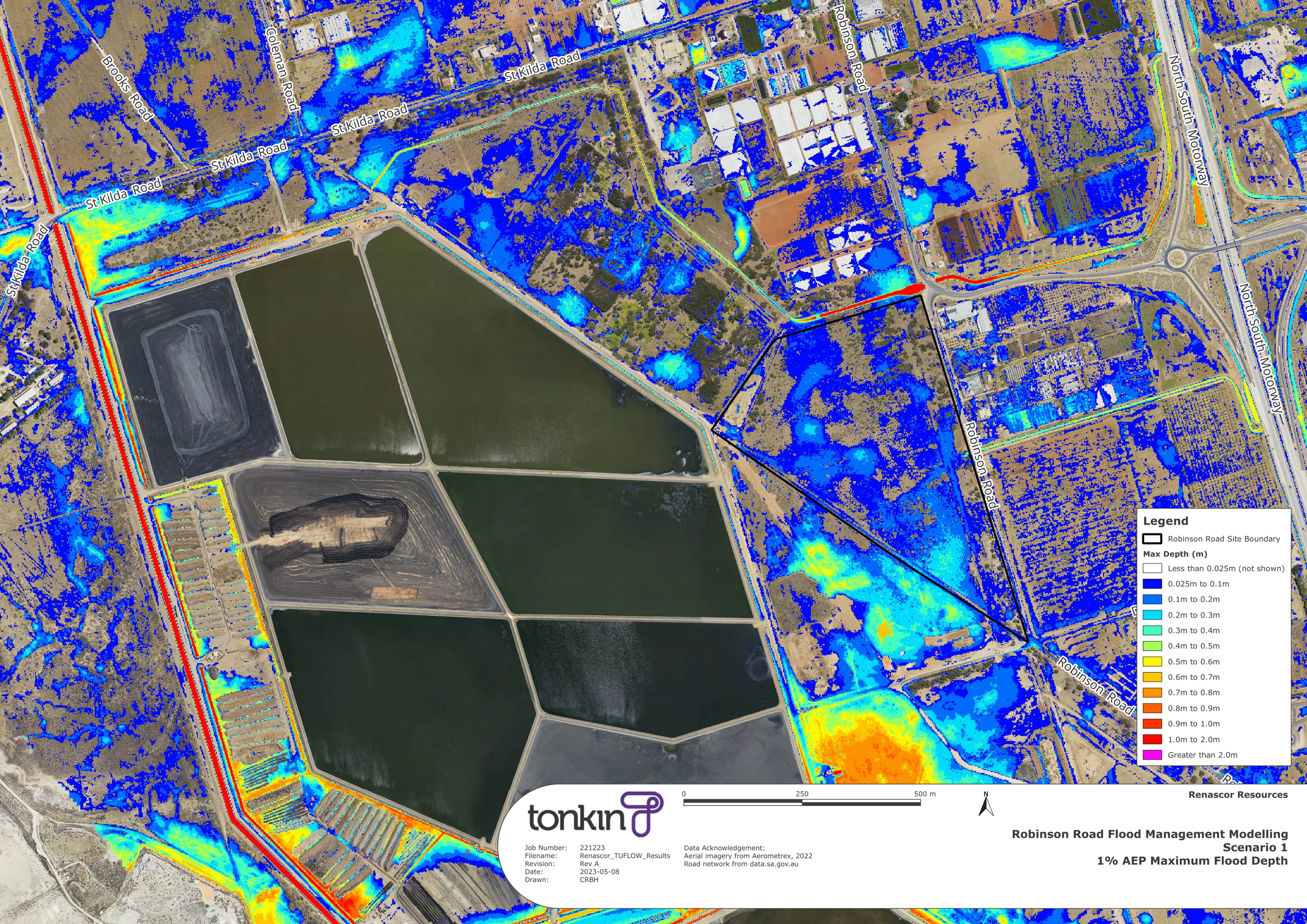
Data Acknowledgement:
Aerial imagery from MetroMap, 2021
Roads and railways from Data SA, 2018

N

Department for Trade and Investment
Planning and Land Use Services

FLOOD HAZARD MAPPING AND ASSESSMENT PROJECT
ADAMS CREEEK AND LOWER LITTLE PARA CATCHMENT
1% AEP FLOOD INUNDATION MAP (SOUTH)
2050 DEVELOPMENT WITH CLIMATE CHANGE

Map 14.2



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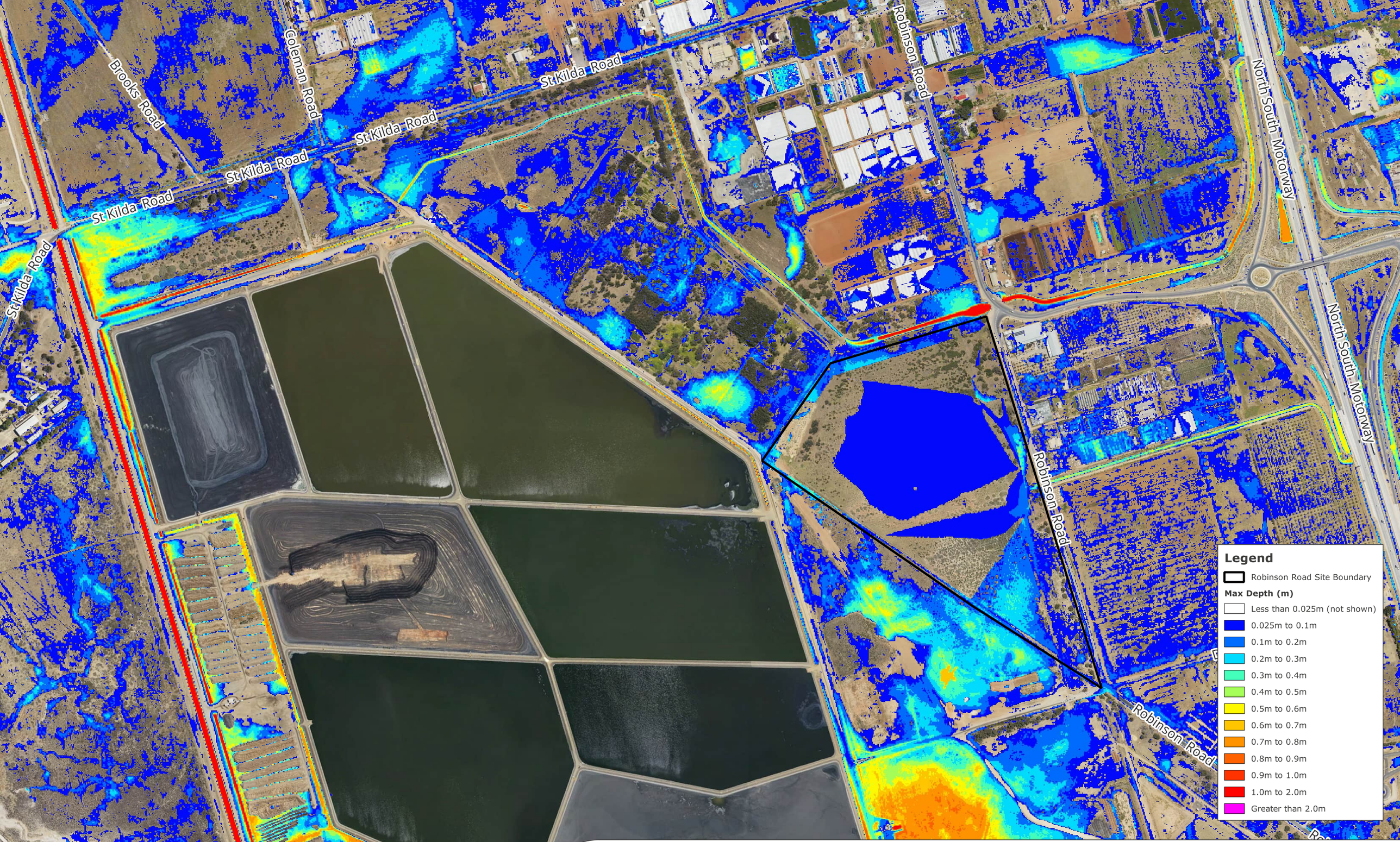
Job Number: 221223
Filename: Renascor_TUFLOW_Results
Revision: Rev A
Date: 2023-05-08
Drawn: CRBH

Data Acknowledgement:
Aerial imagery from Aerometrex, 2022
Road network from data.sa.gov.au

Renascor Resources

Robinson Road Flood Management Modelling
Scenario 1
1% AEP Maximum Flood Depth



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Job Number: 221223
Filename: Renascor_TUFLOW_Results
Revision: Rev A
Date: 2023-05-08
Drawn: CRBH

Data Acknowledgement:
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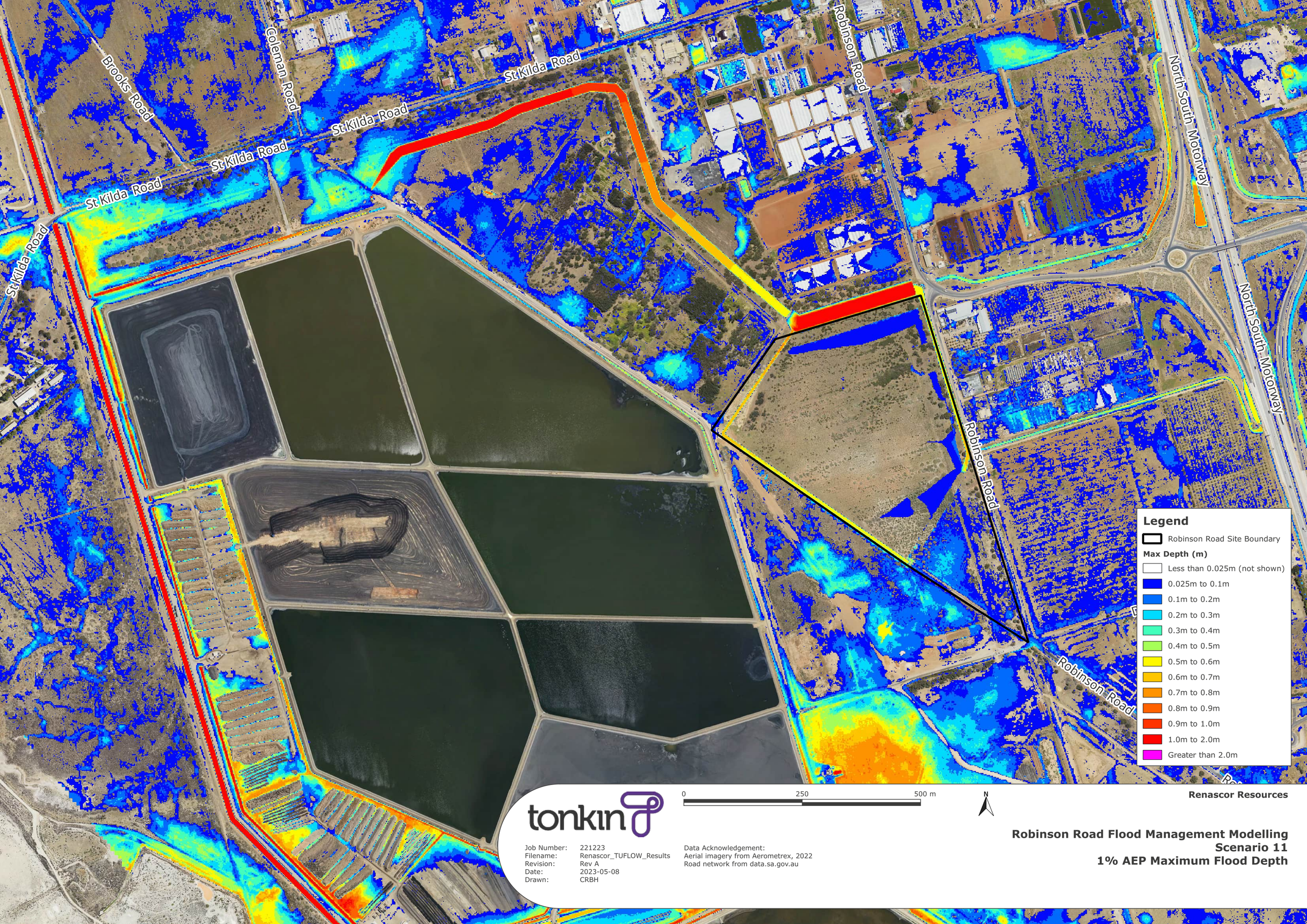
Road network from data.sa.gov.au

Renascor Resources

Robinson Road Flood Management Modelling
Scenario 3
1% AEP Maximum Flood Depth



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Job Number: 221223
Filename: Renascor_TUFLOW_Results
Revision: Rev A
Date: 2023-05-08
Drawn: CRBH

Data Acknowledgement:
Aerial imagery from Aerometrex, 2022
Road network from data.sa.gov.au

Renascor Resources

Robinson Road Flood Management Modelling
Scenario 11
1% AEP Maximum Flood Depth

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Job Number: 221223
Filename: Renascor_TUFLOW_Results
Revision: Rev A
Date: 2023-05-08
Drawn: CRBH

Data Acknowledgement:
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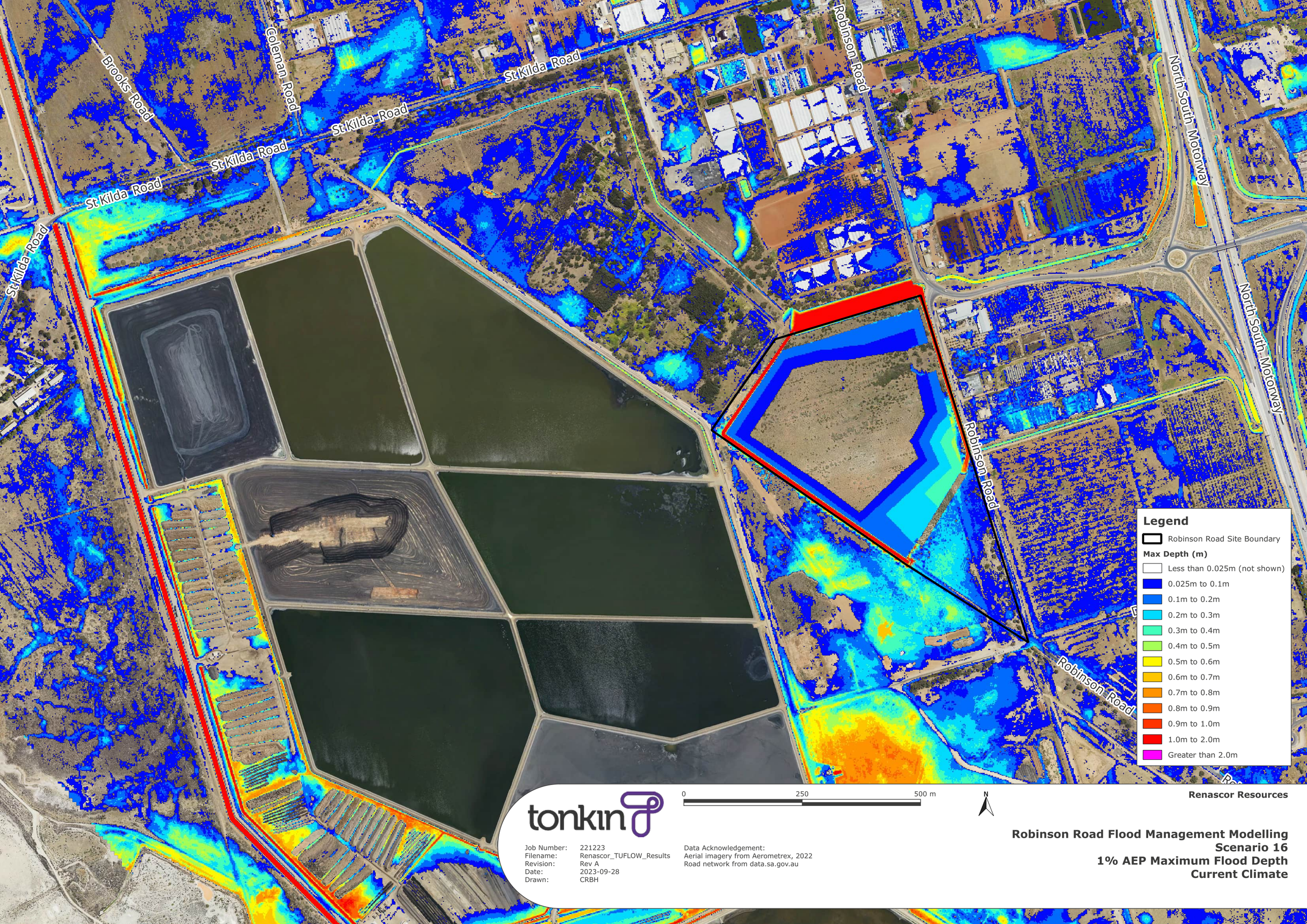
Road network from data.sa.gov.au

Renascor Resources

Robinson Road Flood Management Modelling
Scenario 11
1% AEP Flood Depth Difference to Existing



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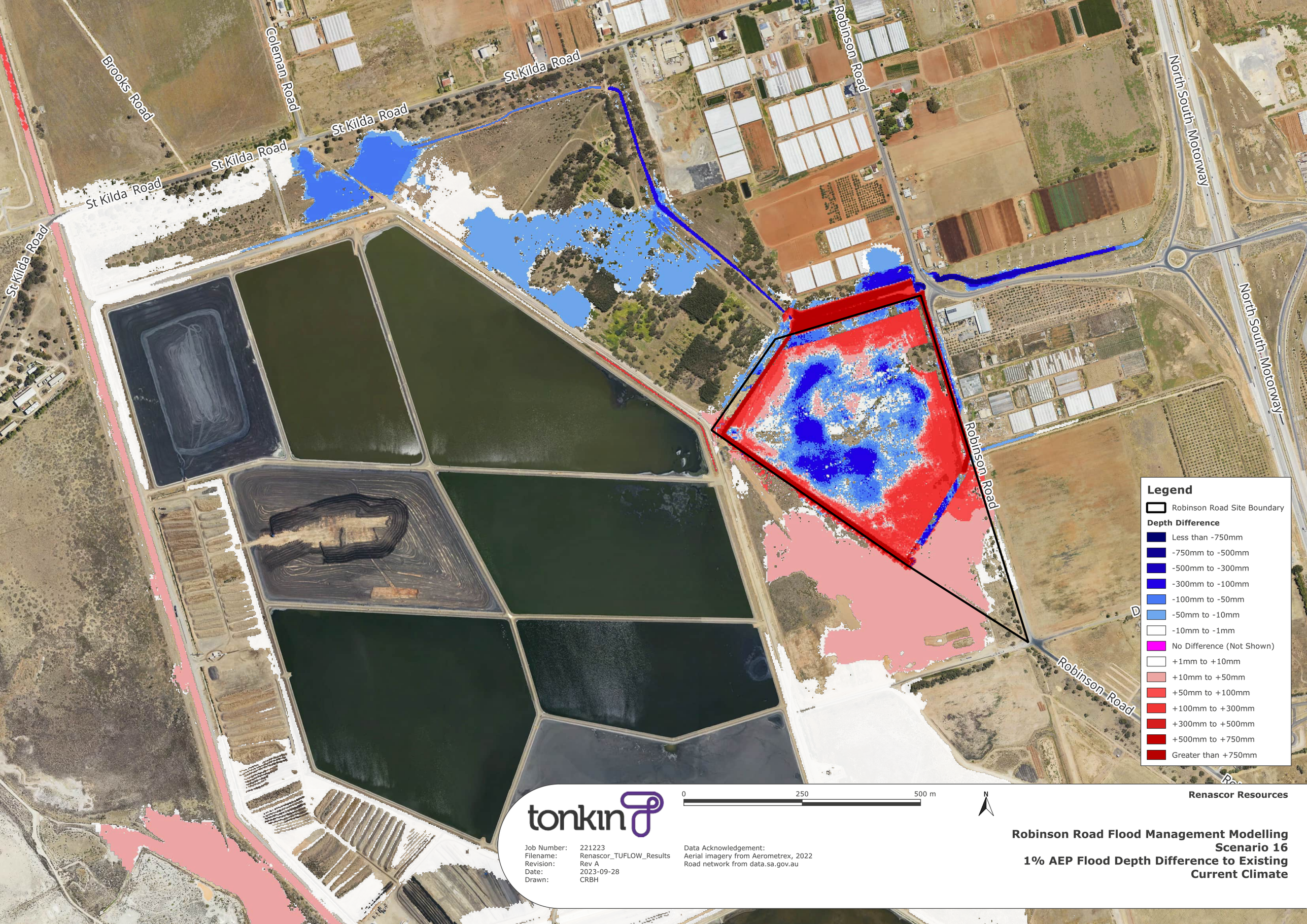
Job Number: 221223
Filename: Renascor_TUFLOW_Results
Revision: Rev A
Date: 2023-09-28
Drawn: CRBH

Data Acknowledgement:
Aerial imagery from Aerometrex, 2022
Road network from data.sa.gov.au

Renascor Resources

Robinson Road Flood Management Modelling
Scenario 16
1% AEP Maximum Flood Depth
Current Climate



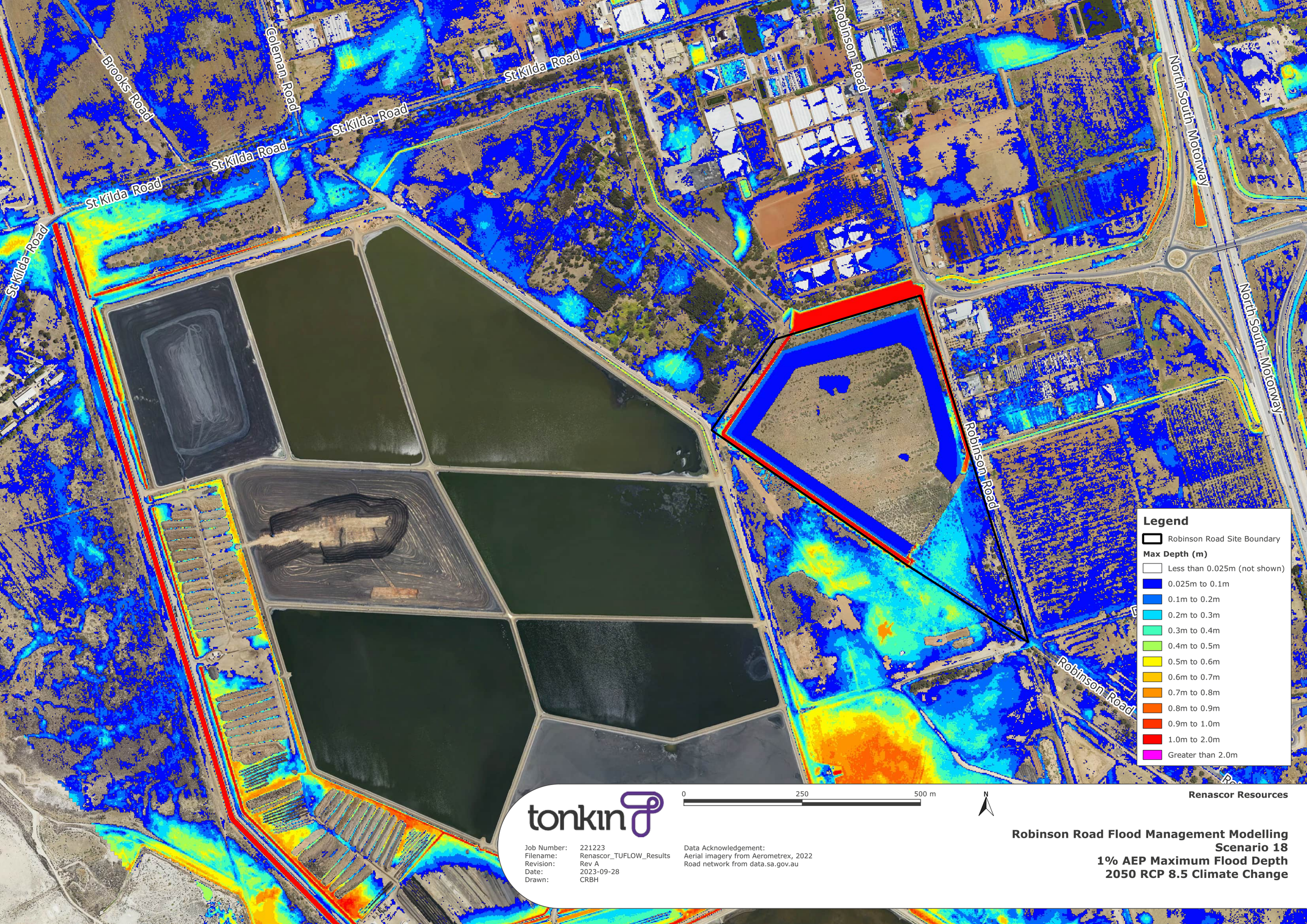
tonkin

Job Number: 221223
Filename: Renascor_TUFLOW_Results
Revision: Rev A
Date: 2023-09-28
Drawn: CRBH

Data Acknowledgement:
Aerial imagery from Aerometrex, 2022
Road network from data.sa.gov.au

Renascor Resources

Robinson Road Flood Management Modelling
Scenario 16
1% AEP Flood Depth Difference to Existing Current Climate



tonkin

Job Number: 221223
Filename: Renascor_TUFLOW_Results
Revision: Rev A
Date: 2023-09-28
Drawn: CRBH

Data Acknowledgement:
Aerial imagery from Aerometrex, 2022
Road network from data.sa.gov.au

Renascor Resources

Robinson Road Flood Management Modelling
Scenario 18
1% AEP Maximum Flood Depth
2050 RCP 8.5 Climate Change

Appendix 11 Air Quality Assessment

RENASCOR BAM PROJECT

Air Quality Assessment
Bolivar UPSG Processing Facility

Prepared for:

JBS&G

SLR Ref: 650.30016-R01
Version No: -v1.4
January 2024

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with JBS&G (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
650.30016-R01-v1.4	18 January 2024	J Meline	J A Cox	J Meline
650.30016-R01-v1.3	21 August 2023	J Meline	J A Cox	J Meline
650.30016-R01-v1.2	23 May 2023	J Meline	J A Cox	J Meline
650.30016-R01-v1.1	22 May 2023	J Meline	J A Cox	J Meline
650.30016-R01-v1.0	15 February 2023	J Meline	J Shepherd	J Meline

CONTENTS

1 INTRODUCTION 6
2 DESCRIPTION OF SITE LOCATION AND OPERATIONS 7
2.1 Site Location 7
2.2 Facility Operations 9
2.3 Facility Air Emissions 13
2.1 Local Topography 14
2.2 Land Use Zoning 14
2.3 Sensitive Receptor Locations 15
2.4 Local Meteorology - Wind Data 17
2.5 Existing Air Quality 20
2.5.1 Background Concentrations 20
2.5.2 Odour 24
3 RELEVANT LEGISLATION, POLICY AND GUIDELINE 25
4 ASSESSMENT METHODOLOGY 27
4.1 Dispersion Model and Meteorological Data 28
4.1.1 Processing of Meteorological Data 28
4.1.2 Dispersion Model Configuration 29
4.2 Emissions Estimation 29
4.3 Air Quality Assessment Criteria 30
4.4 Air Quality Impacts from Construction 30
5 EMISSIONS DATA 31
6 RESULTS 33
6.1 PM_{10} 33
6.2 $PM_{2.5}$ 35
6.3 NO_2 38
6.4 CO 41
6.5 H_2S 44
7 CONCLUSIONS 46
8 REFERENCES 47

CONTENTS

DOCUMENT REFERENCES

TABLES

Table 1 Emission Sources 13
Table 2 Elizabeth Downs PM_{10} 24 Hour Average Data 2008 to 2019 21
Table 3 Elizabeth Downs $PM_{2.5}$ 24 Hour Average Data 2016 to 2019 21
Table 4 Elizabeth Downs NO_2 1 Hour Average Data 2002 to 2019 22
Table 5 Elizabeth Downs CO 1 Hour Average Data 2003 to 2016 23
Table 6 Elizabeth Downs CO 8 Hour Average Data 2003 to 2016 23
Table 7 Air Quality Data for Background Concentrations 24
Table 8 Air EPP Ground Level Concentration Assessment Criteria 26
Table 9 TAPM and CALMET Modelling Domain Details 29
Table 10 CALPUFF Domain Details and Model Settings 29
Table 11 Emissions Estimation Details 30
Table 12 Emissions Data, Emissions Factors and Emission Rates 31
Table 13 Stack/Point Source Parameters 32
Table 14 Volume Source Parameters 32
Table 15 Results Sensitive Receptor Locations PM_{10} Ground Level Concentrations 33
Table 16 Results Sensitive Receptor Location $PM_{2.5}$ Ground Level Concentrations 35
Table 17 Results Sensitive Receptor Location NO_2 Ground Level Concentrations 38
Table 18 Results Sensitive Receptor Location CO Ground Level Concentrations 41
Table 19 Results Sensitive Receptor Locations H_2S Ground Level Concentrations 44

FIGURES

Figure 1 Site Location 8
Figure 2 Mill Train Building Layout 11
Figure 3 Mill Train Building Layout 12
Figure 4 Land Use Zoning Surrounding the Project Location 15
Figure 5 Sensitive Receptor Locations 16
Figure 6 Annual Wind Rose 17
Figure 7 Seasonal Wind Roses 18
Figure 8 Time of Day Wind Roses 19
Figure 9 Dispersion Modelling Assessment Methodology Overview 27
Figure 10 Maximum Predicted PM_{10} 24 Hour Average Ground Level Concentrations 34
Figure 11 Maximum Predicted $PM_{2.5}$ 24 Hour Average Ground Level Concentrations 36
Figure 12 Predicted $PM_{2.5}$ Annual Average Ground Level Concentrations 37
Figure 13 Maximum Predicted NO_2 1 Hour Average Ground Level Concentrations 39
Figure 14 Predicted NO_2 Annual Average Ground Level Concentrations 40
Figure 15 Maximum Predicted CO 1 Hour Average Ground Level Concentrations 42
Figure 16 Maximum Predicted CO 8 Hour Average Ground Level Concentrations 43
Figure 17 Maximum Predicted H_2S 3 Minute Average Ground Level Concentrations 45

CONTENTS

APPENDICES

Appendix A: Selection of Meteorological Data Year
Appendix B: Evaluation of Meteorological Data
Appendix C: IAQM Construction Dust Impact Assessment
Appendix D: Air Quality Management Plan Section for Site Environment Management Plan

1 Introduction

As part of Renascor's Siviour battery anode material (BAM) project with mining and concentration of graphite ore on the Eyre Peninsula, Renascor is seeking approval for a facility to produce uncoated purified spherical graphite (UPSG) near Bolivar in South Australia.

The UPSG facility will refine and purify graphite concentrate, incorporating mechanical shaping and hybrid thermal-chemical purification processes and produce a micronised, spheronised and highly purified (greater than 99.95% carbon) graphite product graded by particle size. Graphite, when refined to purified spherical graphite (PSG), is an essential mineral resource in the manufacture of anodes for lithium-ion batteries, a sector which is projected to experience significant growth in the coming decades.

The UPSG facility is proposed as a two-stage development with Stage 2 effectively doubling the capacity of Stage 1.

SLR was engaged by JBS&G to prepare this air quality assessment for the approvals for the facility.

The air quality assessment was based on dispersion modelling with emissions included from the operations as for the full development of the site (Stage 2).

Full details on what is proposed for the facility are not included in this report. Some of the information regarding the production is commercial in confidence[1].

[1] Renascor considers that some of the information required to be provided to satisfy the EIS assessment requirements is commercially sensitive. Specific and detailed information that relates to equipment, reagents, wastewater treatment and by-products could be utilised by competitors or potential customers to Renascor's commercial disadvantage.

2 Description of Site Location and Operations

2.1 Site Location

The location proposed for the UPSG facility is on land owned by SA Water adjacent to the Bolivar wastewater treatment plant (WWTP) and nearby to the Waterloo Corner Interchange of the North-South Motorway as presented in **Figure 1**.

Figure 1 Site Location

2.2 Facility Operations

PSG is produced in a two-production step process consisting of:

- Mechanical shaping through a milling process for micronisation and spheronisation of the graphite concentrate to micronised (less than 50 microns) and spherical form.
- Purification with cleaning and concentration of the shaped graphite by a hybridised thermal-chemical caustic roast process and acid leach stages into a highly purified product suitable for the production of lithium-ion battery anodes.

Following the purification the PSG product will be dried and packaged for distribution.

The facility will receive flake graphite concentrate at a quality of approximately 95% carbon from the Siviour Graphite Mine by road transport. Packaged PSG products will be transported by road to Port Adelaide for export.

Waste products that cannot be reused in the process are neutralised through chemical precipitation and dried. Graphite fines produced through the micronisation/spheronisation process will either be a waste product or saleable by-product dependant on feasibility and demand for the product.

Key components of the UPSG facility include:

- Structures associated with mechanical processing:
  - industrial buildings
  - silos
  - truck loading and unloading facilities, access and egress
  - product bagging plant equipment, including pneumatic conveyance and feed hoppers
  - mechanical, hydraulic and pneumatic conveyance and feed structures for the purpose of moving graphite concentrate, partially and wholly processed UPSG, chemical reagents and process by-products within the plant
  - chemical storage equipment suitable for the storage of solid and liquid, caustic and acidic reagents including appropriate bunding/hardstand
  - mineral crushing and grinding machinery comprising mechanical micronisation and spheronisation circuits, associated feed hoppers, dust mitigation, collection and conveyance structures, subject to final engineering design.
- Equipment associated with chemical processing:
  - caustic roast kiln (electric or gas-fired) including dry reagent mixing, cooling equipment, lump-breaking and pulping equipment
  - leach tanks (caustic and acid), filtration structures and repulp tanks
  - reverse osmosis (RO) water treatment equipment, including demineralisation brine capture and discharge
  - caustic process water treatment and neutralisation
  - acid process water treatment and neutralisation
  - solid process by-product isolation, drying and containment
  - process monitoring equipment.

- In addition, the UPSG facility will include either:
  - electric kiln, steam production and drying machinery, subject to availability of natural gas connection, or
  - fuel burning equipment including kiln and boiler structures, natural gas connection, stack emission scrubbers (electrostatic precipitators), and associated emissions monitoring and combustion management equipment, or
  - a combination of electric and gas-fired equipment associated with kiln processes, steam production and drying machinery, subject to the outcomes of the DFS.

The micronisation and spheronisation process involves a number of mills connected in trains. All exhaust stacks for the processing building contain dust control. The transport of graphite around the facility is through a pneumatic pipe system. This system is enclosed and include a number of dust collectors as described below at venting points. Layouts of a mill train building is shown in **Figure 2** and **Figure 3**.

Figure 2 Mill Train Building Layout

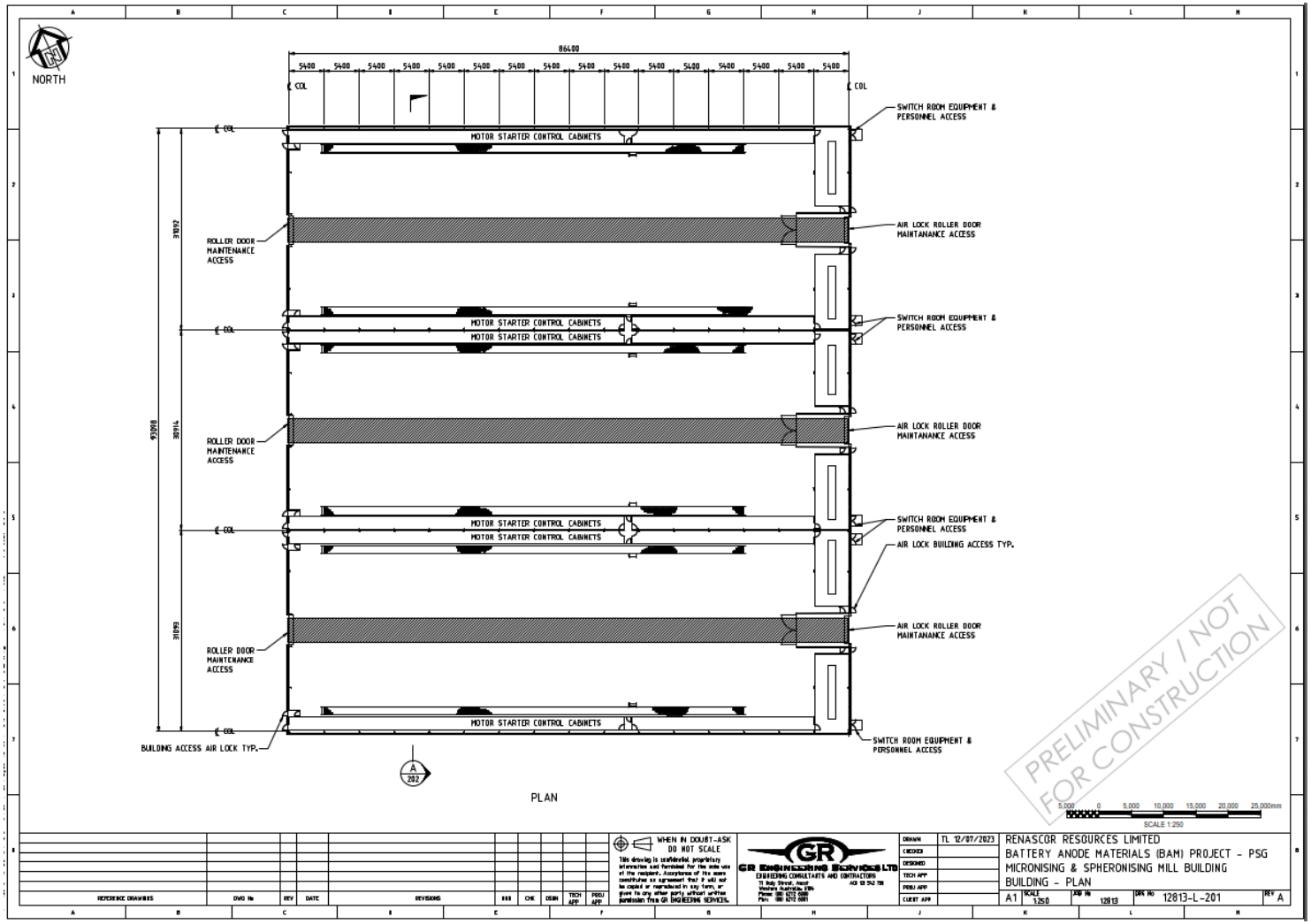
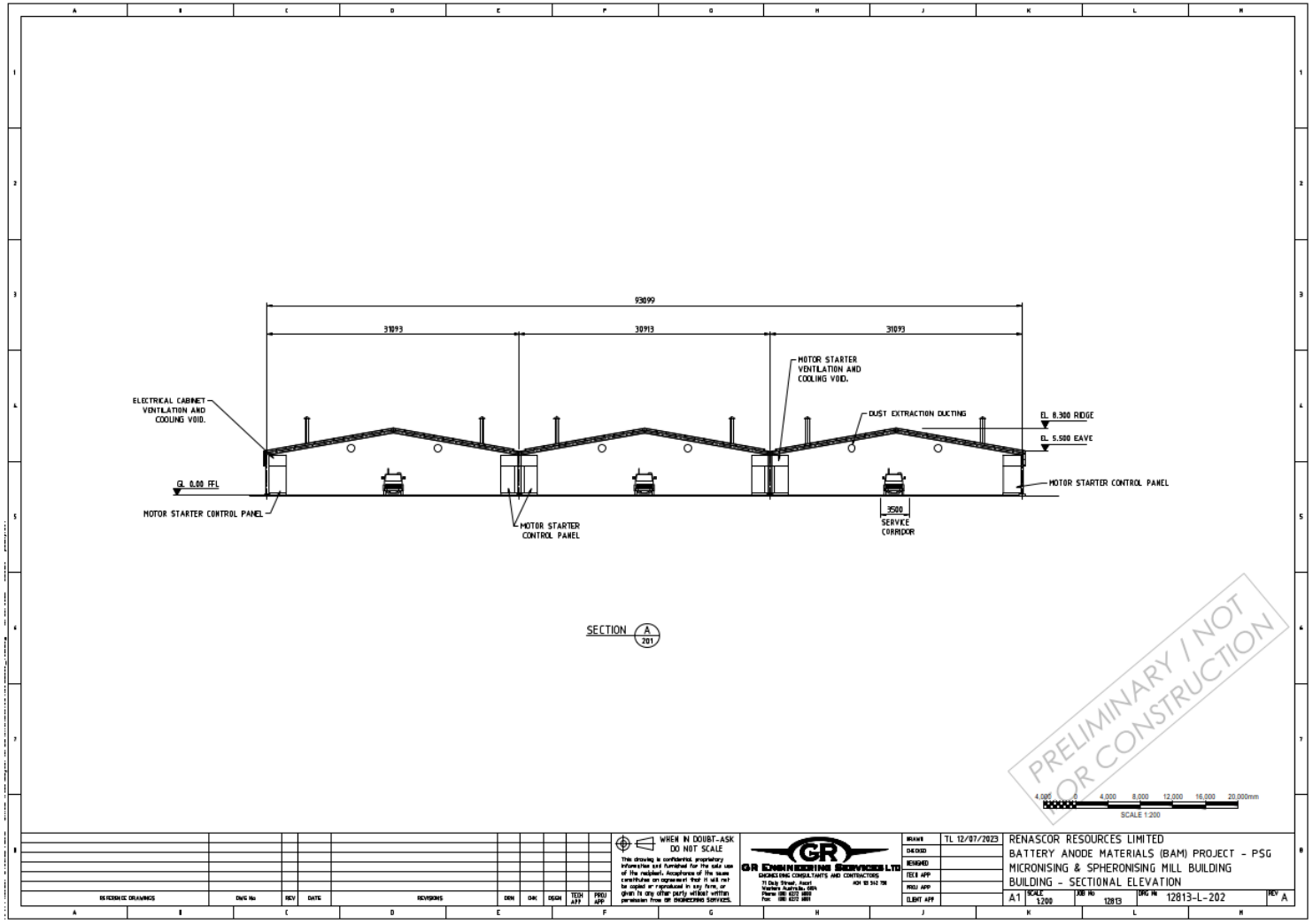


Figure 3 Mill Train Building Layout



2.3 Facility Air Emissions

A summary of the air emission sources included in the assessment, as identified from the project and process descriptions, are listed in **Table 1**.

The following pollutants were identified as emitted from the sources included in the assessment:

- Particulate matter as PM_{10} and $PM_{2.5}$ (equivalent aerodynamic diameters of 10 and 2.5 microns)
- Nitrogen dioxide (NO_2)
- Carbon monoxide (CO)
- Hydrogen sulfide (H_2S)

The potential for nuisance dust impacts from construction was also considered and is addressed in **Appendix C**. The potential for dust impacts from the facility construction was identified as low risk.

Table 1 Emission Sources

Stage 1	Stage 2
Micronisation A conservative number of stacks were modelled based on preliminary engineering design. Final number of stacks to be determined through detailed engineering. Separate dust collector for each stack. Emissions of particulate matter (PM_{10} and $PM_{2.5}$).	**Micronisation** Doubling of Stage 1 emission sources. Separate dust collector for each stack. Emissions of PM_{10} and $PM_{2.5}$.
Spheronisation A conservative number of stacks were modelled based on preliminary engineering design. Final number of stacks to be determined through detailed engineering. Separate dust collector for each stack. Emissions of PM_{10} and $PM_{2.5}$.	**Spheronisation** Doubling of Stage 1 emission sources. Separate dust collector for each stack. Emissions of PM_{10} and $PM_{2.5}$.
Mill train building ventilation exhaust Mill train building ventilation exhaust from dust collector. One ventilation point assumed for each two mill trains. A conservative number of emission points were modelled based on preliminary engineering design. Final number of vents to be determined through detailed engineering. Emissions of PM_{10} and $PM_{2.5}$.	**Mill train building ventilation exhaust** Doubling of Stage 1 emission sources. Emissions of PM_{10} and $PM_{2.5}$.
Rotary kiln stack 1 rotary kiln per stage. Emissions assuming gas fired kiln (as worst-case assumption of the kiln options). At the time of the assessment an electrically heated kiln was being considered as an option. Emissions of combustion gases: PM_{10}, $PM_{2.5}$, NO_2 and CO.	**Rotary kiln stack** 1 rotary kiln per stage. Emissions assuming gas fired kiln (as worst-case assumption of the kiln options). At the time of the assessment an electrically heated kiln was being considered as an option. Emissions of combustion gases: PM_{10}, $PM_{2.5}$, NO_2 and CO.
Rotary kiln dust collector/scrubber stack Emissions of PM_{10} and $PM_{2.5}$ from kiln of roasted product.	**Rotary kiln dust collector/scrubber stack** Emissions of PM_{10} and $PM_{2.5}$ from kiln of roasted product.
Alkaline gas scrubber stack 1 alkaline gas scrubber stack per stage. Emissions of residual H_2S from scrubber treatment.	**Alkaline gas scrubber stack** 1 alkaline gas scrubber stack per stage. Emissions of residual H_2S from scrubber treatment.
Spiral flash drier stack 1 flash drier per stage.	**Spiral flash drier stack** 1 flash drier per stage.

Stage 1	Stage 2
Emissions from stack from gas fired drier. Emissions of combustion gases: PM_{10}, $PM_{2.5}$, NO_2 and CO.	Emissions from stack from gas fired drier. Emissions of combustion gases: PM_{10}, $PM_{2.5}$, NO_2 and CO.
Steam boiler stack 1 boiler per stage. Emissions from stack from gas fired boiler. Emissions of combustion gases: PM_{10}, $PM_{2.5}$, NO_2 and CO.	**Steam boiler stack** 1 boiler per stage. Emissions from stack from gas fired boiler. Emissions of combustion gases: PM_{10}, $PM_{2.5}$, NO_2 and CO.
Pneumatic graphite transport system dust collectors A conservative number of emission points were modelled based on preliminary engineering design. Final number of vents to be determined through detailed engineering. Emissions of PM_{10} and $PM_{2.5}$.	**Pneumatic graphite transport system dust collectors** Doubling of Stage 1 emission sources. Emissions of PM_{10} and $PM_{2.5}$.

Considering the relatively low frequency of truck and vehicle movements[2] at the facility, particulate matter fugitive emissions from truck movements at site are deemed to be relatively insignificant and were therefore not included in the assessment.

2.1 Local Topography

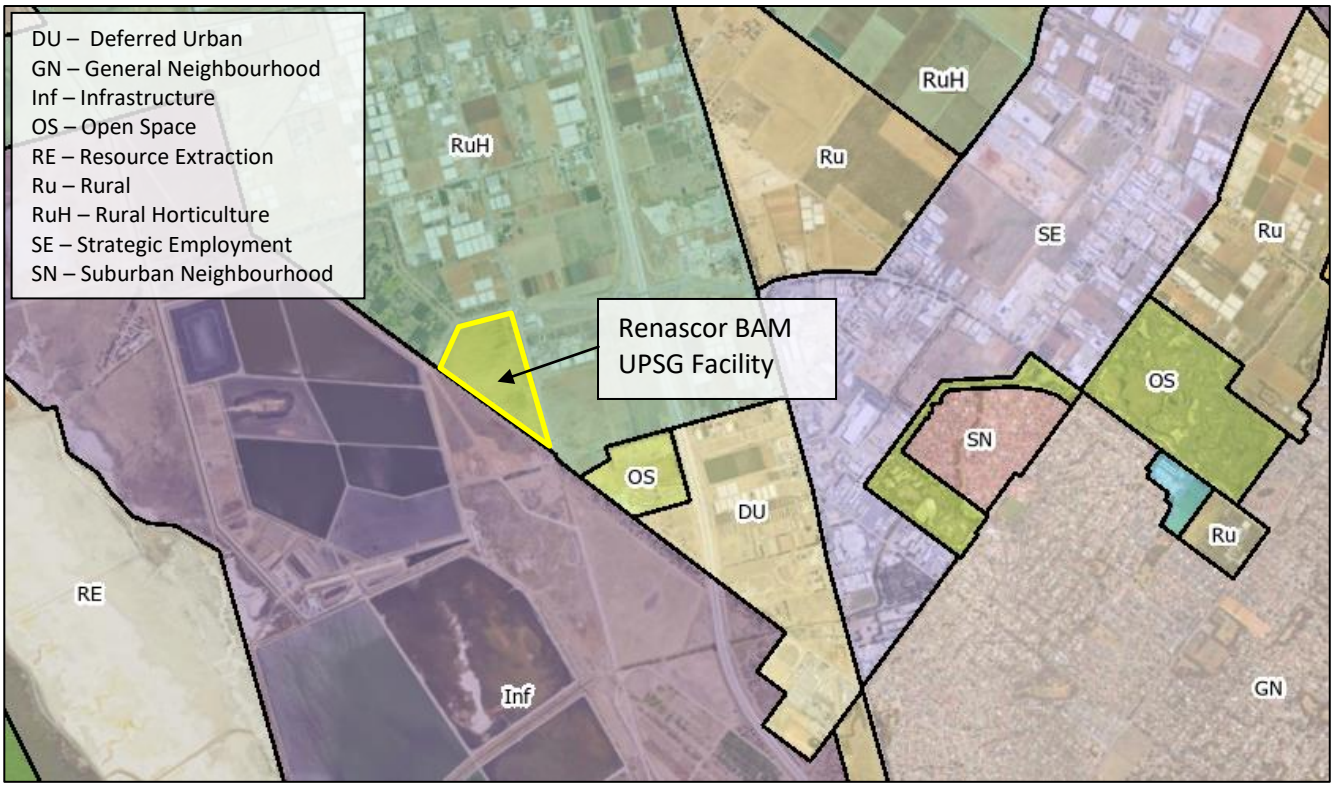
The land around the proposed facility location is essentially flat with a small rising gradient from the coastline towards inland. There are no significant terrain features in the vicinity with any potential to impact on the air quality situation as addressed in this assessment.

2.2 Land Use Zoning

The land use zoning in the area is presented in **Figure 4** and should to some extent be considered in the evaluation of the predicted air quality[3] impacts, at the nearest sensitive receptors.

[2] Less than one truck per hour.
[3] Mostly in relation to odour.

Figure 4 Land Use Zoning Surrounding the Project Location



Source: SA Property and Planning Atlas

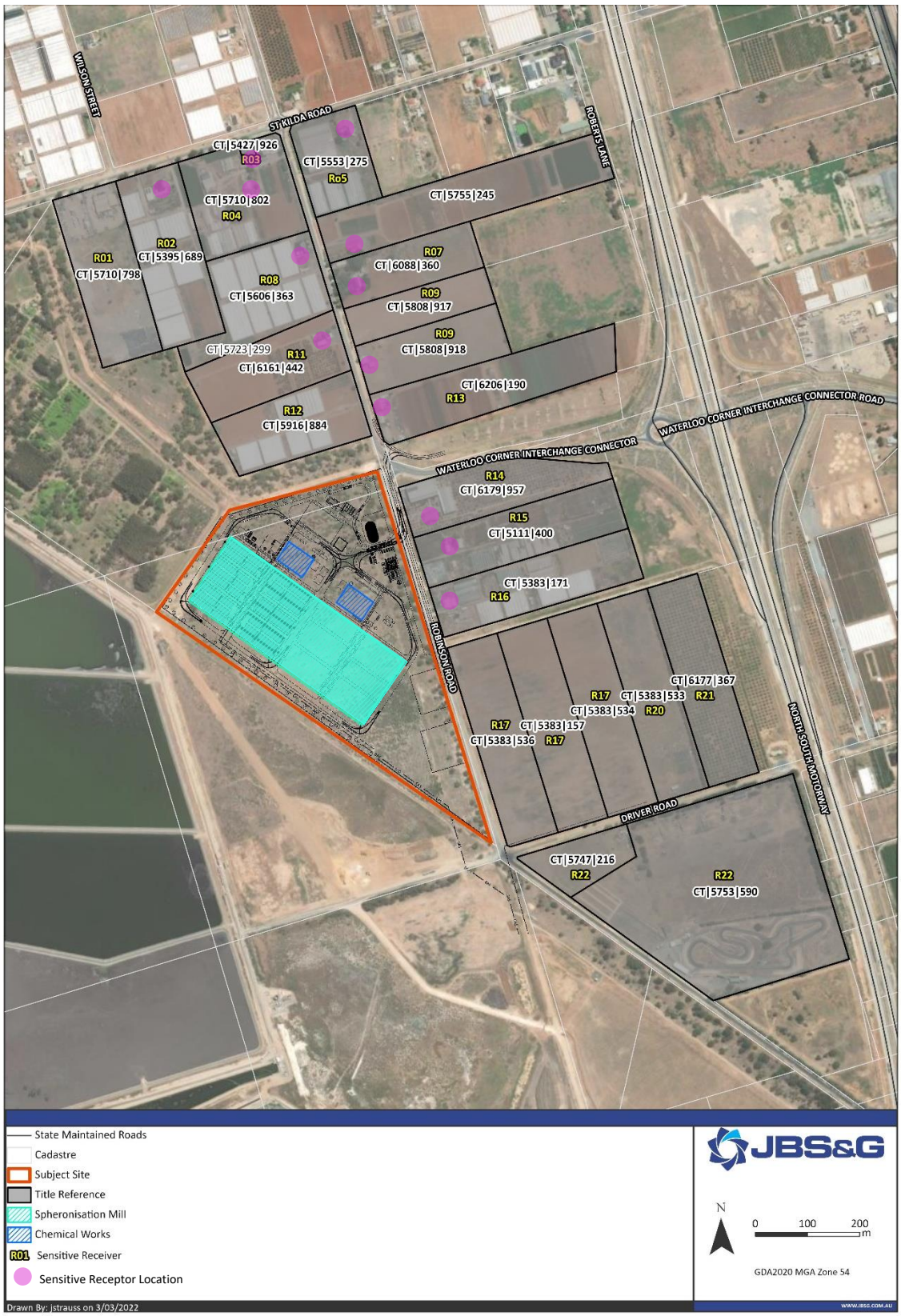
2.3 Sensitive Receptor Locations

The locations of the nearest sensitive receptors, identified as houses used as residences, by JBS&G and are presented in **Figure 5**.

The closest sensitive receptors (R14, R15 and R16) are located at a distance of approximately 120 m to the east of the facility activity-boundary of air emissions sources (purification plant[4]), included in the assessment.

[4] Rotary kiln, Alkaline gas scrubber, Spiral flash drier and Steam boiler

Figure 5 Sensitive Receptor Locations



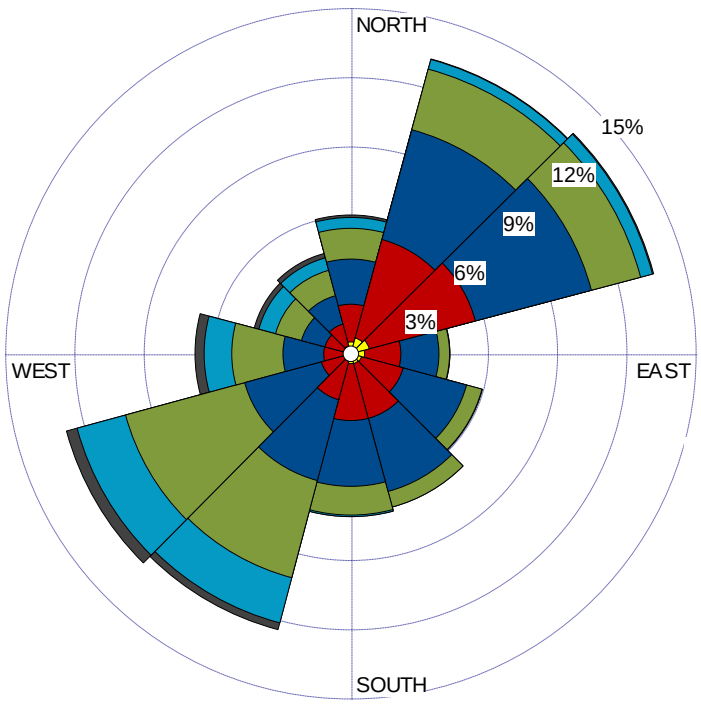
2.4 Local Meteorology - Wind Data

Wind data from the Bureau of Meteorology (BoM) Edinburgh automatic weather station (AWS) located approximately 5.5 km inland to the northeast of the proposed facility location is presented in **Figure 6** to **Figure 8**.

The prevailing wind directions in the area are southwesterly and northeasterly. Southwesterly winds are prevailing in summer months and afternoons and evenings (all year). Northeasterly winds are prevailing in winter months and nights and mornings (all year).

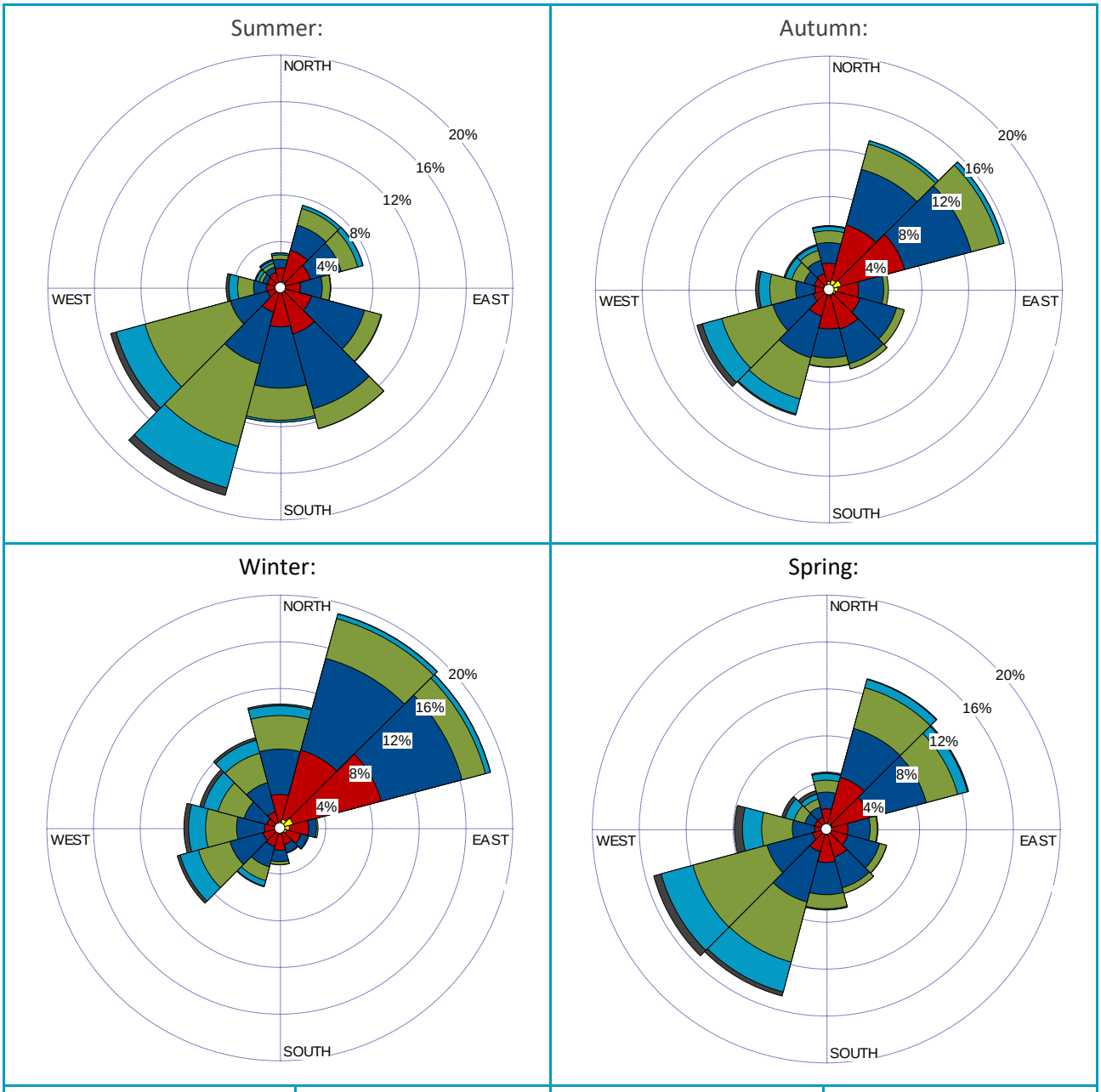
The closest sensitive receptors to the east of the facility on the other side of Robinson Road are in the prevailing downwind southwesterly wind direction. The wind speeds for this direction are however generally higher, which is favourable for dispersion.

Figure 6 Annual Wind Rose



Location: Edinburgh BoM AWS	**Data period:** 2007 to 2021	**Time period:** All hours	**Data type:** Observation	WIND SPEED (m/s) >= 10.80 8.00 - 10.80 5.30 - 8.00 3.00 - 5.30 1.50 - 3.00 0.50 - 1.50
Average wind speed: 4.5 m/s		**Calm wind frequency:** 1.7%		

Figure 7 Seasonal Wind Roses



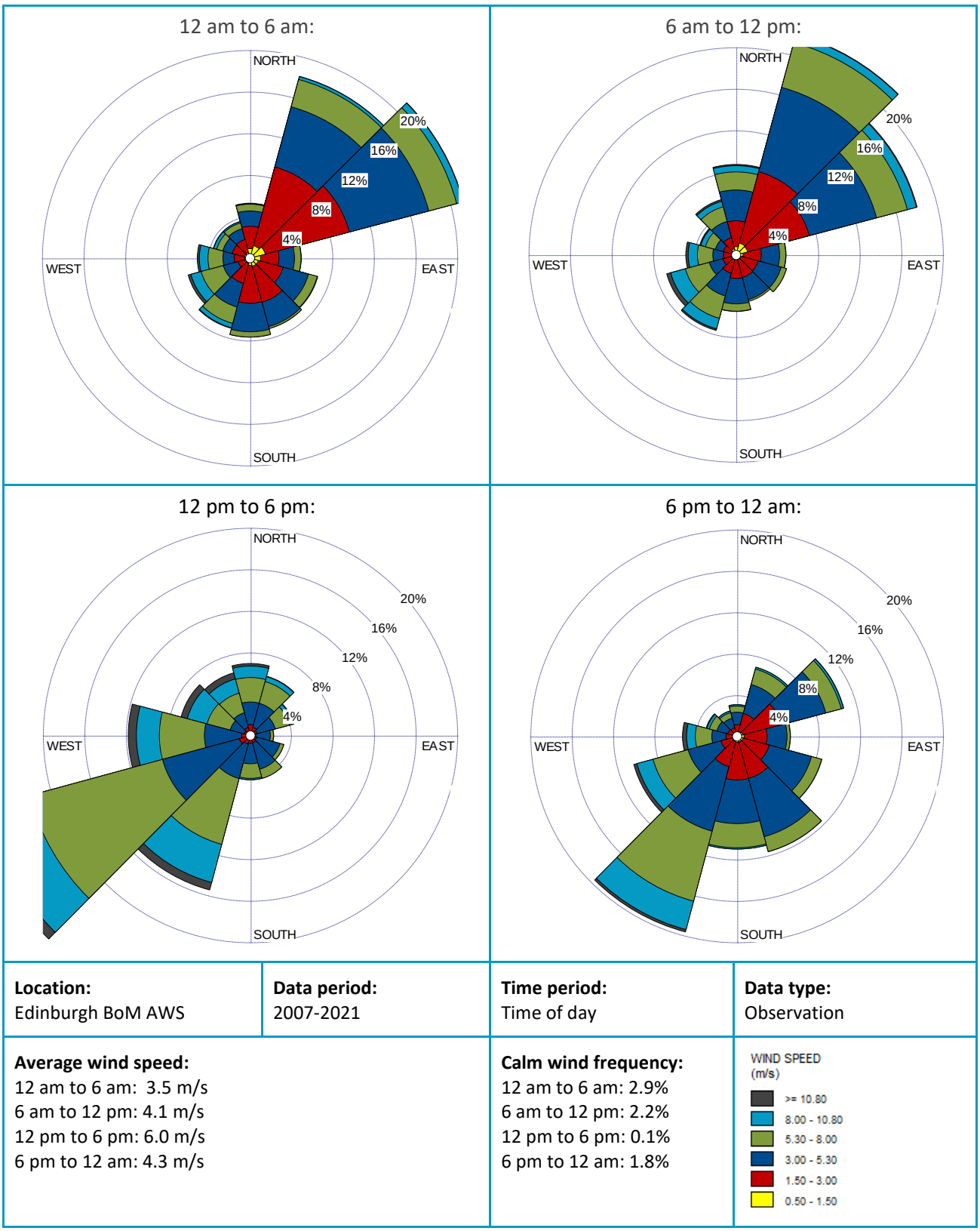
Location:	Data period:	Time period:	Data type:
Edinburgh BoM AWS	2007-2021	Seasonal	Observation

Average wind speed:
Summer: 4.7 m/s
Autumn: 4.1 m/s
Winter: 4.2 m/s
Spring: 7.9 m/s

Calm wind frequency:
Summer: 1.1%
Autumn: 2.4%
Winter: 2.3%
Spring: 1.1%

WIND SPEED (m/s)
- >= 10.80
- 8.00 - 10.80
- 5.30 - 8.00
- 3.00 - 5.30
- 1.50 - 3.00
- 0.50 - 1.50

Figure 8 Time of Day Wind Roses



2.5 Existing Air Quality

2.5.1 Background Concentrations

The closest EPA ambient air quality monitoring stations are:

- North Haven (referred to as the North Western Adelaide – Le Fevre 2 station) approximately 9 km to the southwest of the project location and
- Elizabeth Downs (referred to as the Northern Adelaide – Elizabeth Downs station) approximately 12 km to the east northeast of the project location.

Of these two locations Elizabeth Downs is likely more representative of the project location. Le Fevre 2 arguably has more exposure to coastal conditions and industrial activities on Le Fevre peninsula.

A review of annual air quality data and statics for Elizabeth Downs for the years of data available was performed. The data is presented below and was used for selection of background concentrations for evaluation of the facility air emissions ground level concentrations against the Air EPP assessment criteria:

- PM_{10} data for 2008 to 2019 is presented in **Table 2**
- $PM_{2.5}$ data for 2016 to 2019 is presented in **Table 3**
- NO_2 data for 2002 to 2019 is presented in **Table 4**
- CO data for 2003 to 2016 is presented in **Table 5** and **Table 6.**

The air quality in Adelaide is generally good with only a few exceedances of Air EPP limits and air quality standards, mostly for PM_{10}.

It is noted that DATA SA does not have full data for any year after 2019 (only a few months for 2020 and 2021, and as such not included) available for download. CO monitoring is understood to have stopped in Elizabeth Downs in 2016 and is now only monitored by the EPA at the Adelaide CBD station location in South Australia.

The values selected for use as background concentrations are show in bold and summarised in **Table 7**.

Table 2 Elizabeth Downs PM_{10} 24 Hour Average Data 2008 to 2019

Year	Maximum 24 Hr Avg (µg/m³)	Number of Exceedances of Air EPP limit	90th Percentile 24 Hr Avg (µg/m³)	70th Percentile 24 Hr Avg (µg/m³)	Annual Average (µg/m³)	Data availability
2008	77.5	3	28.5	20.3	17.7	94%
2009	197.5	12	34.8	21.5	19.6	97%
2010	209.5	1	21.3	16.1	14.9	97%
2011	36.5	0	19.8	15.2	13.4	97%
2012	104.5	2	24.0	17.0	15.1	99%
2013	77.1	1	22.6	16.3	14.4	91%
2014	43.6	0	21.3	16.3	14.2	98%
2015	80.2	3	24.0	16.8	14.8	97%
2016	139.9	1	24.3	17.0	15.2	82%
2017	30.8	0	19.7	15.0	13.2	99%
2018	103.5	3	24.0	17.9	16.5	74%
2019	174.0	9	36.5	**22.5**	21.5	87%
2008-2019	209.5	35	25.1	17.4	15.8	79%

Source: (DATA SA, 2022)

Table 3 Elizabeth Downs $PM_{2.5}$ 24 Hour Average Data 2016 to 2019

Year	Maximum 24 Hr Avg (µg/m³)	Number of Exceedances of Air EPP limit	90th Percentile 24 Hr Avg (µg/m³)	70th Percentile 24 Hr Avg (µg/m³)	Annual Average (µg/m³)	Data availability
2016	13.9	0	7.2	5.3	4.5	99%
2017	16.2	0	9.8	**8.1**	**7.3**	85%
2018	15.8	0	9.1	7.2	6.4	73%
2019	33.0	1	8.3	6.5	6.1	98%
2016-2019	33.0	1	8.8	6.9	6.0	83%

Source: (DATA SA, 2022)

Table 4 Elizabeth Downs NO_2 1 Hour Average Data 2002 to 2019

Year	Maximum 1 Hr Avg (µg/m³)	Number of Exceedances of Air EPP limit	90th Percentile 1 Hr Avg (µg/m³)	70th Percentile 1 Hr Avg (µg/m³)	Annual Average (µg/m³)	Data availability
2002	82.1	0	24.6	10.3	9.4	94%
2003	87.6	0	19.8	7.9	7.6	97%
2004	75.3	0	21.3	9.6	8.9	95%
2005	78.0	0	20.5	8.6	8.3	95%
2006	87.2	0	20.5	10.3	8.9	89%
2007	80.0	0	18.5	8.2	7.1	94%
2008	63.6	0	18.5	8.2	7.4	93%
2009	57.5	0	18.5	8.2	6.8	97%
2010	71.8	0	20.5	8.2	8.3	95%
2011	63.6	0	18.5	8.2	7.0	95%
2012	55.4	0	16.4	6.2	6.2	93%
2013	116.6	0	18.5	7.9	7.6	95%
2014	175.5	0	19.8	8.9	8.7	95%
2015	57.5	0	20.5	8.2	8.3	95%
2016	51.3	0	14.4	6.2	5.6	81%
2017	71.8	0	20.5	10.3	9.1	75%
2018	65.7	0	18.5	10.3	8.6	84%
2019	61.6	0	16.4	**8.2**	**7.7**	91%
2002-2019	175.5	0	18.5	8.2	7.8	94%

Source: (DATA SA, 2022)

Table 5 Elizabeth Downs CO 1 Hour Average Data 2003 to 2016

Year	Maximum 1 Hr Avg (µg/m³)	Number of Exceedances of Air EPP limit	90th Percentile 1 Hr Avg (µg/m³)	70th Percentile 1 Hr Avg (µg/m³)	Annual Average (µg/m³)	Data availability
2003	3544	0	146	50	73	90%
2004	2621	0	112	35	57	96%
2005	2096	0	97	31	49	92%
2006	1762	0	112	25	38	86%
2007	1549	0	100	25	34	99%
2008	1562	0	75	25	40	96%
2009	1149	0	87	37	45	100%
2010	1924	0	87	37	44	98%
2011	1487	0	100	25	41	91%
2012	1737	0	75	25	30	94%
2013	1314	0	58	25	30	99%
2014	741	0	52	19	23	99%
2015	3223	0	50	25	27	97%
2016	825	0	50	12	21	99%
2003-2016	3544	0	85	**25**	39	95%

Source: (DATA SA, 2022)

Table 6 Elizabeth Downs CO 8 Hour Average Data 2003 to 2016

Year	Maximum 8 Hr Avg (µg/m³)	Number of Exceedances of Air EPP limit	90th Percentile 8 Hr Avg (µg/m³)	70th Percentile 8 Hr Avg (µg/m³)	Annual Average (µg/m³)	Data availability
2003	1758	0	181	63	73	92%
2004	1045	0	140	48	57	98%
2005	992	0	117	41	50	94%
2006	875	0	95	36	38	86%
2007	800	0	94	31	34	100%
2008	559	0	87	33	40	96%
2009	537	0	94	44	45	100%
2010	451	0	95	42	44	98%
2011	937	0	104	34	40	91%
2012	761	0	77	30	30	94%
2013	1254	0	65	26	30	99%
2014	284	0	56	23	23	99%
2015	1231	0	61	25	27	98%
2016	323	0	47	**22**	21	100%
2003-2016		0	91	34	39	96%

Source: (DATA SA, 2022)

A summary of the background concentrations applied in the assessment are presented in **Table 7.** These values were selected on conservative basis with a preference for a more recent year as to better reflect current conditions**.**

Table 7 Air Quality Data for Background Concentrations

Pollutant	Background Concentration	Averaging Time	Statistic	Monitoring Location	Percentile Year
PM_{10}	22.5 µg/m³	24 hours	70th Percentile	Elizabeth Downs	2019
$PM_{2.5}$	8.1 µg/m³	24 hours	70th Percentile		2017
	7.3 µg/m³	12 months	Annual average		2017
NO_2	8.2 µg/m³	1 hour	70th Percentile		2019
	7.7 µg/m³	12 months	Annual average		2019
CO	25 µg/m³	1 hour	70th Percentile		2003-2016
	22 µg/m³	8 hours	70th Percentile		2016

Source: (DATA SA, 2022)

2.5.2 Odour

The facility is proposed to be located within a couple of hundred metres from the SA Water Bolivar WWTP sludge lagoons. Considering the scale of nearby the Bolivar WWTP sludge operations, it is expected that there will be odour from the WWTP present at times in the area surrounding the proposed facility. There are no significant odour emissions from the proposed facility apart from some low level H_2S emissions estimated for the alkaline scrubber stacks. No estimate on a potential background concentration of H_2S (as relating to odour) from the Bolivar WWTP sludge operations has been included. There is no data or assessment available on a potential background concentration of H_2S in the area.

3 Relevant Legislation, Policy and Guideline

The Environment Protection Act 1993 (EP Act) is the legislative foundation for regulating air quality in South Australia. Section 25 of the EP Act defines a General Environmental Duty to take all reasonable and practical steps to prevent or minimise environmental harm.

Environmental harm is defined under Section 5 of the EP Act as including harm, potential harm and environmental nuisance. Harm is further categorised as material or serious environmental harm, according to the nature and scale of its impacts.

From an air quality perspective, environmental harm is caused by air pollutants having toxic or adverse effects on human health or the environment. Effects may be long term (for example, chronic cardio-respiratory conditions) or short term (for example irritation of eyes and nose and triggering of asthma).

Environmental nuisance is often caused by odours or dust that interfere with the amenity of affected communities. Odours may be obnoxious, causing immediate discomfort. However, sometimes more pleasant odours can become unpleasant to people because they are exposed continuously. Dust may be visible as clouds and can deposit on surfaces, such as windowsills and doorsteps or cause soiling of clothes.

The General Environmental Duty is implemented through mandatory provisions of policies and environmental authorisations. In relation to air quality, the Environment Protection (Air Quality) Policy 2016 (Air EPP) incorporates a range of ground level concentrations, odour criteria and in-stack concentrations for assessing impacts of a wide range of air pollutants (SA EPA, 2016).

In addition to the Air EPP there are also the Ambient Air Quality Assessment guideline issued by the Environment Protection Authority South Australia (SA EPA) which provides general guidance on air quality assessment in South Australia (SA EPA, 2016).

As outlined in the Ambient Air Quality Assessment guideline, the EPA takes a risk-based approach to environmental protection. This is typically also reflected in air quality assessment requirements.

3.1.1 Air EPP Air Quality Assessment Criteria

For the evaluation of air quality impacts and assessment of compliance for the proposed PSG production facility, the predicted maximum ground level concentrations from the dispersion modelling were assessed against the Air EPP Schedule 2 ground level concentration assessment criteria as presented in **Table 8** at the nearest sensitive receptor locations, as presented in **Section 2.3**.

Predicted maximum ground level concentrations of PM_{10}, $PM_{2.5}$, NO_2 and CO were assessed cumulatively with background concentrations as selected in **Section 2.5**.

Table 8 Air EPP Ground Level Concentration Assessment Criteria

Pollutant	Classification	Averaging Time	Air EPP Maximum Ground Level Concentration (µg/m³)
PM_{10}	Toxicity	24 hours	50
$PM_{2.5}$	Toxicity	24 hours	25
		12 months	8
NO_2	Toxicity	1 hour	250
	Toxicity	12 months	60
CO	Toxicity	1 hour	31,240
	Toxicity	8 hours	11,250
H_2S	Odour	3 minutes	0.15
	Toxicity	3 minutes	510

Source: SA, 2016

3.1.2 Evaluation Distances

The Evaluation Distances for Effective Air Quality and Noise Management guideline provides recommendations on evaluation (separation) distances for air quality management across interfaces between activities with emissions and sensitive receptors (SA EPA, 2019).

The guideline evaluation distances for activities similar to the proposed activities with milling for the PSG production include:

- the evaluation distance of 300 m for crushing grinding or milling of chemical or rubber (non-odorous)
- the evaluation distance of 500 m for crushing, grinding or milling of rock, ores or minerals.

The evaluation distance for crushing, grinding or milling of rock, ores or minerals might seem relevant to consider, however from the activity description in the guideline it is understood that this evaluation distance is likely primarily intended for handling and processing of bulk materials. This is not the case for the PSG production which is an enclosed process for the handling and transport of the lightweight graphite material.

4 Assessment Methodology

An overview of the air quality impact assessment dispersion modelling methodology is provided in **Figure 9**. Details on each of the key aspects of the air quality assessment methodology are provided in the following sections.

Figure 9 Dispersion Modelling Assessment Methodology Overview

4.1 Dispersion Model and Meteorological Data

Dispersion modelling to predict the ground level concentrations of emissions to air from the facility was performed using the CALPUFF dispersion model. CALPUFF is widely used in Australia as a suitable dispersion model for a range of applications including assessments in complex meteorological/terrain settings, such as hilly terrain or near coastal areas with land/sea interactions on dispersion.

The meteorological data year for the assessment was selected based on a review of wind data for recent years (2007 to 2021) recorded at regional Bureau of Meteorology AWS including Edinburgh, Parafield and Outer Harbour, at distances of 5.5 to 10 km from the project site. The year 2020 was selected as the most average year with a conservative frequency of calms[5], which often can be indicator of poor dispersion conditions.

It is noted that the SA EPA has indicated a preference for the year 2009 for use in dispersion modelling. However, the year 2009 does not provide the most representative or conservative conditions for modelling in all locations. Data availability for 2009 compared to more recent years is also an emerging issue. A summary on the wind data statistics, wind roses, windspeed class frequencies, temperature and rainfall data for the selection of the meteorological data year is presented and plotted in **Appendix A**.

4.1.1 Processing of Meteorological Data

The dispersion modelling requires twelve months of hourly meteorological data. The Air Pollution Model (TAPM) was used to generate site-representative data for input into CALMET for further processing of the fine scale three-dimensional wind field data required for the CALPUFF dispersion model. CALMET was processed in two steps with an outer coarser grid as an intermediary step for preparing the inner CALMET fine resolution modelling domain.

- A description of TAPM is available in the model user manual (CSIRO, 2008).
- A description of the CALMET/CALPUFF model is available in the CALPUFF manual (SRC, 2011).

A summary of the meteorological model domain details is provided in **Table 9**. Evaluation of the processed meteorological data is provided in **Appendix B**.

[5] Low wind speeds <0.5 m/s. Near calms often reflect peak impact conditions for air quality assessments.

Table 9 TAPM and CALMET Modelling Domain Details

Model and Domain Settings	Details	Model and Domain Settings	Details	Model and Domain Settings	Details
TAPM		**CALMET Outer**		**CALMET Inner**	
5 nested grids	30 x 30 grid points	Domain size	25 km x 25 km	Domain size	12 km x 12 km
Grid point resolutions	30 km, 10 km, 3 km, 1 km	Receptor grid	500 m resolution	Receptor grid	100 m resolution
Domain origin centre point	E: 275,731 N: 6,151,946 Zone: 54S	Domain origin southwest corner	E: 263,231 N: 6,139,446 Zone: 54S	Domain origin southwest corner	E: 269,731 N: 6,145,946 Zone: 54S
Period	31/12/2019 to 01/01/2021	Period	01/01/2020 to 31/12/2020	Period	01/01/2020 to 31/12/2020
Modelled with wind assimilation data for Edinburgh, Parafield and Outer Harbour.		Initial guess field	3D output from TAPM	Initial guess field	CALMET outer

Further details on model settings can be provided as required.

4.1.2 Dispersion Model Configuration

A summary of the model details is provided in **Table 10**.

Table 10 CALPUFF Domain Details and Model Settings

Item	Details
Domain details	100 m resolution for 9 km by 9 km domain
Receptor details	100 m resolution for gridded receptors and sensitive receptor locations
Emissions data	Continuous emissions for all sources assumed as for 24/7 operations.
Stack/point sources	Due to the number of stack sources from the mill buildings included for the assessment, building wakes were not included in the dispersion modelling from these sources. The reason for this was the complications with the amount of BPIP input data required for entry for each model configuration file input. Also, the exhaust velocities from the two types of mill stacks were high (50.8 and 25.6 m/s) providing a low likelihood of building wake entrainment [a].

Further details on model settings can be provided as required.

[a] A review of the results showed this to be a reasonable assumption.

4.2 Emissions Estimation

Emission rates for the emission sources (see **Section 5**) were estimated based on emissions data and emissions factors as summarised in **Table 11**.

Table 11 Emissions Estimation Details

Emission source	Details
Micronisation	Micronisation mill PM_{10} and $PM_{2.5}$ emission rates calculated based on dust collector exhaust emission concentrations and fan rates.
Spheronisation	Spheronisation mill PM_{10} and $PM_{2.5}$ emission rates calculated based on dust collector exhaust emission concentrations and fan rates.
Mill train building ventilation exhaust	Mill train building exhaust ventilation PM_{10} and $PM_{2.5}$ emission rates calculated based on dust collector exhaust emission concentrations and building ventilation rates.
Rotary kiln stack	The rotary kiln combustion emission rates were estimated with emission factors based on the estimated gas consumption rate.
Rotary kiln dust collector stack/scrubber stack	PM_{10} and $PM_{2.5}$ emission rates were estimated based on the dust collector fan rate and the dust collector performance, as for other dust collectors proposed for the facility.
Alkaline gas scrubber stack	H_2S emission rate was estimated based on exhaust flow rate and concentration from test work data.
Spiral flash drier stack	The drier combustion emissions were estimated with emission factors based on the estimated gas consumption rate.
Steam boiler stack	The boiler combustion emissions were estimated with emission factors based on the estimated gas consumption rate.
Pneumatic graphite transport system dust collectors	PM_{10} and $PM_{2.5}$ emission rates from the graphite/product pipeline transport system calculated based on dust collector exhaust emission concentrations and information on the pneumatic system operation flowrates.

4.3 Air Quality Assessment Criteria

The dispersion modelling results were evaluated against the Air EPP air quality assessment criteria as presented in **Section 3.**

The potential for nuisance dust impacts was evaluated based on the PM_{10} dispersion modelling results, as presented in **Section 6,** showing a low level of PM_{10} impacts (a maximum incremental 24 hour average ground level concentration at the nearest sensitive receptor of 2.2 µg/m^3). The predicted low level incremental PM_{10} concentrations is indicative of a low risk of nuisance dust impacts[6].

To provide contingency and management of the operations without nuisance dust/particulate matter impacts an air quality management plan section was prepared as input for a site Environment Management Plan (included in **Appendix D**).

4.4 Air Quality Impacts from Construction

The potential for air quality impacts from the facility construction activities were reviewed using the Institute of Air Quality Management IAQM "Guidance on the Assessment of Dust from Demolition and Construction" developed in the United Kingdom by the (IAQM, 2014).

A summary of the assessment is provided in **Appendix C**. It was concluded that the risks associated with construction dust emissions is low with no specific concerns.

[6] Comparison against operational dust monitoring trigger levels in relation to nuisance dust risks (EPA Victoria, 2022).

5 Emissions Data

Emission rates used in the dispersion modelling were estimated based on emissions data and emission factors, as described in **Section 4.2,** and as summarised in **Table 12**.

Parameters for the stack sources used in the dispersion modelling are presented in **Table 13** and source parameters for the volume sources are presented in **Table 14**.

The building and the pneumatic graphite/product transport system dust collectors exhausts are emitted from wall mounted exhausts and were modelled as volume sources. The mill train building dust collectors were modelled with a separate source for each building. The pneumatic transport dust collectors were modelled represented by a single source for each stage located to the north of the mill train buildings[7].

All sources were modelled with continuous emissions as for continuous full production 24/7.

Table 12 Emissions Data, Emissions Factors and Emission Rates

Sources	Data and Emission Factors (per stack source)	Emission Rates (per source/stack) (g/s)	Comments
Micronisation mill stacks	Dust collector PM emission concentrations [a]: PM_{10}: 36 µg/m^3 $PM_{2.5}$: 17.8 µg/m^3 Exhaust flow rate: 5,750 m^3/hr [b]	PM_{10}: 0.000058 $PM_{2.5}$: 0.000028	Number of stacks commercial in confidence.
Spheronisation mill stacks	Dust collector PM emission concentrations [a]: PM_{10}: 36 µg/m^3 $PM_{2.5}$: 17.8 µg/m^3 Exhaust flow rate: 2,900 m3/hr [b]	PM_{10}: 0.000029 $PM_{2.5}$: 0.000014	Number of stacks commercial in confidence.
Rotary kiln stacks	Natural gas consumption rate: 0.407 T/hr [c] EF PM: 0.16 kg/T [d] EF NO_x: 3.68 kg/T [d] EF CO: 0.52 kg/T [d]	PM_{10}: 0.028 $PM_{2.5}$: 0.028 NO_2: 0.064 CO: 0.090	Total of 2 stacks. Assuming 10%[j] NO_x/NO_2 conversion
Rotary kiln dust collector stacks	Dust collector PM emission concentrations: PM_{10}: 50 µg/m^3 [h] $PM_{2.5}$: 25 µg/m^3 [h] Exhaust flow rate: 16,500 m^3/hr [f]	PM_{10}: 0.00023 $PM_{2.5}$: 0.00011	Total of 2 stacks.
Alkaline gas scrubber stacks	Scrubber H_2S concentration: 0.003 ppm [i] Exhaust flow rate: 700 m3/hr [f]	H_2S: 0.0000008	Total of 2 stacks.
Spiral flash drier stacks	Natural gas consumption rate: 0.248 T/hr [c] EF PM: 0.16 kg/T [d] EF NO_x: 0.155 kg/T [e] EF CO: 0.06 kg/T [e]	PM_{10}: 0.011 $PM_{2.5}$: 0.011 NO_2: 0.0011 CO: 0.0041	Total of 2 stacks. Assuming 10%[j] NO_x/NO_2 conversion
Steam boiler stacks	Natural gas consumption rate: 0.623 T/hr [c] EF PM: 0.16 kg/T [d] EF NO_x: 3.68 kg/T [d] EF CO: 0.52 kg/T [d]	PM_{10}: 0.018 $PM_{2.5}$: 0.018 NO_2: 0.042 CO: 0.060	Total of 2 stacks. Assuming 10%[j] NO_x/NO_2 conversion
Mill train building ventilation exhaust (2 train building)	Dust collector PM emission concentrations: PM_{10}: 50 µg/m^3 [f] $PM_{2.5}$: 25 µg/m^3 [f] Exhaust flow rate: 27,200 m^3/hr [f]	PM_{10}: 0.00038 $PM_{2.5}$: 0.00019	Number of vents commercial in confidence.

[7] The assumption to combine the emissions from these sources to a single source location was considered conservative considering the source locations in relation the nearest sensitive receptors.

Sources	Data and Emission Factors (per stack source)	Emission Rates (per source/stack) (g/s)	Comments
Mill train building ventilation exhaust	Dust collector PM emission concentrations: PM_{10}: 50 µg/m³ [f] $PM_{2.5}$: 25 µg/m³ [f] Exhaust flow rate: 40,800 m³/hr [f]	PM_{10}: 0.00057 $PM_{2.5}$: 0.00028	Modelled as volume sources
Pneumatic graphite transport system dust collectors	Dust collector PM emission concentrations: PM_{10}: 50 µg/m³ [h] $PM_{2.5}$: 25 µg/m³ [h] Exhaust flow rate: 800 m³/hr [g]	PM_{10}: 0.000011 $PM_{2.5}$: 0.0000056	Number of vents commercial in confidence.

[a] (Yilian, 2023)
[b] (Renascor, 2022a)
[c] (JBS&G, 2023a)
[d] (NPI, 2011) Table 20
[e] (NPI, 2002) Table 3
[f] (GRES, 2022)
[g] (JBS&G, 2023b)
[h] Assumption of performance same as for mill train building ventilation exhaust dust collector based on (JBS&G, 2023b)
[i] Kiln H_2S concentration determined from test work data <0.003 ppm (GRES, 2023)
[j] Emissions from combustion sources include nitrogen oxides (NO_x) as a mixture of nitric oxide (NO) and nitrogen dioxide (NO_2). The ratio depends on the combustion source, but is typically 5-10% NO_2 at point of source emission. Once emitted into the atmosphere, NO is oxidised to form NO_2. The rate at which this occurs is variable depending on ambient ozone and VOC concentrations as well as the rate of turbulent mixing of the plume with surrounding air and UV insolation. For this assessment, with the nearest sensitive receptors at a distance of less than 200 m from sources, 10% conversion of NO_x to NO_2 was assumed.

Table 13 Stack/Point Source Parameters

Source	Number of stacks	Stack Height (m)	Stack Diameter (m)	Exit Temperature (°C)	Exit Velocity (m/s)
Micronisation mill stacks – Stage 1&2	[a]	10	0.2	30	50.8
Spheronisation mill stacks – Stage 1&2	[a]	10	0.2	30	25.6
Rotary kiln stacks	2	21.6	0.7	450	22.3
Rotary kiln dust collector stacks	2	30.3	0.5	30	23.3
Alkaline gas scrubber stacks	2	15	0.175	30	8.1
Spiral flash drier stacks	2	23.2	1	96	14.3
Steam boiler stacks	2	16.7	0.2	100	57.3

[a] Number of stacks/production units commercial in confidence.

Table 14 Volume Source Parameters

Source	Number of Sources	Effective Height (m)	Sigma Y (m)	Sigma Z (m)
Mill train building dust collection exhausts	[a]	4.2	8	2
Pneumatic graphite transport system dust collectors	[a]	4.2	8	2

[a] Number of units commercial in confidence.

All building dust collector sources per stage modelled combined as 2 separate volume sources (one per stage)

Note: Volume source dimensions assumed based on mill train building dimensions

6 Results

The predicted results for the dispersion modelling at the sensitive receptors are presented below in **Table 15** to **Table 19** and plotted in **Figure 10** to **Figure 17**.

The results show that the proposed facility operations, as assessed, have low incremental impacts with good margins to the Air EPP assessment criteria for PM_{10}, $PM_{2.5}$, NO_2, CO and H_2S at the nearest sensitive receptors.

6.1 PM_{10}

Table 15 Results Sensitive Receptor Locations PM_{10} Ground Level Concentrations

Sensitive Receptor	Maximum Predicted Ground Level Concentrations (µg/m³)	
	PM_{10} 24 Hour Average Incremental	PM_{10} 24 Hour Average Cumulative (Including Background)
R2	0.7	23.2
R3	0.7	23.2
R4	0.8	23.3
R5	0.6	23.1
R6	0.8	23.3
R7	1.0	23.5
R8	0.9	23.4
R9	1.3	23.8
R11	1.0	23.5
R13	1.5	24.0
R14	1.6	24.1
R15	1.7	24.2
R16	2.2	24.7
Air EPP Criterion (µg/m³)	**NA**	**50**
Background Concentration (µg/m³)	**NA**	**22.5**

Figure 10 Maximum Predicted PM_{10} 24 Hour Average Ground Level Concentrations

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Air EPP Criterion (red):	50 µg/m³
Statistic:	Maximum
Background Concentration:	22.5 µg/m³
Date:	16/05/2023

Renascor UPSG Facility

Results Stage 1 & Stage 2

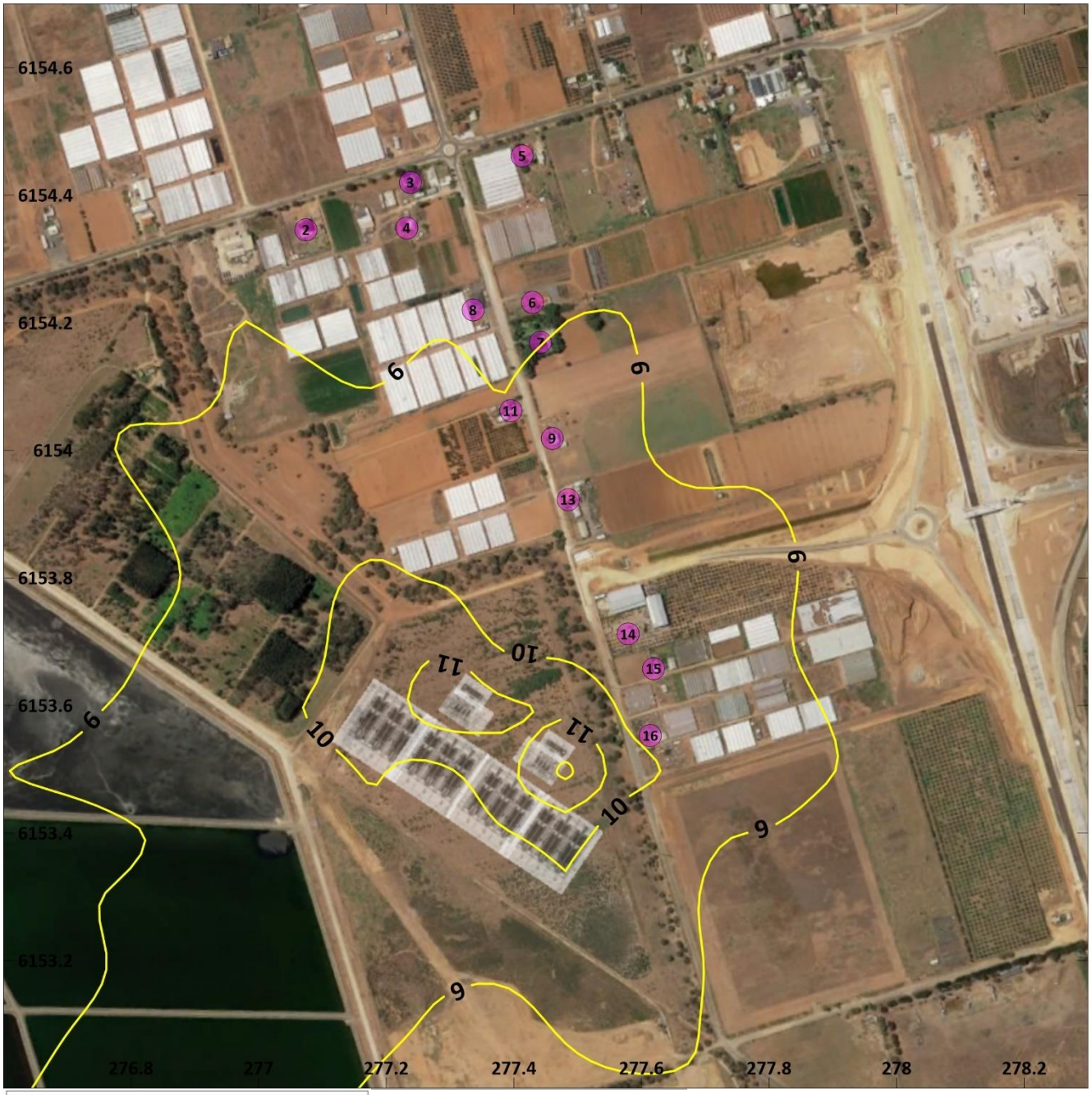
Pollutant: PM_{10} Avg Period: 24 hr Unit: µg/m³

6.2 $PM_{2.5}$

Table 16 Results Sensitive Receptor Location $PM_{2.5}$ Ground Level Concentrations

Sensitive Receptor	Maximum Predicted Ground Level Concentrations (µg/m³)			
	$PM_{2.5}$ 24 Hour Average		$PM_{2.5}$ Annual Average	
	Incremental	Cumulative (Including Background)	Incremental	Cumulative (Including Background)
R2	0.6	8.7	0.1	7.4
R3	0.6	8.7	0.1	7.4
R4	0.7	8.8	0.1	7.4
R5	0.5	8.6	0.1	7.4
R6	0.7	8.8	0.1	7.4
R7	0.8	8.9	0.1	7.4
R8	0.8	8.9	0.1	7.4
R9	1.2	9.3	0.1	7.4
R11	0.9	9.0	0.1	7.4
R13	1.3	9.4	0.2	7.5
R14	1.4	9.5	0.4	7.7
R15	1.5	9.6	0.3	7.6
R16	1.9	10.0	0.3	7.6
Air EPP Criterion (µg/m³)	**NA**	**25**	**NA**	**8**
Background Concentration (µg/m³)	**NA**	**8.1**	**NA**	**7.3**

Figure 11 Maximum Predicted $PM_{2.5}$ 24 Hour Average Ground Level Concentrations



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Air EPP Criterion (red):	25 µg/m³
Statistic:	Maximum
Background Concentration:	8.1 µg/m³
Date:	16/05/2023

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Results Stage 1 & Stage 2

Pollutant: $PM_{2.5}$ Avg Period: 24 hr Unit: µg/m³

Figure 12 Predicted $PM_{2.5}$ Annual Average Ground Level Concentrations

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Air EPP Criterion (red):	8 µg/m³
Statistic:	Annual Average
Background Concentration:	7.3 µg/m³
Date:	16/05/2023

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Results Stage 1 & Stage 2

Pollutant: $PM_{2.5}$ Avg Period: Annual Unit: µg/m³

6.3 NO_2

Table 17 Results Sensitive Receptor Location NO_2 Ground Level Concentrations

Sensitive Receptor	Maximum Predicted Ground Level Concentrations (µg/m³)			
	NO_2 1 Hour Average		NO_2 Annual Average	
	Incremental	Cumulative (Including Background)	Incremental	Cumulative (Including Background)
R2	2.4	10.6	0.1	7.8
R3	3.0	11.2	0.1	7.8
R4	3.1	11.3	0.1	7.8
R5	4.1	12.3	0.1	7.8
R6	5.2	13.4	0.1	7.8
R7	5.2	13.4	0.1	7.8
R8	4.7	12.9	0.1	7.8
R9	4.3	12.5	0.2	7.9
R11	4.9	13.1	0.2	7.9
R13	4.2	12.4	0.3	8.0
R14	4.4	12.6	0.5	8.2
R15	4.0	12.2	0.5	8.2
R16	5.3	13.5	0.4	8.1
Air EPP Criterion (µg/m³)	**NA**	**250**	**NA**	**60**
Background Concentration (µg/m³)	**NA**	**8.2**	**NA**	**7.7**

Figure 13 Maximum Predicted NO_2 1 Hour Average Ground Level Concentrations

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Air EPP Criterion (red):	250 µg/m³
Statistic:	Maximum
Background Concentration:	8.2 µg/m³
Date:	16/05/2023

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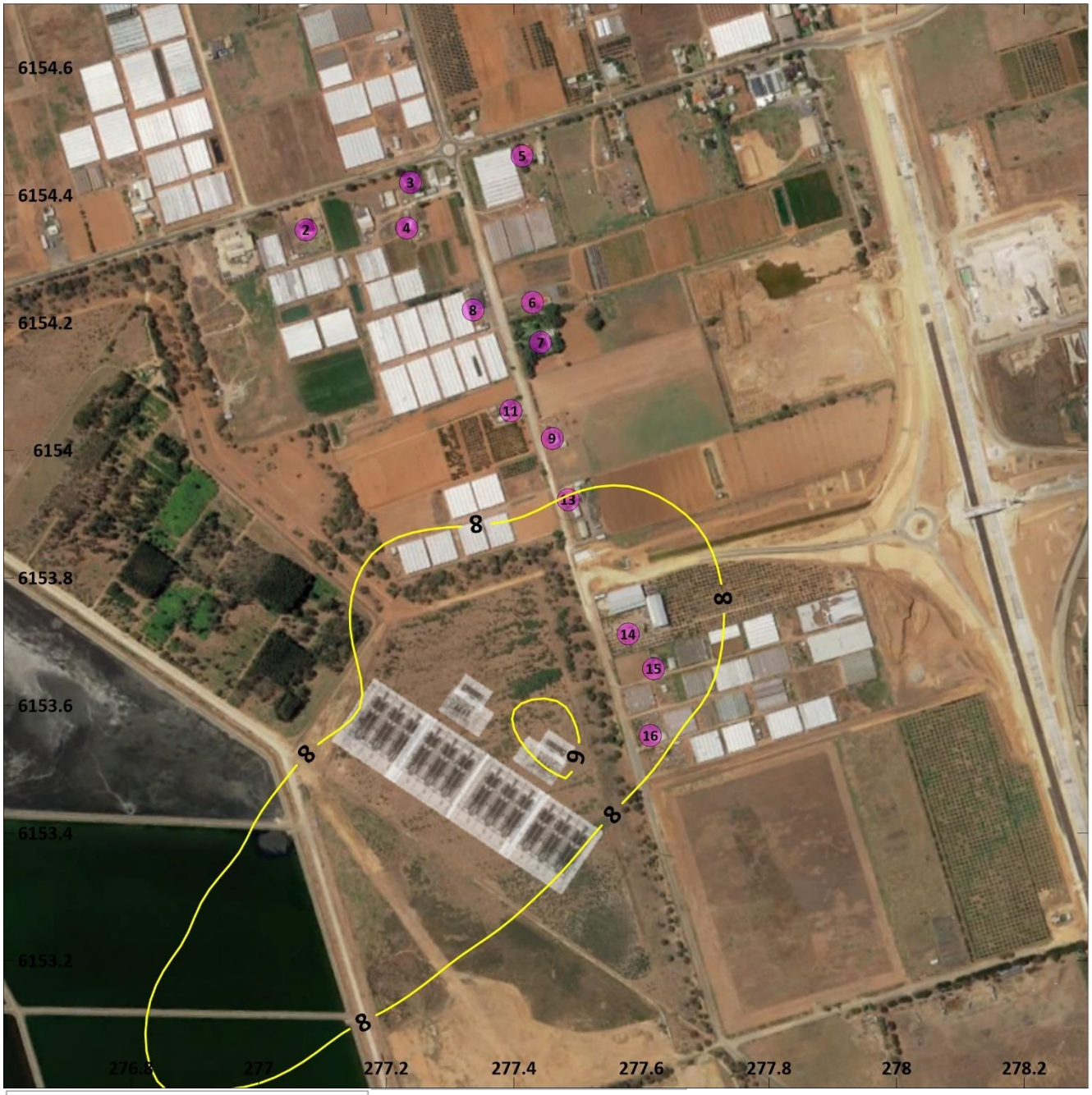
Results Stage 1 & Stage 2

Pollutant: NO_2 Avg Period: 1 Hr Unit: µg/m³

Figure 14 Predicted NO_2 Annual Average Ground Level Concentrations



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Air EPP Criterion (red):	60 µg/m³
Statistic:	Annual Average
Background Concentration:	7.7 µg/m³
Date:	16/05/2023

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Results Stage 1 & Stage 2

Pollutant: NO_2 Avg Period: Annual Unit: µg/m³

6.4 CO

Table 18 Results Sensitive Receptor Location CO Ground Level Concentrations

Sensitive Receptor	Maximum Predicted Ground Level Concentrations (µg/m³)			
	CO 1 Hour Average		CO 8 Hour Average	
	Incremental	Cumulative (Including Background)	Incremental	Cumulative (Including Background)
R2	4.4	29	3.1	25
R3	5.5	31	3.0	25
R4	5.8	31	3.3	25
R5	7.5	32	2.7	25
R6	9.5	35	3.3	25
R7	9.7	35	3.4	25
R8	8.7	34	3.5	25
R9	8.1	33	4.1	26
R11	9.2	34	4.0	26
R13	7.5	33	4.8	27
R14	7.1	32	5.3	27
R15	7.5	33	5.3	27
R16	8.9	34	6.3	28
Air EPP Criterion (µg/m³)	**NA**	**31,240**	**NA**	**11,250**
Background Concentration (µg/m³)	**NA**	**25**	**NA**	**22**

Figure 15 Maximum Predicted CO 1 Hour Average Ground Level Concentrations

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Air EPP Criterion (red):	31,240 µg/m³
Statistic:	Maximum
Background Concentration:	25 µg/m³
Date:	16/05/2023

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Results Stage 1 & Stage 2

Pollutant: CO Avg Period: 1 Hr Unit: µg/m³

Figure 16 Maximum Predicted CO 8 Hour Average Ground Level Concentrations

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Air EPP Criterion (red):	11,250 µg/m³
Statistic:	Maximum
Background Concentration:	22 µg/m³
Date:	16/05/2023

Renascor UPSG Facility

Results Stage 1 & Stage 2

Pollutant: CO Avg Period: 8 Hr Unit: µg/m³

6.5 H_2S

Table 19 Results Sensitive Receptor Locations H_2S Ground Level Concentrations

Sensitive Receptor	Maximum Predicted Ground Level Concentrations (µg/m³)
	H_2S 3 Minute Average Incremental
R2	0.00011
R3	0.00011
R4	0.00011
R5	0.00009
R6	0.00012
R7	0.00014
R8	0.00012
R9	0.00020
R11	0.00015
R13	0.00024
R14	0.00027
R15	0.00029
R16	0.00040
Air EPP Criterion (µg/m³)	**Toxicity: 510** **Odour: 0.15**
Background Concentration (µg/m³)	**NA**

Figure 17 Maximum Predicted H_2S 3 Minute Average Ground Level Concentrations

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Air EPP Toxicity:	510 µg/m³
Air EPP Odour (red):	0.15 µg/m³
Statistic:	Maximum
Background Concentration:	NA
Date:	16/05/2023

Renascor UPSG Facility

Results Stage 1 & Stage 2

Pollutant: H_2S Avg Period: 3 min Unit: µg/m³

7 Conclusions

The air quality assessment of the Renascor BAM Bolivar UPSG processing facility demonstrates the following:

- The proposed facility operations, as assessed, are predicted to result in low incremental impacts with good margins to the Air EPP assessment criteria for PM_{10}, $PM_{2.5}$, NO_2, CO and H_2S at the nearest sensitive receptors.
- In relation to the results for PM_{10} and $PM_{2.5}$, it is noted the dust collector performance (emission concentrations of PM_{10} and $PM_{2.5}$) as provided for the assessment is understood to be high (achieving low emission concentrations). Due to the number of sources included in the assessment, the dispersion modelling results can be considered to be strongly dependent on the dust collector performance as provided for the assessment.
- Considering the proximity to the Bolivar WWTP it is expected that there will be odour from the Bolivar WWTP sludge operations on occasion in the vicinity of the facility.

8 References

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Appendix A:

Selection of Meteorological Data Year

2020 was selected as a representative and conservative assessment year considering BoM wind data from Edinburgh, Outer Harbour and Parafield. Additional data is presented below to provide comparison against long term conditions and the year 2009.

Long term annual average wind speed, frequency of calms and data availability for Edinburgh, Outer Harbour and Parafield are presented in **Table A-1**.

Long term and 2020 and 2009 wind roses for comparison for Edinburgh, Outer Harbour and Parafield are presented in **Figure A-1**.

Long term and 2020 and 2009 wind class frequency data for comparison for Edinburgh, Outer Harbour and Parafield are presented in **Figure A-2**.

Rainfall data comparing 2020 to long term conditions are plotted in **Figure A-3**.

Temperature data comparing 2020 to long term conditions are plotted in **Figure A-4**.

Table A-1 Annual Wind Data Statistics

BoM Station	Edinburgh			Outer Harbour			Parafield		
Year	Average Wind Speed	Calms	Data %	Average Wind Speed	Calms	Data %	Average Wind Speed	Calms	Data %
2007	4.61	1.32	99.61	5.64	0.14	99.92	4.32	3.39	99.71
2008	4.52	1.59	99.94	5.62	0.15	99.98	4.24	3.93	99.99
2009	4.6	1.67	99.12	5.74	0.19	98.05	4.32	4.13	99.94
2010	4.34	1.93	99.38	5.47	0.34	99.68	4.06	4.81	99.89
2011	4.21	1.64	98.66	5.39	0.25	98.78	3.99	4.74	99.81
2012	4.44	1.84	99.78	5.58	0.17	99.86	4.19	4.67	99.93
2013	4.59	1.32	99.97	5.7	0.3	100	4.35	3.42	99.99
2014	4.32	1.68	100	5.44	0.33	98.95	4.04	5.42	99.98
2015	4.29	2.31	99.98	5.45	0.25	97.26	4.05	5.8	99.97
2016	4.59	1.76	99.67	5.88	0.3	97.7	4.23	4.66	99.92
2017	4.28	2	99.95	5.46	0.51	100	3.99	6.4	99.97
2018	4.62	1.58	99.92	5.78	0.8	91.13	4.3	4.71	99.84
2019	4.57	2.01	100	5.69	0.23	96.26	4.17	5.66	99.98
2020 [a]	**4.46**	**1.94**	**99.99**	**5.77**	**0.35**	**95.82**	**4.17**	**6.09**	**99.91**
2021	4.43	1.55	99.53	5.76	0.37	97.64	4.13	5.31	99.98
Average all years	***4.46***	***1.74***	***99.7***	***5.62***	***0.31***	***98.07***	***4.17***	***4.88***	***99.92***

[a] Selected year

Figure A-1 Wind Rose Comparison of Years

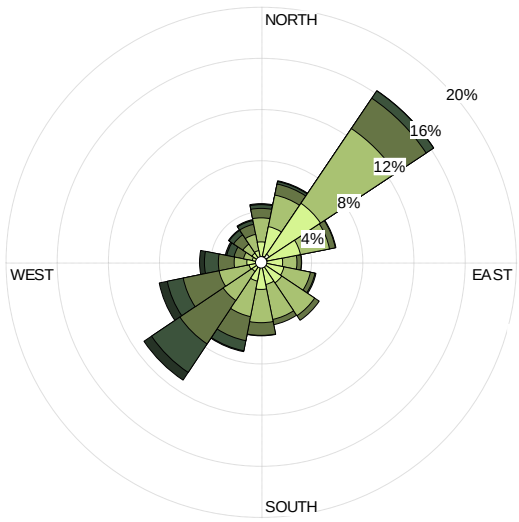
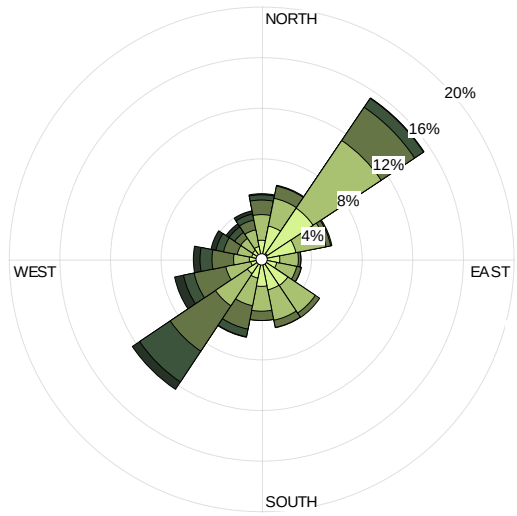
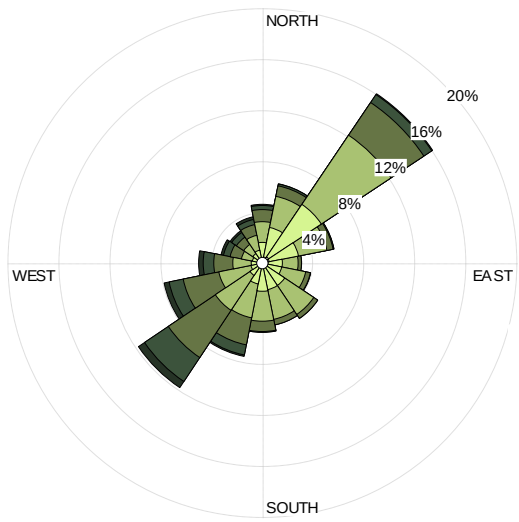
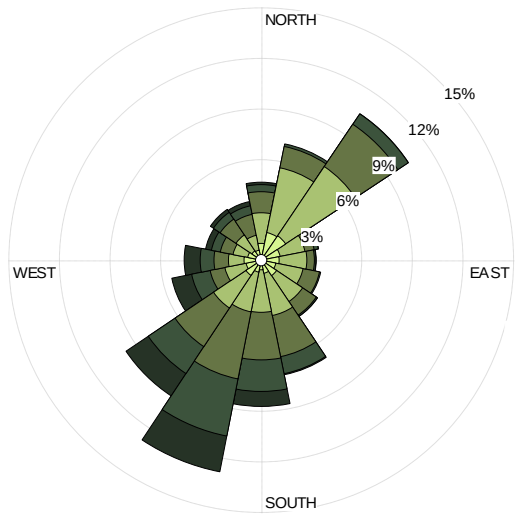
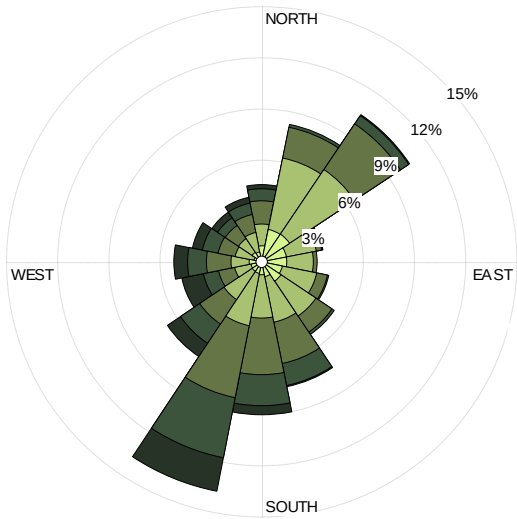
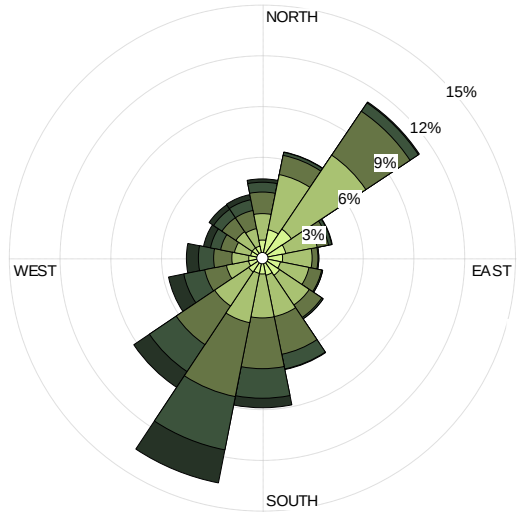
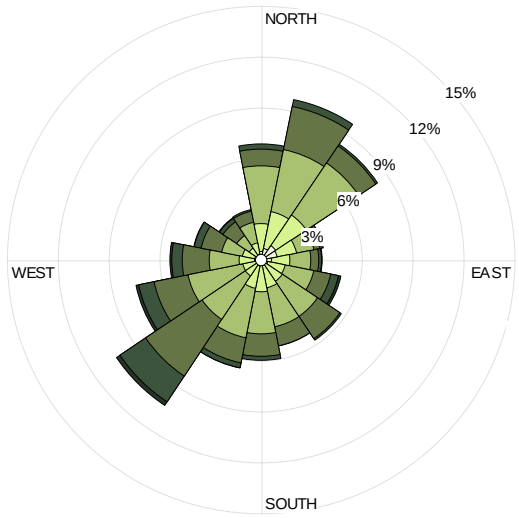
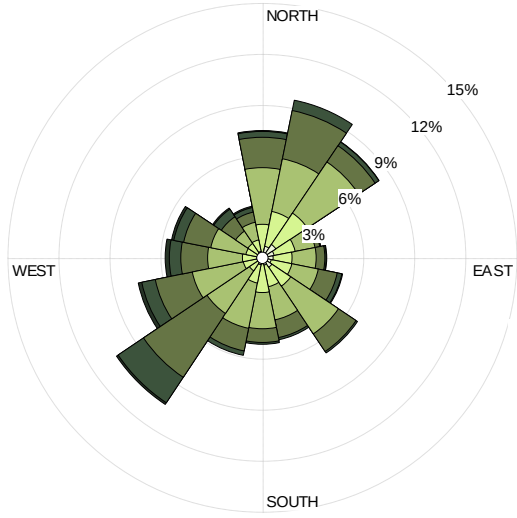
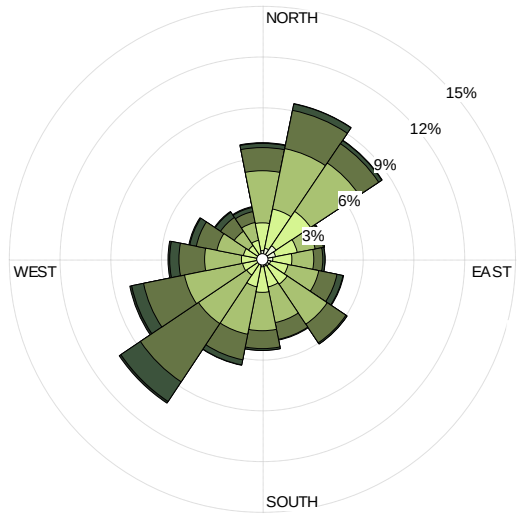
	Wind Rose for 2020	Wind Rose for 2009	Wind Rose for 2007 to 2021
Edinburgh			
Outer Harbour			
Parafield			

Figure A-2 Wind Class Frequency Comparison of Years

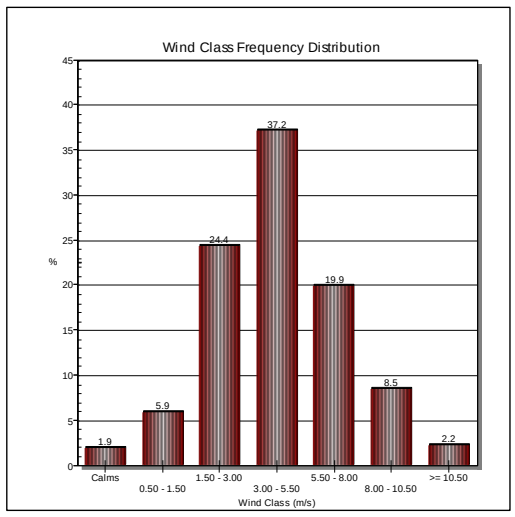
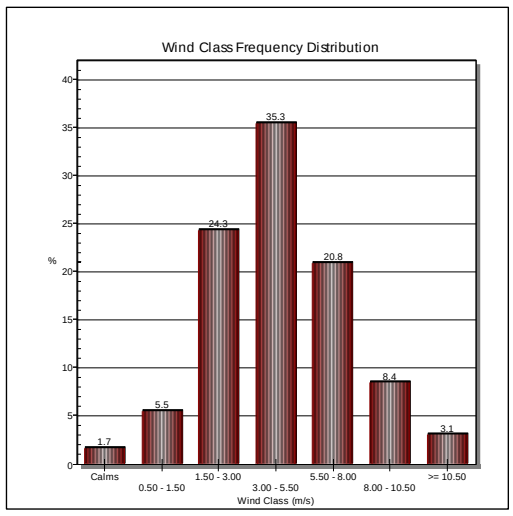
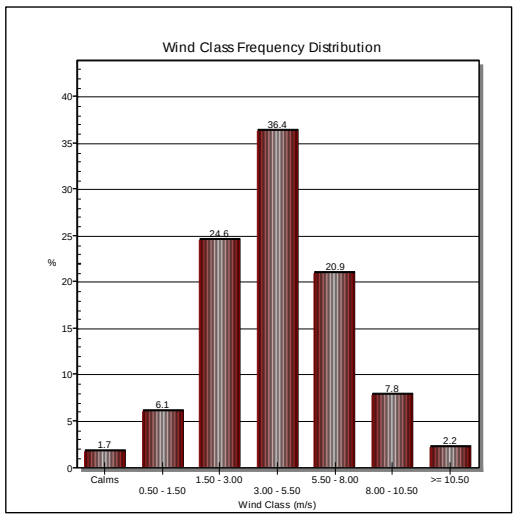
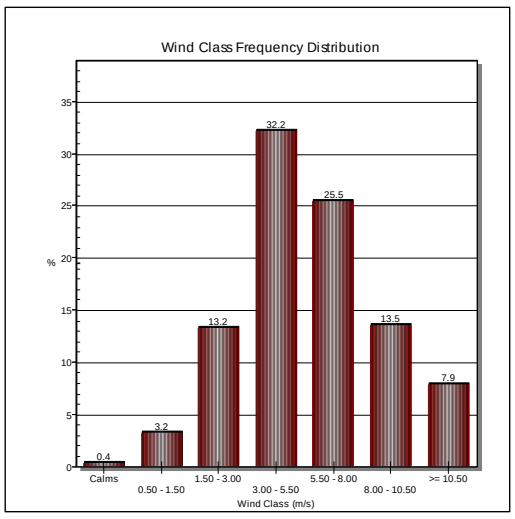
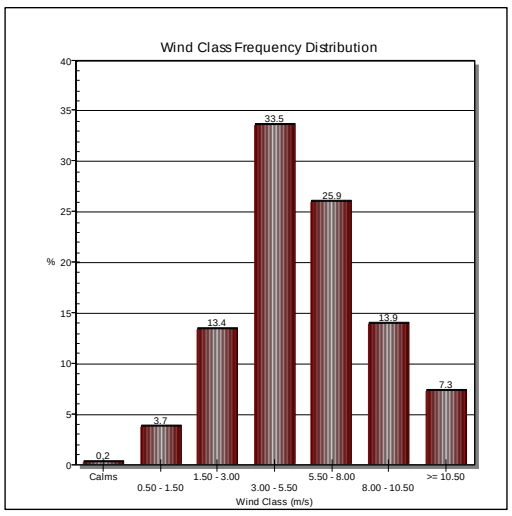
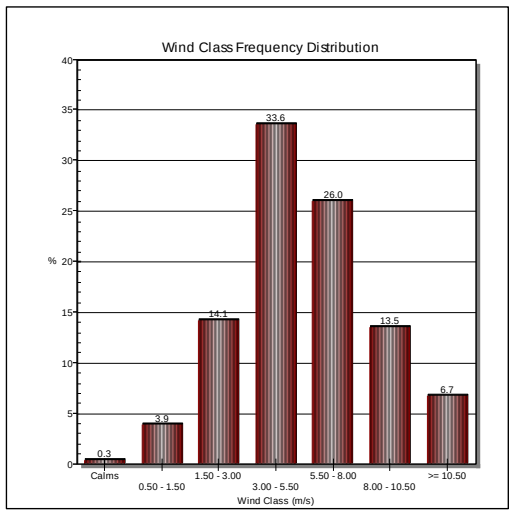
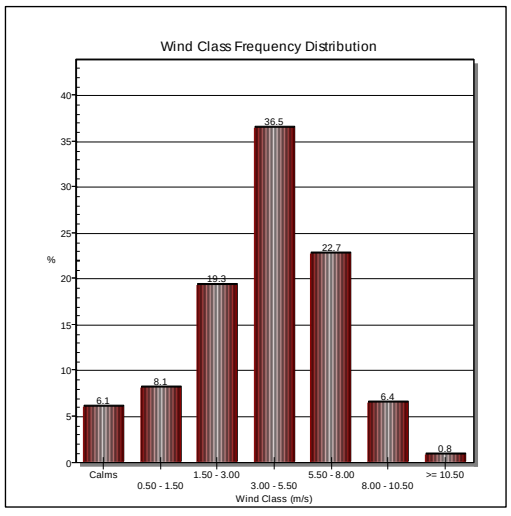
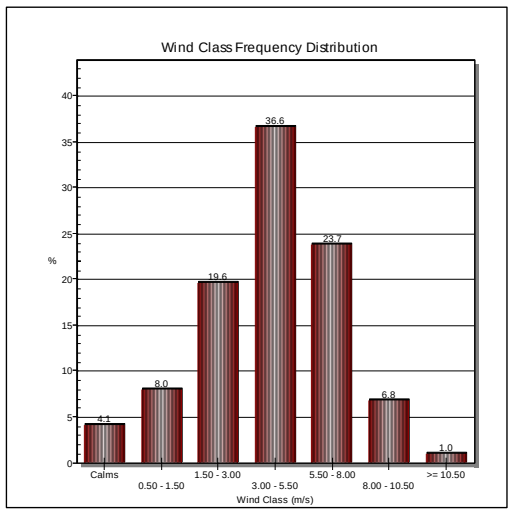
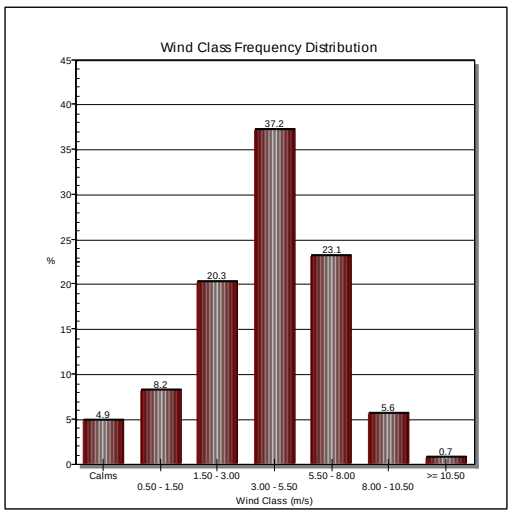
	Wind Class Frequency for 2020	Wind Class Frequency for 2009	Wind Class Frequency 2007 to 2021
Edinburgh			
Outer Harbour			
Parafield			

Figure A-3 Rainfall Data Comparison of Years

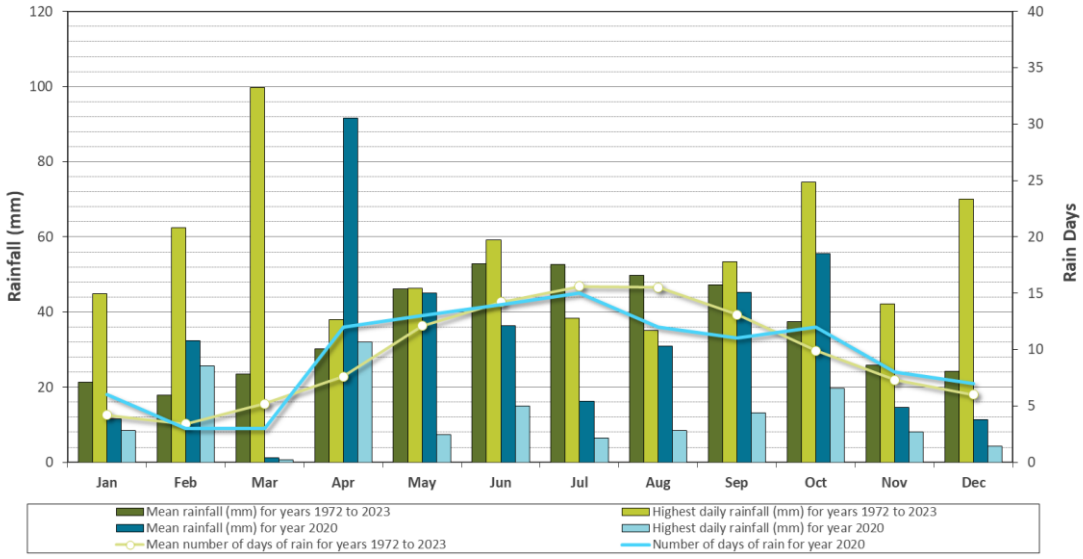
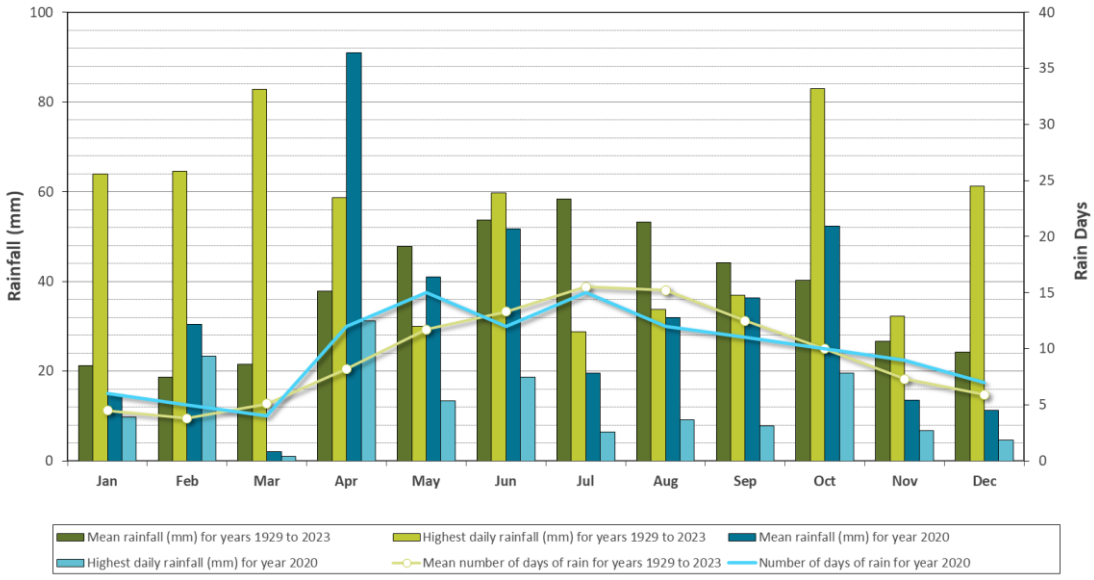
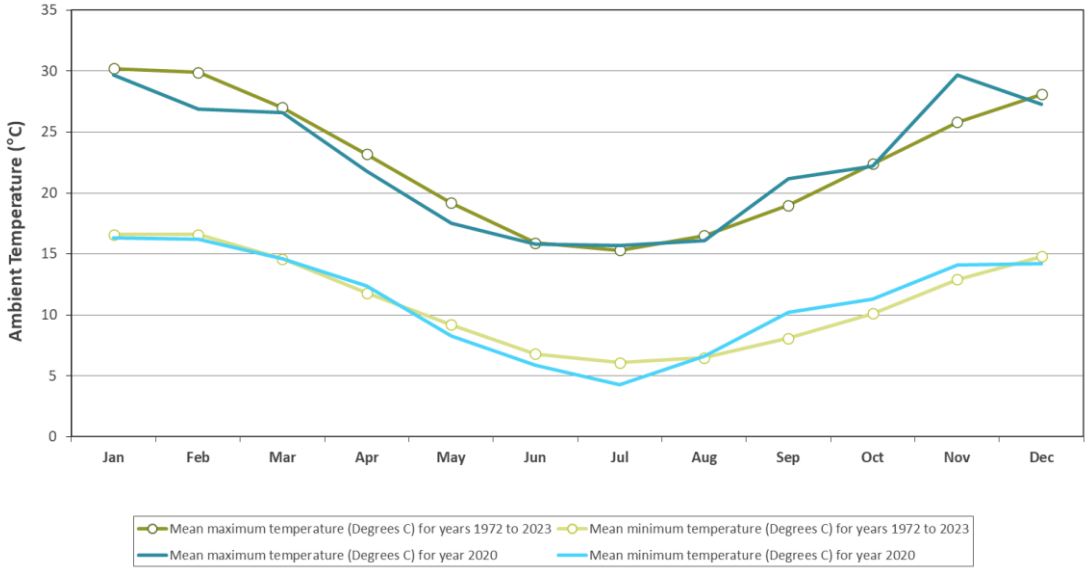
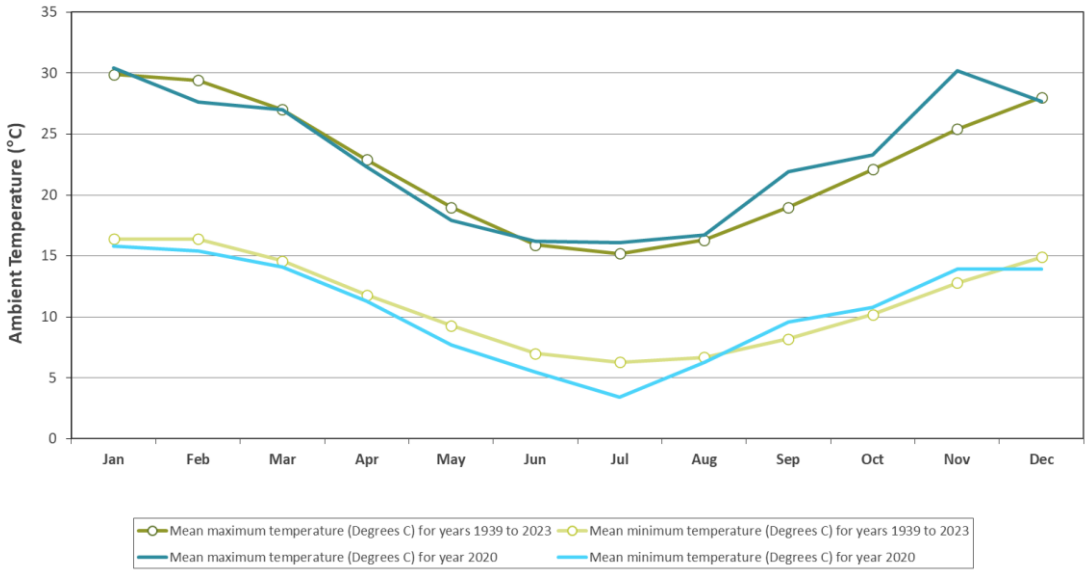
	Rain Fall Data Comparison of 2020 to Long Term
Edinburgh	
Parafield	
Source: BoM	

Figure A-4 Temperature Data Comparison of Years

	Temperature Data Comparison of 2020 to Long Term
Edinburgh	
Parafield	
Source: BoM	

Appendix B:

Evaluation of Meteorological Data

Evaluation of Meteorological Data

The primary meteorological data parameters relevant for dispersion modelling are typically:

- wind (wind speed and direction)
- turbulence (atmospheric stability)
- mixing height (depth of turbulent layer)

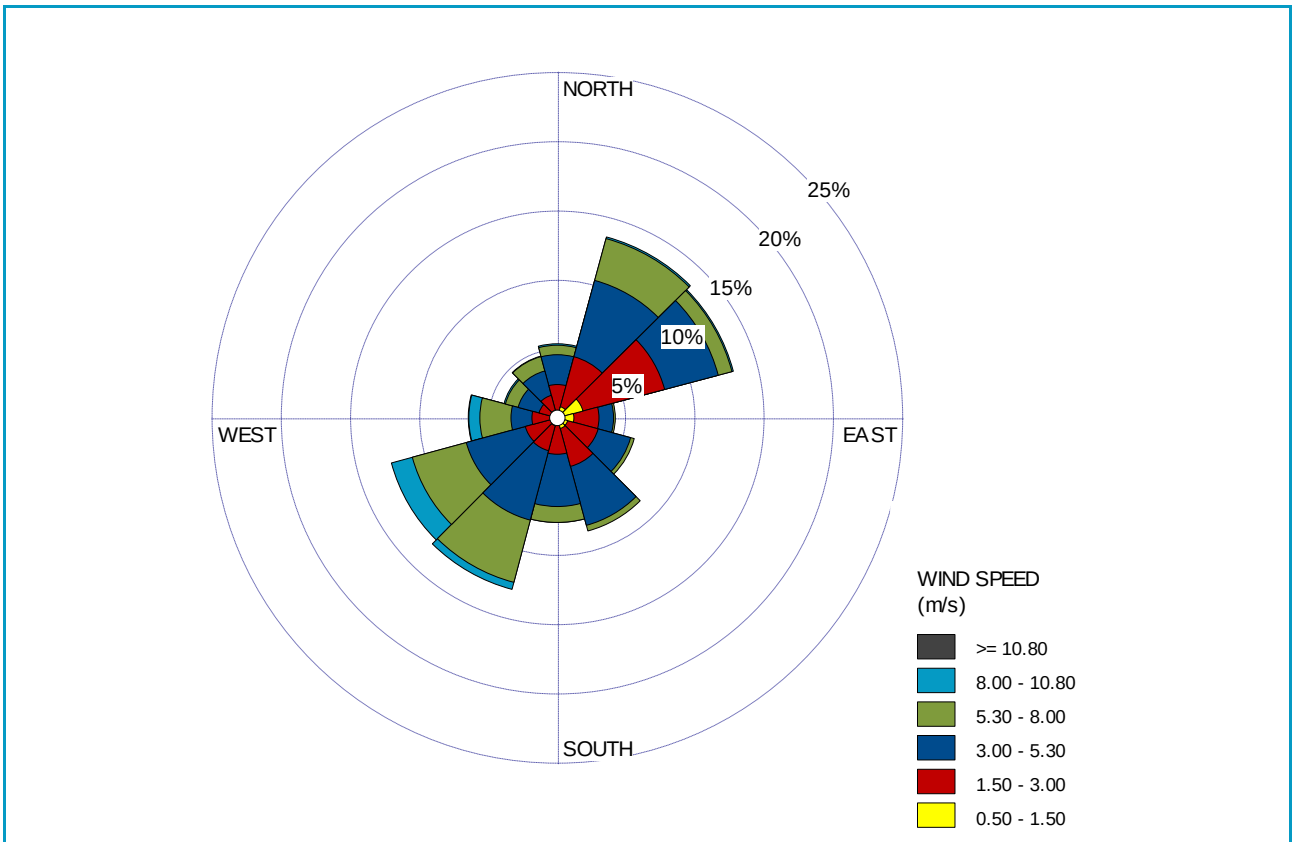
A review of the meteorological data used in the dispersion modelling for the above parameters is provided below.

Wind Speed and Wind Direction

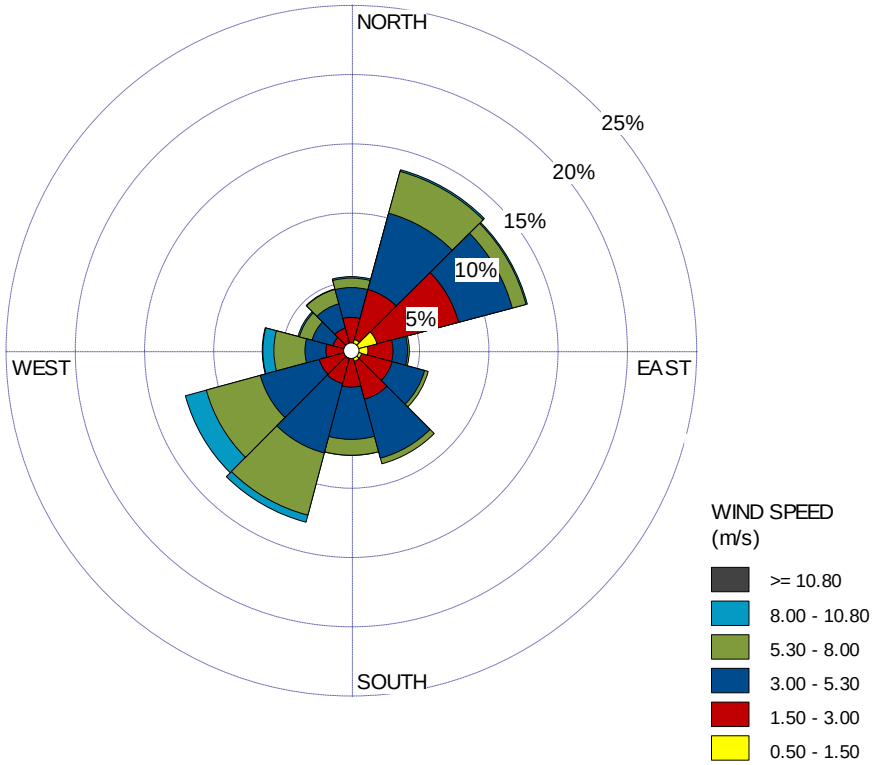
Wind roses show the frequency of occurrence of winds by direction and strength. The bars show the direction the wind is blowing from and the lengths show the frequency of winds from that direction. The bars also show the wind speed categories for each direction with the frequency represented by the size of each bar with the lightest wind speed category closest to the centre of the wind rose.

An annual wind rose for 2020 for the Renascor BAM project location is presented in **Figure B-1**. Seasonal and time of day wind roses are presented in **Figure B-2** and **Figure B-3**. The wind data compares well against the Edinburgh data (as presented in **Section 2.4**) with slightly lower wind speeds, as is typical for TAPM generated data, and conservative considering dispersion.

Figure B-1 Annual Wind Rose

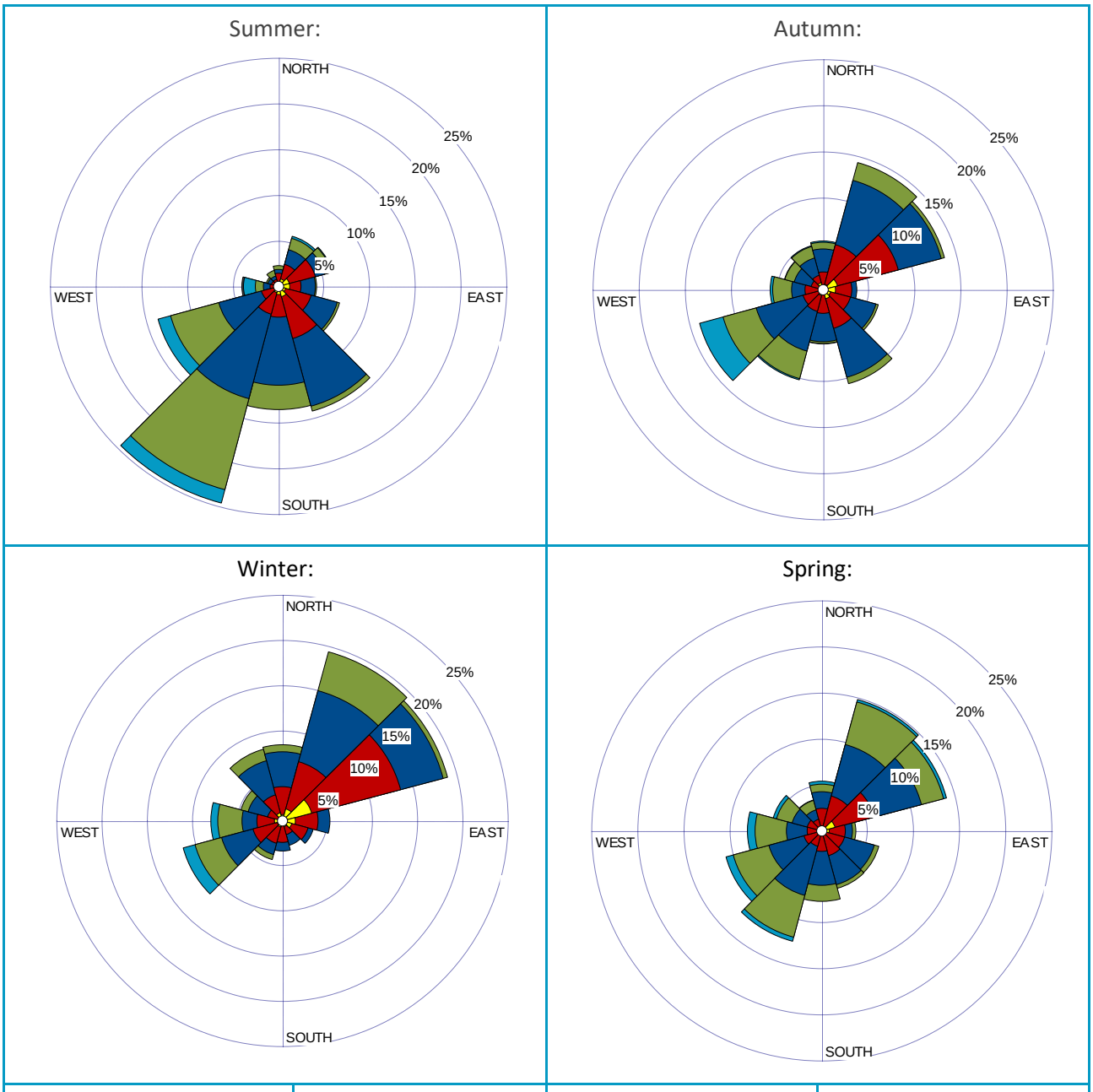


Location:	Data period:	Time period:	Data type:
Site (Waterloo Corner)	2020	All hours	CALMET Extract



Average wind speed: 3.8 m/s	**Calm wind frequency:** 1.1%

Figure B-2 Seasonal Wind Roses



Location:	Data period:	Time period:	Data type:
Site (Waterloo Corner)	2020	Seasonal	CALMET Extract

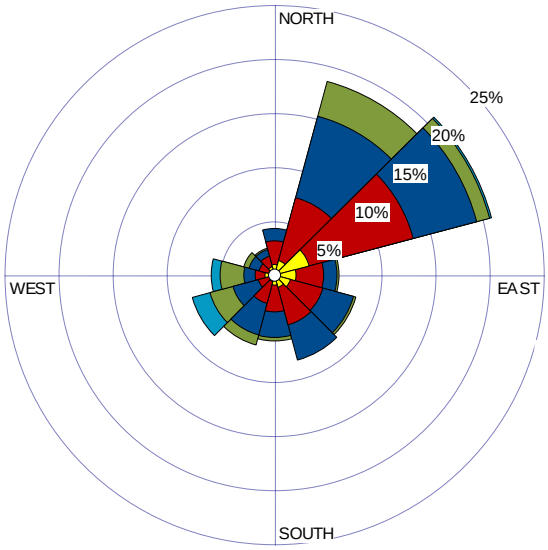
Average wind speed:
Summer: 4.1 m/s
Autumn: 3.7 m/s
Winter: 3.3 m/s
Spring: 4.1 m/s

Calm wind frequency:
Summer: 1.3%
Autumn: 1.0%
Winter: 1.2%
Spring: 1.0%

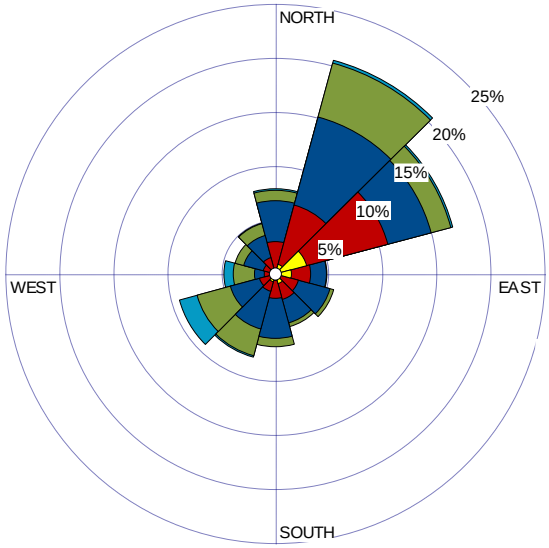
WIND SPEED (m/s)
- >= 10.80
- 8.00 - 10.80
- 5.30 - 8.00
- 3.00 - 5.30
- 1.50 - 3.00
- 0.50 - 1.50

Figure B-3 Time of Day Wind Roses

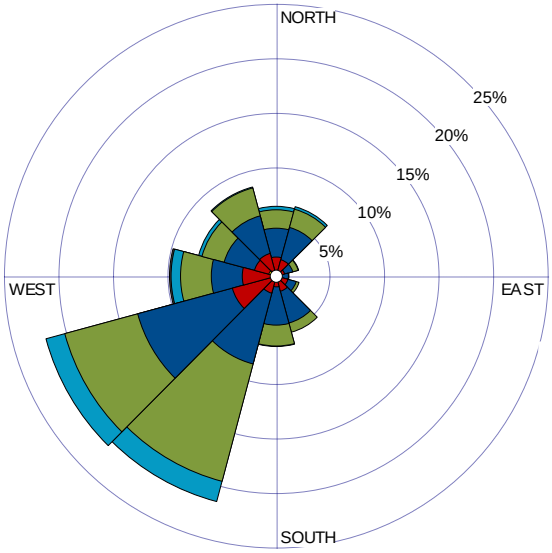
12 am to 6 am:



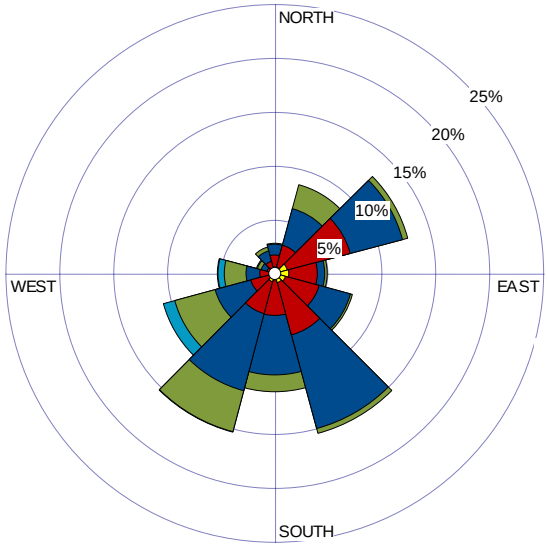
6 am to 12 pm:



12 pm to 6 pm:



6 pm to 12 am:



Location:	**Data period:**	**Time period:**	**Data type:**
Site (Waterloo Corner)	2020	Time of day	CALMET Extract

Average wind speed:
12 am to 6 am: 3.2 m/s
6 am to 12 pm: 3.7 m/s
12 pm to 6 pm: 4.7 m/s
6 pm to 12 am: 3.6 m/s

Calm wind frequency:
12 am to 6 am: 1.8%
6 am to 12 pm: 1.3%
12 pm to 6 pm: 0.3%
6 pm to 12 am: 1.1%

WIND SPEED (m/s)
- >= 10.80
- 8.00 - 10.80
- 5.30 - 8.00
- 3.00 - 5.30
- 1.50 - 3.00
- 0.50 - 1.50

Atmospheric Stability

Atmospheric stability refers to atmospheric turbulence and the tendency of the atmosphere to resist or enhance vertical motion. Depending on conditions the atmospheric stability can either inhibit or promote pollutant dispersion. The Pasquill-Gifford scheme provides six stability classes, A to F, to categorise the degree of atmospheric stability as follows:

A = Extremely unstable conditions

B = Moderately unstable conditions

C = Slightly unstable conditions

D = Neutral conditions

E = Slightly stable conditions

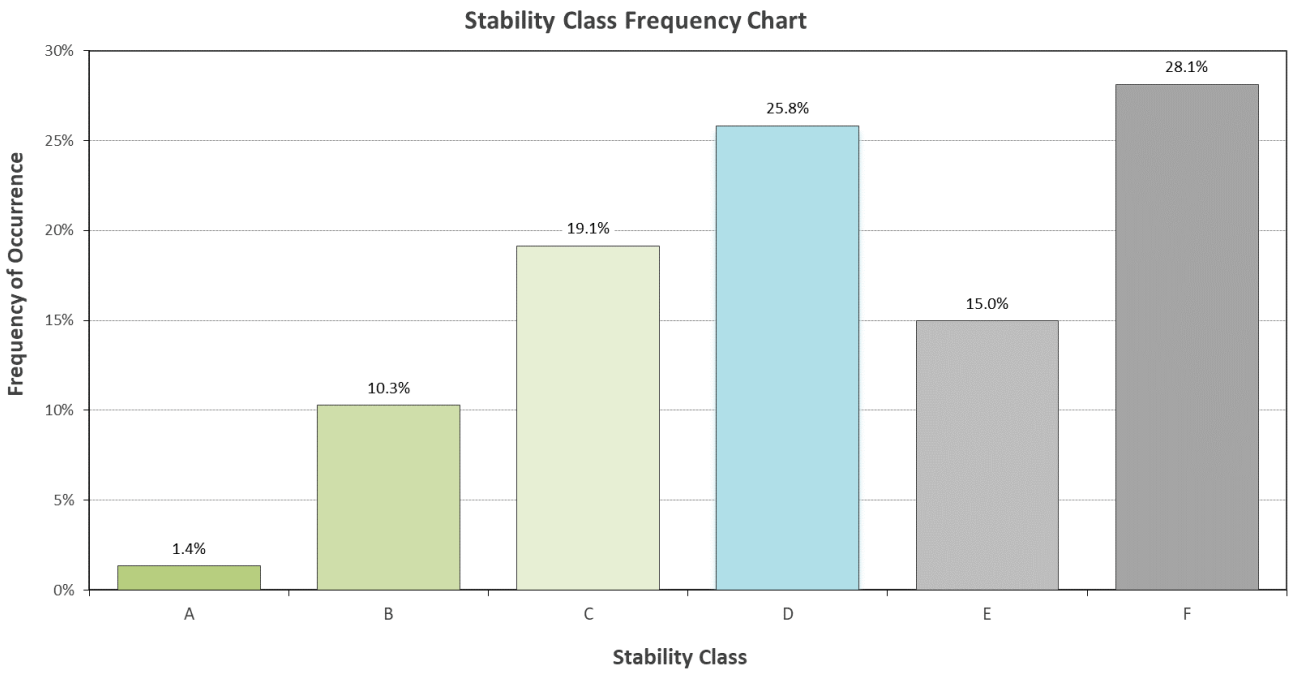
F = Moderately stable conditions

Unstable conditions are favourable for dispersion, while stable conditions are unfavourable for dispersion.

The dispersion modelling in CALPUFF used a more advanced atmospheric stability scheme (based on micro meteorology). Stability class data was extracted from the meteorological dispersion modelling data set for the meteorological data evaluation.

Stability class data for the Renascor BAM project location are presented in **Figure B-4**. The frequency of E and F class stability is as typical for inland settings. Given the near coastal location a higher a higher frequency of D class stability would typically have been expected. However, the higher frequency of F class stability should contribute with conservatism in the assessment.

Figure B-4 Distribution of Atmospheric Stability Classes



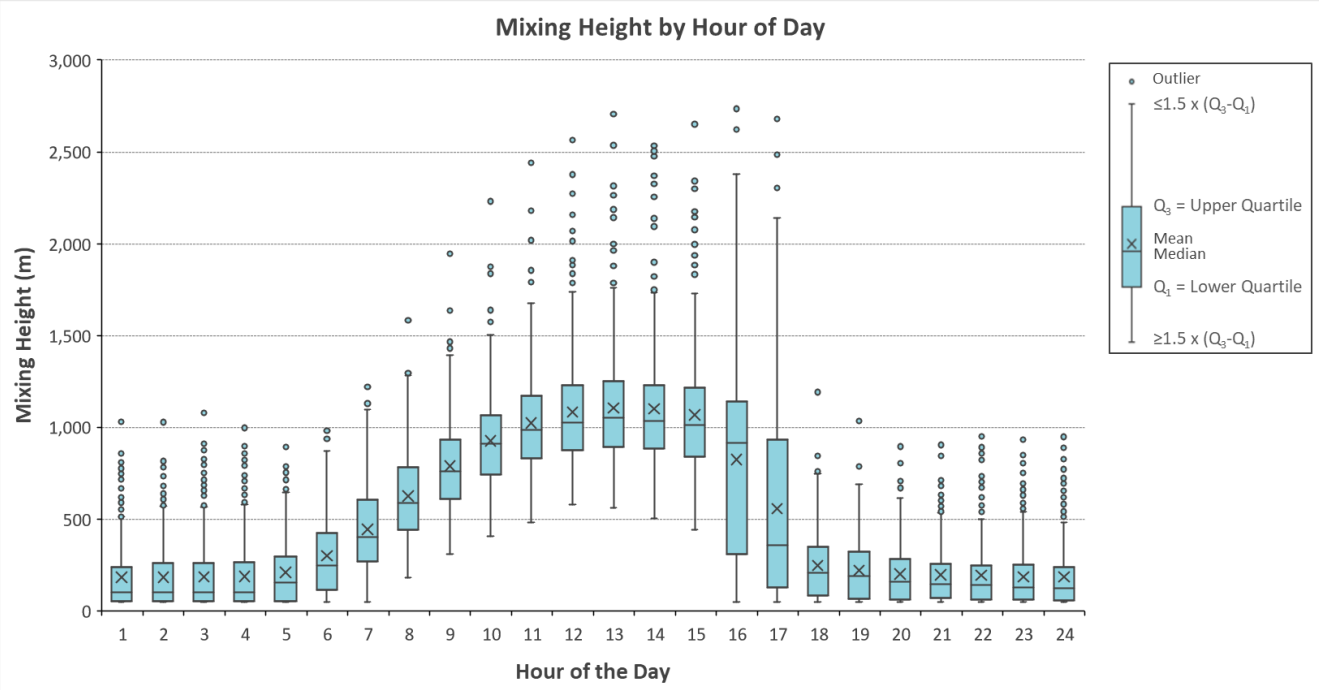
Mixing Height

The mixing height is the depth of the atmospheric mixing layer between ground level and an elevated temperature inversion. Depending on conditions, vertical dispersion is typically limited by the mixing height. This is an important parameter in dispersion modelling since the mixing height largely sets the vertical profile the dispersion can take place in.

Mixing heights have a diurnal variation in response to mixing from convection due to insolation and grow from sunrise to around midday. Followed by a decline until sunset when there typically is a rapid decline. If a plume penetrates through, or is released above, the mixing height the pollutants will be trapped aloft with no mixing to ground level (unless in specific conditions such as fumigation). Similarly, if a plume is trapped below a low mixing height (inversion layer) the vertical dispersion will be limited, and higher ground-level concentrations are likely to occur.

The profile of the diurnal mixing heights predicted at the project site is presented in **Figure B-5**.

Figure B-5 Distribution and Statistics of Mixing Heights



Appendix C:

IAQM Construction Dust Impact Assessment

1 Construction Dust Impact Assessment

1.1 Assessment Methodology of Construction for Dust Impacts

For review of potential air quality/dust impacts from the construction works of the facility, the IAQM *"Guidance on the Assessment of Dust from Demolition and Construction",* developed in the United Kingdom by the Institute of Air Quality Management (IAQM, 2014) was used for screening of assessment requirements.

The IAQM method uses a four-step process for assessing potential dust impacts from construction activities:

- **Step 1**: Screening based on distance to the nearest sensitive receptor; whereby the sensitivity to dust deposition and human health impacts of the identified sensitive receptors is determined.
- **Step 2**: Assess risk of dust effects from activities based on:
  - the scale and nature of the works, which determines the potential dust emission magnitude; and
  - the sensitivity of the area surrounding dust-generating activities.
- **Step 3**: Determine site-specific mitigation for remaining activities with greater than negligible effects.
- **Step 4**: Assess significance of remaining activities after management measures have been considered.

Step 1 – Screening Based on Separation Distance

The Step 1 screening criteria provided by the IAQM guidance suggests screening out any assessment of impacts from construction activities where sensitive receptors are located more than 350 m from the boundary of the Site, more than 50 m from the route used by construction vehicles on public roads, and more than 500 m from the Site entrance. This step is noted as having deliberately been chosen to be conservative and will require assessments for most projects.

Step 2a – Assessment of Scale and Nature of the Works

Step 2a of the assessment provides "dust emissions magnitudes" for each of four dust generating activities; demolition, earthworks, construction, and trackout (the movement of site material onto public roads by vehicles). The magnitudes are: *Large*; *Medium*; or *Small*, with suggested definitions for each category. The definitions given in the IAQM guidance for earthworks, construction activities and trackout, which are most relevant to this Development, are as follows:

Demolition (Any activity involved with the removal of an existing structure [or structures]. This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time):

- ***Large***: Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
- ***Medium***: Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- ***Small***: Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks (Covers the processes of soil-stripping, ground-levelling, excavation and landscaping):

- ***Large***: Total site area greater than 10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), more than 10 heavy earth moving vehicles active at any one time, formation of bunds greater than 8 m in height, total material moved more than 100,000 t.
- ***Medium***: Total site area 2,500 m^2 to 10,000 m^2, moderately dusty soil type (e.g. silt), five to 10 heavy earth moving vehicles active at any one time, formation of bunds 4 m to 8 m in height, total material moved 20,000 t to 100,000 t.
- ***Small***: Total site area less than 2,500 m^2, soil type with large grain size (e.g. sand), less than five heavy earth moving vehicles active at any one time, formation of bunds less than 4 m in height, total material moved less than 20,000 t, earthworks during wetter months.

Construction (Any activity involved with the provision of a new structure (or structures), its modification or refurbishment. A structure will include a residential dwelling, office building, retail outlet, road, etc):

- ***Large***: Total building volume greater than 100,000 m^3, piling, on site concrete batching; sandblasting.
- ***Medium***: Total building volume 25,000 m^3 to 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching.
- ***Small***: Total building volume less than 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout (The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network):

- ***Large***: More than 50 heavy vehicle movements per day, surface materials with a high potential for dust generation, greater than 100 m of unpaved road length.
- ***Medium***: Between 10 and 50 heavy vehicle movements per day, surface materials with a moderate potential for dust generation, between 50 m and 100 m of unpaved road length.
- ***Small***: Less than 10 heavy vehicle movements per day, surface materials with a low potential for dust generation, less than 50 m of unpaved road length.

In order to provide a conservative assessment of potential impacts, it has been assumed that if at least one of the parameters specified in the 'large' definition is satisfied, the works are classified as large, and so on.

Step 2b – Risk Assessment

Assessment of the Sensitivity of the Area

Step 2b of the assessment process requires the sensitivity of the area to be defined. The sensitivity of the area takes into account:

- The specific sensitivities that identified sensitive receptors have to dust deposition and human health impacts;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Other site-specific factors, such as whether there are natural shelters such as trees to reduce the risk of wind-blown dust.

Individual receptors are classified as having *high*, *medium* or *low* sensitivity to dust deposition and human health impacts (ecological receptors are not addressed using this approach). The IAQM method provides guidance on the sensitivity of different receptor types to dust soiling and health effects as summarised in **Table 1**. It is noted that user expectations of amenity levels (dust soiling) is dependent on existing deposition levels.

Table 1 IAQM Guidance for Categorising Receptor Sensitivity

Value	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
Dust soiling	Users can reasonably expect a high level of amenity; or The appearance, aesthetics or value of their property would be diminished by soiling, and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods as part of the normal pattern of use of the land.	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or The appearance, aesthetics or value of their property could be diminished by soiling; or The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.	The enjoyment of amenity would not reasonably be expected; or Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.
	Examples: Dwellings, museums, medium- and long-term car parks and car showrooms.	*Examples: Parks and places of work.*	*Examples: Playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.*
Health effects	Locations where the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	Locations where human exposure is transient.
	Examples: Residential properties, hospitals, schools and residential care homes.	*Examples: Office and shop workers, but will generally not include workers occupationally exposed to PM_{10}.*	*Examples: Public footpaths, playing fields, parks and shopping street.*

According to the IAQM methods, the sensitivity of the identified individual receptors (as described above) is then used to assess the *sensitivity of the area* surrounding the active construction area, taking into account the proximity and number of those receptors, and the local background PM_{10} concentration (in the case of potential health impacts) and other site-specific factors.

Additional factors to consider when determining the sensitivity of the area include:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;

- Any pre-existing screening between the source and the receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area and if relevant, the season during which the works will take place;
- Any conclusions drawn from local topography;
- The duration of the potential impact (as a receptor may be willing to accept elevated dust levels for a known short duration, or may become more sensitive or less sensitive (acclimatised) over time for long-term impacts); and
- Any known specific receptor sensitivities which go beyond the classifications given in the IAQM document.

The IAQM guidance for assessing the sensitivity of an area to dust soiling is shown in **Table 2**. The sensitivity of the area should be derived for each of activity relevant to the project (i.e. construction and earthworks).

Table 2 IAQM Guidance for Categorising the Sensitivity of an Area to Dust Soiling Effects

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Note: Estimate the total number of receptors within the stated distance. Only the *highest level* of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors < 20m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors < 50 m is 102. The sensitivity of the area in this case would be high.

A modified version of the IAQM guidance for assessing the *sensitivity of an area* to health impacts is shown in **Table 3**. For high sensitivity receptors, the IAQM methods takes the existing background concentrations of PM_{10} (as an annual average) experienced in the area of interest into account and is based on the air quality objectives for PM_{10} in the UK. As these objectives differ from the ambient air quality criteria adopted for use in this assessment (i.e. an annual average of 25 µg/m^3 for PM_{10}) the IAQM method has been modified slightly.

a. This approach is consistent with the IAQM guidance, which notes that in using the tables to define the *sensitivity of an area*, professional judgement may be used to determine alternative sensitivity categories, taking into account the following factors:

b. any history of dust generating activities in the area;

c. the likelihood of concurrent dust generating activity on nearby sites;

d. any pre-existing screening between the source and the receptors;

e. any conclusions drawn from analysing local meteorological data which accurately represent the area, and if relevant the season during which the works will take place;

f. any conclusions drawn from local topography;

g. duration of the potential impact; and

h. any known specific receptor sensitivities which go beyond the classifications given in this document.

Table 3 IAQM Guidance for Categorising the Sensitivity of an Area to Dust Health Effects

Receptor sensitivity	Annual mean PM_{10} conc.	Number of receptors [a,b]	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>25 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	21-25 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	17-21 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<17 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>25 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	21-25 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	17-21 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<17 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Notes: (a) Estimate the total within the stated distance (e.g. the total within 350 m and not the number between 200 and 350 m); noting that only the highest level of area sensitivity from the table needs to be considered.

(b) In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties.

Risk Assessment

The dust emission magnitude from Step 2a and the receptor sensitivity from Step 2b are then used in the matrices shown in **Table 4** (demolition), **Table 5** (earthworks and construction) and **Table 6** (trackout) to determine the risk category with no mitigation applied.

Table 4 Risk Category from Demolition Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 5 Risk Category from Earthworks and Construction Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 6 Risk Category from Trackout Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Step 3 - Site-Specific Mitigation

Once the risk categories are determined for each of the relevant activities, site-specific management measures can be identified based on whether the site is a low-, medium- or high-risk site.

Step 4 – Residual Impacts

Following Step 3, the residual impact is then determined after management measures have been considered.

1.2 Assessment

A summary of the IAQM assessment for the construction of the proposed facility is provided in **Table 7**.

Table 7 IAQM Assessment Summary

IAQM Assessment Step	Evaluation
Step 1	The closest sensitive receptors are located across Robinson Road at distances approximately between 50 m and 80 m from the site boundary of the Renascor BAM project site. However, most of the construction work at the site is understood to be undertaken away from the eastern site boundary.
Step 2	Scale of earth works: Large (Footprint of Stage 1 constructions approximately 69,000 m^2) Scale of construction works: Large (Footprint of Stage 1 buildings estimated to approximately 29,000 m^2) Potential for trackout: Small (Number of heavy vehicle movements/deliveries estimated to approximately 3 per day.) Receptor sensitivity: High Sensitivity potential in relation to dust soiling effects: Low Sensitivity potential in relation to potential dust health effects: Low Risk category from earthworks activities: Low risk Risk category from construction activities: Low risk Risk category from trackout activities: Low risk
Step 3	The risks associated with construction dust emissions are assessed as low. Common good dust management/mitigation practises should be applied for the construction and earthworks.
Step 4	No residual dust issues are expected for project construction activities based on implementation of good construction dust management/mitigation practises.

Appendix D:

Air Quality Management Plan Section for Site Environment Management Plan

AQMP Section for EMP

Introduction

This air quality management plan (AQMP) section has been prepared as input for the site environment management plan (EMP) for Renascor's Siviour battery anode material (BAM) project facility to produce uncoated purified spherical graphite (UPSG) near Bolivar in South Australia.

EPA License and/or Development Approval Requirements

<Section for summary of any EPA License and/or Development Approval requirements - To be included when available.>

Dust Management Plan Purpose and Objective

The purpose of the AQMP is to fulfil the facility EPA Licence and other approval requirements.

The objective of the plan is to manage the operations without particulate matter/dust air emissions causing nuisance complaints.

Responsibilities

The Operations Manager has the responsibility for the implementation of the AQMP, including:

- ensuring that all personnel and contractors conform with requirements of the AQMP
- ensuring that personnel on site are aware of their environmental responsibilities and obligations
- ensuring that dust control equipment is:
  - available for all relevant emission points,
  - functional, and
  - maintained to uphold performance
- responding to complaints, as per procedure
- reviewing and updating the AQMP as required.

Description of Operations and Particulate Matter/Dust Sources

Description of Production Activities

Purified spherical graphite (PSG) is produced in a two-production step process consisting of:

- Mechanical shaping through a milling process for micronisation and spheronisation of the graphite concentrate to micronised (less than 50 microns) and spherical form.
- Purification with cleaning and concentration of the shaped graphite by a hybridised thermal-chemical caustic roast process and acid leach stages into a highly purified product suitable for the production of lithium-ion battery anodes.

Following the purification the PSG product will be dried and packaged for distribution.

The facility will receive flake graphite concentrate at a quality of approximately 95% carbon from the Siviour Graphite Mine by road transport. Packaged PSG products will be transported by road to Port Adelaide for export.

Waste products that cannot be reused in the process are neutralised through chemical precipitation and dried. Graphite fines produced through the micronisation/spheronisation process will either be a waste product or saleable by-product dependant on feasibility and demand for the product.

Key components of the UPSG facility include:

- Structures associated with mechanical processing:
  - industrial buildings
  - silos
  - truck loading and unloading facilities, access and egress
  - product bagging plant equipment, including pneumatic conveyance and feed hoppers
  - mechanical, hydraulic and pneumatic conveyance and feed structures for the purpose of moving graphite concentrate, partially and wholly processed UPSG, chemical reagents and process by-products within the plant
  - chemical storage equipment suitable for the storage of solid and liquid, caustic and acidic reagents including appropriate bunding/hardstand
  - mineral crushing and grinding machinery comprising mechanical micronisation and spheronisation circuits, associated feed hoppers, dust mitigation, collection and conveyance structures, subject to final engineering design.
- Equipment associated with chemical processing:
  - caustic roast kiln (electric or gas-fired) including dry reagent mixing, cooling equipment, lump-breaking and pulping equipment
  - leach tanks (caustic and acid), filtration structures and repulp tanks
  - reverse osmosis (RO) water treatment equipment, including demineralisation brine capture and discharge
  - caustic process water treatment and neutralisation
  - acid process water treatment and neutralisation
  - solid process by-product isolation, drying and containment
  - process monitoring equipment.
- In addition, the UPSG facility will include either:
  - electric kiln, steam production and drying machinery, subject to availability of natural gas connection, or
  - fuel burning equipment including kiln and boiler structures, natural gas connection, stack emission scrubbers (electrostatic precipitators), and associated emissions monitoring and combustion management equipment, or
  - a combination of electric and gas-fired equipment associated with kiln processes, steam production and drying machinery, subject to the outcomes of the DFS.

Sources and Generation of Particulate Matter/Dust Emissions

The micronisation and spheronisation process involves a number of mills connected in trains. All mills are connected to exhaust stacks with two stage dust control. The mill train exhausts are the primary source of particulate matter emissions from the facility.

The transport of graphite around the facility is through a pneumatic pipe system. This system is enclosed and include dust collectors at venting and materials handling points.

Truck movements at site also has the potential to contribute to nuisance dust impacts. However, it was identified in the air quality impact assessment[8] that the low frequency of truck and vehicle movements at the facility was unlikely to contribute to nuisance dust impacts.

A list of the facility air emission sources is included in the Dust Management section.

Dust Management

Dust management is best achieved through a combination of:

- use of dust emission control units
- use of standard operation procedures and routine dust control methods adapted for the applications
- review of operation/production procedures to ensure optimal outcomes
- planning of production and maintenance activities to ensure that appropriate dust controls and mitigating actions are in place given potential breakdowns and maintenance schedules
- review of performance and dust management/control action effectiveness over time.

Induction and Training

As part of the site induction, all employees, contractors and visitors to site will be made aware of the following:

- why management, mitigation and control of air emissions are required
- the need to plan for maintenance schedules and production requirements
- the need to inform the Operations Manager failures of dust control units are observed
- that in situations with failure of dust control units, the affected mill/mills shall be taken off line until the dust control units are serviced.

Dust Management, Mitigations and Controls

Monitoring

As demonstrated in the air quality impact assessment[7] there is no ambient compliance or operational air quality monitoring required for the operations.

To review the performance of dust control units over time, it is recommended that the performance of mill dust control units are tested after commission and then reviewed/tested at an interval as required.

[8] SLR, Renascor BAM Project Air Quality Assessment Bolivar UPSG Processing Facility, January 2024

Dust Mitigation and Control Measures

Dust mitigation and particulate matter emission control measures for the sources for the operations are included below.

Sources	Emission Control	Mitigation and Control Measures
Micronisation and spheronisation mill stacks	Dust collector	Production scheduling to be planned to include regular service of dust control units. Production units to be taken offline when corresponding dust control unit performance is compromised/faulty. Maintenance as per equipment manufacturers specification and as required. Review/monitoring of dust control unit performance overtime.
Rotary kiln stacks dust collector	Dust collector	Maintenance as per equipment manufacturers specification and as required.
Alkaline gas scrubber stacks	Scrubber	Maintenance as per equipment manufacturers specification and as required.
Spiral flash drier stacks	No specific controls for management of particulate matter emissions	Maintenance as per equipment manufacturers specification and as required.
Steam boiler stacks	No specific controls for management of particulate matter emissions	Maintenance as per equipment manufacturers specification and as required.
Mill train building ventilation exhaust	Dust collector	Maintenance as per equipment manufacturers specification and as required.
Pneumatic graphite transport system dust collectors	Dust collector	Maintenance as per equipment manufacturers specification and as required.
Site vehicle and truck movements	NA	Maintenance and upkeep of onsite roadways to avoid silt build up and any potential spills of product.

Complaints Management

Well managed responses to complaints can play a significant role in managing potential nuisance.

Complaints Response Process

Upon receipt of a dust complaint, the following information shall be recorded:

1. The date and time of complaint.
2. The method by which the complaint was made (i.e. email, verbal, telephone, written) and who received the compliant.
3. Any personal details of the complainant which were provided by the complainant, or if no such details were provided, a note to that effect.
4. Whether the dust was visible (airborne) or deposited.
5. The location of the nuisance observation.
6. Wind speed and direction prior to, and at the time the complaint was received (from the site weather station).
7. Site activities at the time of (and recently preceding) the complaint.
8. The action taken by Renascor in relation to the complaint, including investigation and any follow up contact/correspondence with the complainant.
9. If no action was taken, the reason(s) why no action was taken.

The Operations Manager shall be informed immediately of any complaints received.

A complaints registry form is included in below.

Dust Complaints Registration Form

COMPLAINT RECEIPT	
Date and time of complaint.	
The method by which the complaint was made (i.e. verbal, telephone, written).	
Any personal details of the complainant which were provided by the complainant, or if no such details were provided, a note to that effect.	
Whether the dust was visible in the air (airborne) or deposited.	
The location of the nuisance observation.	
Any request by complainant for follow up correspondence.	
Complaint received by:	
INVESTIGATION AND FOLLOW UP	
Wind speed and direction prior to, and at the time the complaint was received.	
Site activities (incl potential maintenance issues) at the time of the complaint (and the period leading up to).	
The action taken by Renascor in relation to the complaint, including any follow up contact with the complainant.	
If no action was taken, the reason(s) why no action was taken.	

Complaints Validation Process

When the Operations Manager becomes aware of a complaint, the following will occur:

1. Review wind speed and wind direction at the time of the complaint and the period leading up to the time of the complaint.
2. The Operations Manager or other nominated and appropriately trained person will travel to the boundary and/or the complainant's location (if known) to inspect the situation. If visible particulate matter/dust is leaving the site, measures within the AQMP will be implemented to reduce emissions to an acceptable level.
3. If particulate matter/dust is not observed leaving the site, the Operations Manager will survey the area (from vantage point on site or drive around the local area to identify other sources).
4. The results of the two exercises above will be recorded in the complaint register.

Should Renascor be made aware of a complaint after the fact, this will be recorded and complaints validation may be limited to review of recorded wind conditions (direction and wind speed) and the operations at the time of the complaint.

Notifications

Any documented complaints will be made available to the EPA when requested and will be recorded within the electronic system.

Reporting

All employees and contractors are required to report generation of significant dust emissions (dust emissions with the potential to cause off-site nuisance) to the Operations Manager.

All dust complaints received shall be logged. This shall be completed within 24 hours of receiving the complaint and is considered internal reporting.

Review

The AQMP will be reviewed annually by the Operations Manager.

The effectiveness of the dust management, mitigations and controls will be evaluated considering:

- number of complaints received
- review of performance of dust emission controls
- dust management and control improvement opportunities to improve dust performance
- impacts on production in relation to dust performance.

Improvements as considered required will be implemented and the AQMP updated to capture changes.

Changes to a process at the site or inclusion of a new process that is relevant to dust management shall also prompt a review of the AQMP to update the plan as relevant. The EPA shall be notified of plan updates.

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Appendix 12 Environmental Noise Assessment

UPSG Facility EIS

Environmental Noise Assessment

A220674RP1 Revision C

Thursday, 17 August 2023

Resonate

Document Information

Project	UPSG Facility EIS
Client	JBS&G Pty Ltd
Report title	Environmental Noise Assessment
Project Number	A220674

Revision Table

Report revision	Date	Description	Author	Reviewer
0	13 February 2023	Draft issue	Nick Henrys	Nick Henrys
A	22 June 2023	For issue	Eleanor Tan	Nick Henrys
B	4 July 2023	Revised	Eleanor Tan	Nick Henrys
C	17 August 2023	Commercial-in-confidence items removed	Eleanor Tan	Nick Henrys

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
Characteristic	Associated with a noise source, means a tonal, impulsive, low frequency or modulating characteristic of the noise that is determined in accordance with the Guidelines for the use of the Environment Protection (Noise) Policy (Noise Policy) to be fundamental to the nature and impact of the noise.
Continuous noise level	A-weighted noise level of a continuous steady sound that, for the period over which the measurement is taken using fast time weighting, has the same mean square sound pressure as the noise level which varies over time when measured in relation to a noise source and noise-affected premises in accordance with the Noise Policy
Day	Between 7 am and 10 pm as defined in the Noise Policy
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of loudness.
dB(A)	Units of the A-weighted sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
Indicative noise level	Indicative noise level determined under clause 5 of the Noise Policy.
L_{90}	Noise level exceeded for 90 % of the measurement time. The L_{90} level is commonly referred to as the background noise level.
L_{eq}	Equivalent Noise Level—Energy averaged noise level over the measurement time.
L_{max}	The maximum instantaneous noise level.
Night	Between 10.00 p.m. on one day and 7.00 a.m. on the following day as defined in the Noise Policy
Noise source	Premises or a place at which an activity is undertaken, or a machine or device is operated, resulting in the emission of noise
Quiet locality	A locality is a quiet locality if the Planning & Design Code provisions that make land use rules for the locality principally promote land uses that all fall within either or both of the following land use categories: (a) Residential; (b) Rural Living;

Table of Contents

Executive Summary 3

1 Introduction 6

1.1 Overview 6

1.2 Proposed development 6

1.3 Purpose of the report 7

2 Proposed development 9

2.1 Location 9

2.2 Operation 9

2.3 Construction 11

2.4 Proposed construction 11

3 Planning & Design Code 13

3.1 Zoning 13

3.1.1 Subject site 13

3.1.2 Adjacent land and noise sensitive receivers 14

3.2 Interface between land uses 16

4 Noise criteria 17

4.1 Legislation 17

4.2 Environmental Protection (Noise) Policy 17

4.2.1 Construction noise 18

5 Baseline Noise Environment 20

5.1 Details 20

5.2 Instrumentation 20

5.3 Results 21

6 Assessment methodology 23

6.1 Modelling parameters 23

6.2 Noise modelling scenarios 23

6.3 Characteristic noise penalties 23

7 Construction noise assessment 25

7.1 Construction noise sources 25

7.2 Predicted noise levels 25

7.3 Construction noise mitigation 25

8 Operational noise assessment 29

8.1 Noise sources 29

8.2 Mitigation 29

8.3 Predicted noise levels 31
8.4 Discussion 33
9 Conclusion 39
Appendix A—Site layout 40
Appendix B—Daily measured noise levels 42
Appendix C—Noise sources 67

Executive Summary

This report outlines the environmental noise assessment for the proposed Battery Anode Material (BAM) Facility at Robinson Road, Bolivar in South Australia.

The potential noise emissions from the development have been assessed at the existing adjacent noise sensitive receptors. The potential environmental noise emissions impact has been assessed against the:

- South Australia, Planning & Design Code
- South Australian *Environmental Protection (Noise) Policy* 2007

Project delivery will be staged, with Stage 1 capacity to be doubled in Stage 2 expansion. The noise assessment has considered the following scenarios:

- Stage 1 construction
- Stage 2 construction (including contribution from Stage one operation)
- Stage 1 operation
- Stage 1 and 2 operation.

A summary of the noise assessment, outcomes and indicative mitigation recommendations are outlined in Table 1.

Table 1 Assessment summary and outcomes

Noise source	Outcomes and recommendations
Construction equipment	• Adopt standard noise mitigation measures as required by the Noise Policy • Construction activities should generally be limited to standard hours (7am to 7pm Monday to Saturday) other than intrinsically low noise activities, or where it can be demonstrated that there is no adverse impact based on the existing ambient noise environment. • Additional mitigation measures to be developed in the CEMP
Micronising & Spheronising Mill Buildings	• Limit the sound level of the micronising exhaust stacks as described in Table 18 • Facade construction to be metal cladding with 12 mm fibre cement sheet (or equivalent) directly flush to the metal cladding on the internal side of the external walls (where required) and roof as described in Table 18 • Roller doors and other external openings to be shut except to allow for timely ingress and egress of staff and vehicles.
Kiln	• Limit the sound level of noise sources as described in Table 18 and Table 23 • Facade construction to be upgraded to metal cladding with 12 mm fibre cement sheet (or equivalent) directly flush to the metal cladding on the internal side of external walls (where required) and roof as described in Table 18
Purification Building	• Limit the sound level of noise sources as described in Table 18 and Table 23 • Facade construction to be upgraded to metal cladding with 12 mm fibre cement sheet (or equivalent) directly flush to the metal cladding on the internal side of the external walls (where required) and roof as described in Table 18
Waste Water Treatment Plant (WWTP)	• Equipment selections and detailed design to limit the contribution of the WWTP to achieve L_{eq} 35 dB(A) or less at the nearest receivers.

Noise source	Outcomes and recommendations
Demineralisation plant	• Equipment selections and detailed design to limit the contribution of the Demineralisation Plant to achieve L_{eq} 35 dB(A) or less at the nearest receivers.
Reagent areas	• Equipment selections and detailed design to limit the contribution of the reagent areas to achieve L_{eq} 35 dB(A) or less at the nearest receivers.
Compressors	• Fully enclose the compressors in a profile metal shed or equivalent
Workshop and warehouse facility	• Roller doors and other external to be shut except to allow for timely ingress and egress of staff and vehicles.
Externally located air conditioning condenser	• No specific acoustic treatments are required based on indicative noise data. To be reviewed during detailed design to confirm.
Heavy vehicle deliveries and service vehicles	• Use broadband reversing alarms only, or eliminate the need for heavy vehicle reversing movements on site
Light vehicles and car park	• No specific acoustic treatments are required (to be reviewed during detailed design to confirm)
Forklifts	• Forklifts should be gas or electric • Use broadband reversing alarms only

This assessment shows that, with the indicative on-site noise mitigation treatments detailed in this report, the noise emissions from construction and operation of the proposed development are expected to comply with the relevant environmental noise criteria, except at three neighbouring receiver locations where noise from operation of the project may exceed the night time Noise Policy criteria by up to 6 dB(A) during a nominal worst-case scenario.

The predicted exceedance is primarily due to truck movements. It is expected that up to 1-2 trucks may enter the site during the night time period (i.e. up to four night time truck movements entering and exiting the site).

It should be noted that there are already relatively frequent existing truck movements on Robinson Road, which generate similar or higher noise emissions at noise sensitive receiver locations, than those expected from the proposed Project.

Noise from trucks associated with the Project cannot practically be further mitigated (e.g. through noise barriers or similar) since trucks must enter the site from Robinson Road. It is understood that restricting trucks to daytime hours only is likely to result in unreasonable costs associated with additional storage infrastructure and driver labour. Additionally, the flexibility to receive emergency parts or materials via truck delivery during night time hours is required in order to avoid the significant costs that would otherwise be associated with halting production.

Noise emissions from operation of Stage 1 of the Project, in the absence of truck movements, is predicted to comply with the relevant daytime and night time environmental noise criteria at all locations. Cumulative noise from operation of Stage 1 and 2 of the Project, in the absence of truck movements, is predicted to comply with the environmental noise criteria at all locations except one residence where noise may exceed the night time Noise Policy criteria by up to 2 dB(A) during a nominal worst-case scenario.

Clause 20(6) of the Noise Policy acknowledges that a potential inability to meet the objective night time criteria is, in itself, no indication that excessive noise would be generated by the proposed development. The predicted noise levels are less than existing average ambient night time noise levels at this location, and all reasonable and practicable noise mitigation measures will be adopted to minimise noise emissions.

On this basis the proposed development will be able to operate within the relevant noise provisions in the Planning & Design Code, Environmental Protection (Noise) Policy, and Environment Protection Act.

1 Introduction

1.1 Overview

Renascor Resources Ltd (Renascor) are proposing to construct a purpose-built Battery Anode Material (BAM) Facility in the Bolivar area of Adelaide's northern suburbs as part of the Siviour Battery Anode Material Project (Siviour BAM Project).

The BAM facility (the proposed development) will complement Renascor's Siviour graphite mining operation on the Eyre Peninsula, South Australia (SA). The proposed development consists of an industrial downstream processing facility for refinement and purification of graphite and will produce a micronised, spheronised and highly purified (>99.95% Carbon) PSG graded by particle size, from graphite concentrate mined on the Eyre Peninsula under Mining Lease (ML) 6495.

Graphite, when refined to PSG, is an essential mineral resource in the manufacture of anodes for lithium-ion batteries, a sector which is projected to experience significant growth in the coming decades. In order to capitalise on this opportunity, Renascor has been conducting feasibility and technological studies into the potential for Siviour graphite to be processed into PSG in SA. The Siviour BAM Project is the resultant strategy, incorporating best-practice technologies and processes into a vertically integrated graphite mining and PSG production project wholly within SA. This provides an opportunity for SA to become global leader in the manufacturer of lithium-ion battery anode material.

Renascor's ambition is to supplement the economic benefit of the Siviour mining operation through in-country downstream processing to produce a refined graphite product for direct use by the global battery anode manufacturing sector at world-competitive prices. Renascor's stated aim is to become a global leader in the supply of sustainable, Australian made battery anode material with a focus on sound environmental management. A key aspect of this is the development of a purification process that is significantly more environmentally friendly than prevailing global PSG production technologies. Renascor's purification process avoids the use of hydrofluoric acid (HF) as a reagent chemical, offering a cleaner and safer HF-free process.

As a key part of the Siviour BAM Project, the BAM Facility is considered to be a project of state significance. Accordingly, the BAM Facility was declared by the Minister to be an Impact Assessed Development under Section 108(c) of the Planning, Development and Infrastructure Act 2016 (the PDI Act) on 8 December 2022, requiring preparation of an Environmental Impact Statement (EIS).

1.2 Proposed development

The proposed development comprises two discrete but integrated industrial plants—mechanical shaping and purification—with associated equipment and reagents. The BAM Facility will conduct micronisation and spheronisation of graphite concentrate (milling), followed by a caustic roast purification process (chemical works). Additionally, equipment for the packaging and distribution of a range of PSG products and related by-products will be incorporated into the proposed development. Proposed development delivery is anticipated to be staged, with Stage 1 capacity to be doubled in Stage 2 expansion.

The key components of the BAM Facility in relation to noise generation include:

- Kiln Building
  - Rotary kiln
  - Alkaline gas scrubbing unit
  - Spherical graphite kiln feed bin
  - Rotary kiln dust collector
  - Scrubber unit
- Mills Building

  - Dust collector
  - Cyclone
  - Mill
  - Motor control panel
- Purification building
  - Spiral flash dryer
  - Spiral flash dryer dust collector
  - SPG bagging plant
  - Product silo
  - Caustic leach filters
  - Acid leach filters
- Water treatment plant facility
- Demineralisation plant facility
  - RO processing
- Workshop and warehouse facility
- Administration Building
- Emergency and first aid facility
- PSG shifts change ablutions
- Product storage building

During the projected Stage 2 expansion of the BAM Facility, the overall PSG production capacity is anticipated to double, subject to ongoing analysis of market demand and commercial feasibility. Subsequently, some of the key components of the BAM Facility will require stepped expansion commensurate with production volume. The land parcel for the BAM Facility has been chosen with this expansion in mind, such that available land area is adequate to meet the projected scale of the Stage 2 expansion.

Details of plant design, such as the capacity and dimensions of storage silos, loading and unloading facilities, industrial buildings, hardstand area and conveyance equipment, are not yet finalised and remain subject to change according to the outcome of the forthcoming DFS and further plant engineering design, which is anticipated to be informed by the impact assessment process.

There is potential for noise emissions from construction activities from Stage 2 expansion. Significant construction activities include the following:

- Site preparation and civil works
- Processing plant construction

Appendix A—Site layout shows the preliminary site plan for Stage 1 and Stage 2 of BAM Facility.

1.3 Purpose of the report

This report outlines the environmental noise assessment for the proposed Battery Anode Material (BAM) Facility at Robinson Road, Bolivar in South Australia.

This report includes the following:

- Description of the proposed development, including activities with potential significant noise emissions during construction and operation;
- Location of the proposed development and significant noise sources;
- Locations of the nearest noise sensitive receivers;
- Relevant noise criteria for assessment of noise from the facility during construction and operation;
- Description of the baseline noise environment;

- Assessment methodology including details of acoustic modelling parameters and assumptions.
- Prediction of worst-case noise emissions during the following scenarios:
  - Stage one construction
  - Stage two construction (including contribution from Stage one operation)
  - Stage one operation
  - Stage one and two operations
- Assessment of predicted daytime and night time noise levels against the relevant criteria
- Mitigation of noise emissions to comply with the relevant criteria, where reasonable and practicable.

The potential noise emissions from the development have been assessed against the requirements of:

- South Australia's Planning & Design Code
- South Australian *Environmental Protection (Noise) Policy* 2007.

2 Proposed development

2.1 Location

The proposed development is located at Robison Road, Bolivar, South Australia 5110 within CT 5723/299 and comprises the majority of Allotment 3 (F115108AL3) and portions of Allotment 4 (F115108AL4) as shown in Figure 1.

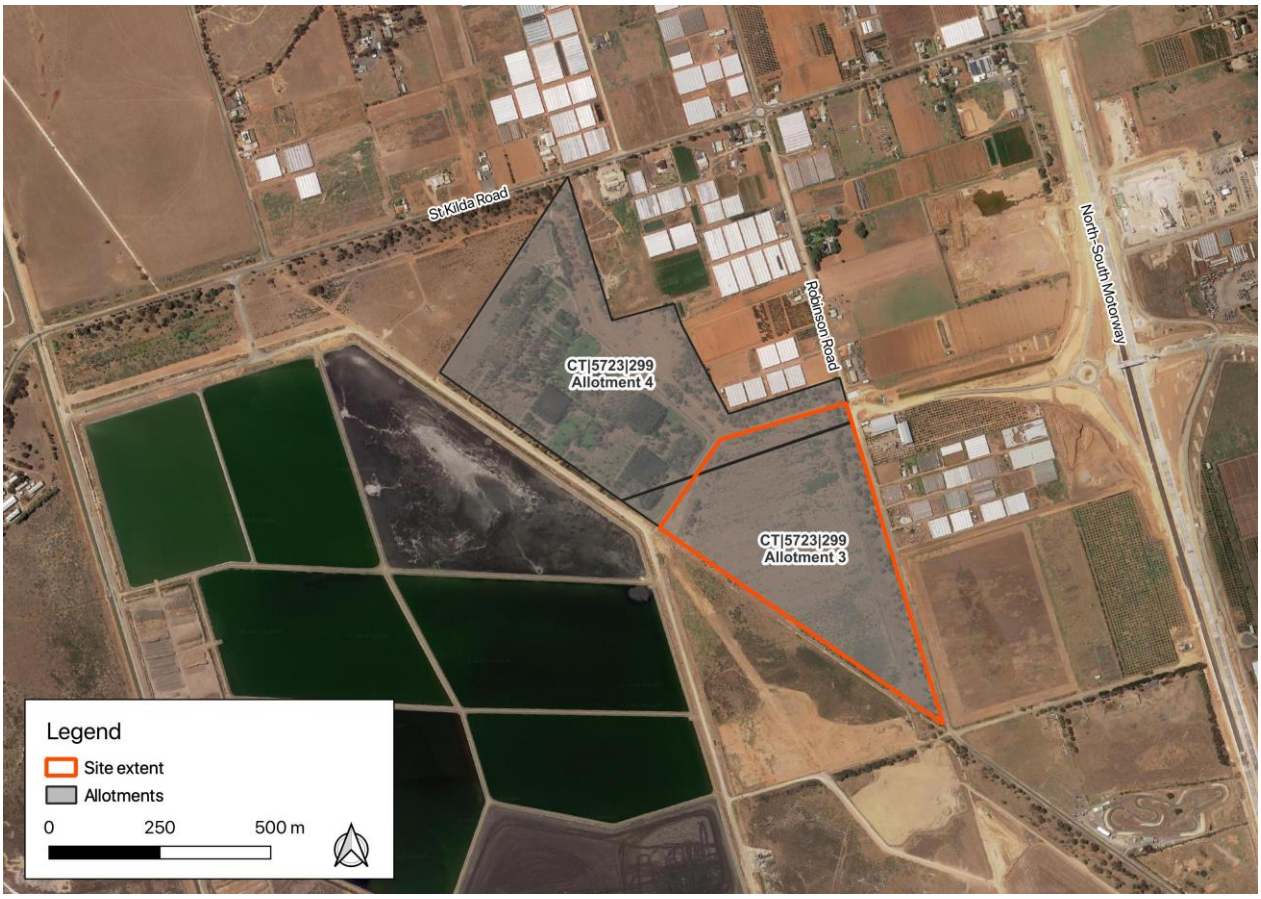


Figure 1 Locality of the site

2.2 Operation

The BAM Facility is proposed to operate 24 hours a day, 7 days a week. Note the following hours are relevant to the day and night-time periods as per *Environmental Protection (Noise) Policy* 2007:

- Day: 7 am – 10 pm
- Night: 10 pm – 7 am.

The proposed activities outlined in Table 2. This is based on the following:

- Estimated average vehicle movements per day is derived from 'Renascor Resources – Definitive Feasibility Study: Chapter 11 Logistics'
- Information provided by Renascor
- Noise measurements undertaken from similar projects
- Noise data from Resonate's database

For the operation of the BAM facility is 24/7, the proposed activities remain consistent for both day and night time periods.

Table 2 Proposed operational activity

Noise sources	Period	
	Day—7 am to 10 pm	Night—10 pm to 7 am
Micronising & Spheronising Mill Building	• All equipment (as outlined in Table 23) operating at 100% capacity	
Kiln Building	• All equipment (as outlined in Table 23) operating at 100% capacity	
Purification Building	• All equipment (as outlined in Table 23) operating at 100% capacity	
Compressor	• All compressors operating at 100% capacity	
Waste Water Treatment Plant (WWTP)	• All equipment (as outlined in Table 23) operating at 100% capacity	
Demineralisation	• All equipment (as outlined in Table 23) operating at 100% capacity	
Workshop and warehouse facility	• Workshop activities • Assumed internal noise level of L_P 75 dB(A). No hearing protection required for staff	
Reagent storage	• All equipment (as outlined in Table 23) operating at 100% capacity	
Storage / bagging	• Dry goods storage only • 2 gas forklift movements	
Condensers	• All plant operating at 100% capacity	
Vehicle movements • The vehicle movements adopted for both light and heavy vehicles are derived from the information shown in Table 3. • It is assumed that the proposed site will adopt sealed internal roads, however, a change to unseal roads will not materially affect the outcomes of the noise assessment.		
Light vehicles and car park	• 20 car movements per 15-minute period assessment period and 75 number of parking space.	
Heavy vehicle deliveries and service vehicles	• 1 heavy vehicle movement per 15-minute assessment period	

Estimated average vehicle movements per day during operation of the Project is provided in Table 3.

Table 3 On-site daily vehicle trips during operation

Vehicle type	Details	Stage 1	Stage 2
Light vehicles	Personal vehicles	52	69
	Food truck	2	2
Heavy vehicles	Fuel Truck B double	1 per month	1 per month
	Product haulage truck (AB-triple or A-double) trips	4	7-8

Vehicle type	Details	Stage 1	Stage 2
	Miscellaneous delivery	2	2
	Over-width load	1 per month	1 per month

2.3 Construction

The construction of the facility proposed to occur between 7 am to 7 pm Monday to Sunday.

The proposed activities outlined in Table 4. This is based on the following:

- Estimated average vehicle movements per day is derived from 'Renascor Resources – Definitive Feasibility Study: Chapter 11 Logistics'.
- Information provided by Renascor
- Noise measurements undertaken from similar projects
- Noise data from Resonate's database

Table 4 Proposed construction activities

Activities	Details
C1: Site preparation and civil works	• All equipment (as outlined in Table 22) operating at 100% capacity
C2: Processing plant construction (structural works)	• All equipment (as outlined in Table 22) operating at 100% capacity

The estimated average vehicle movements in and out of the site per day during construction of the development is outlined in Table 5, which is further adopted for the noise assessment.

Table 5 Vehicle movements during construction

Vehicle type	Details	Average trips each day
Heavy vehicles	Equipment (inc modules) and misc. deliveries	1 – 2
	Fuel	< 1(1)
	1 x flat- bed truck	1
	1 x 20-seater bus	1(1)
Light vehicles	Utes	35
	Food truck	2

(1) Assumed quantity – no number provided in logistics report

2.4 Proposed construction

The facade constructions of the development (without additional noise mitigation) have been advised by Renascor or shown in concept drawings, which are outlined in Table 6.

Table 6 Building facade construction (without additional noise mitigation)

Element	Construction
Micronising & Spheronising Mill Building	• Profile metal cladding to the external walls and roof • Roller doors remain shut when not required for access and egress
Kiln	• Profile metal roof
Purification	• Profile metal roof
Compressors	• Profile metal roof
Reagents	• Fully open
Condensers	• Fully open
Workshop and warehouse	• Profile metal cladding to the external walls and roof • Roller doors remain shut when not required for access and egress

3 Planning & Design Code

3.1 Zoning

3.1.1 Subject site

The subject site is located within the City of Salisbury Council in a Rural Horticulture zone and is located within CT 5723/299 and comprises the majority of Allotment 3 (F115108AL3) and portions of Allotment 4 (F115108AL4). The relevant Assessment Provisions for the Rural Horticulture zone are outlined in Table 7.

Table 7 Relevant Assessment Provisions—Rural Horticulture zone

Assessment Provisions	
Desired Outcome	
DO1	Intensive agriculture in the form of horticulture and associated value-adding enterprises and activities.
DO 2	The establishment of appropriately scaled industries for washing, processing, bottling and packaging primary produce and servicing and supporting horticulture.
DO 3	Manage interface conflict between horticulture and other land uses.
Performance Outcomes	**Deemed-to-Satisfy Criteria / Designated Performance Feature**
PO 4.3 Industry, storage, warehousing, transport distribution or similar activities are sited, designed and of a scale that maintains rural function and character in a manner that respects landscape amenity.	DTS/DPF 4.3 Buildings and associated activities: (a) are setback at least 50m from all road and allotment boundaries (b) are not sited within 100m of a sensitive receiver in other ownership (c) have a building height not greater than 10m above natural ground level (d) incorporate the loading and unloading of vehicles within the confines of the allotment.

3.1.2 Adjacent land and noise sensitive receivers

The closest noise affected receptors located around the site are shown in Figure 2, with details as outlined in Table 8. It is noted that there are no existing buildings at Receiver Numbers R17, R20 and R21.

Figure 2 Subject site with respect to adjacent receptors

Table 8 Closest noise affected receptors with respect to the subject site

Receptor Number	Address	Land Use	Zoning	Desired Outcomes
R01	146-156 St Kilda Rd, Waterloo Corner SA 5110	Agriculture	Rural Horticulture	Table 7
R02	134-144 St Kilda Rd, Waterloo Corner SA 5110 (St Kilda Roses)	Agriculture	Rural Horticulture	Table 7
R03	118 St Kilda Rd, Waterloo Corner SA 5110	Rural Residential	Rural Horticulture	Table 7
R04	120-132 St Kilda Rd, Waterloo Corner SA 5110	Rural Residential	Rural Horticulture	Table 7
R05	102-114 St Kilda Rd, Waterloo Corner SA 5110	Rural Residential	Rural Horticulture	Table 7

Receptor Number	Address	Land Use	Zoning	Desired Outcomes
R06	111 Robinson Rd, Waterloo Corner SA 5110	Rural Residential	Rural Horticulture	Table 7
R07	107 Robinson Rd, Waterloo Corner SA 5110	Rural Residential	Rural Horticulture	Table 7
R08	108-122 Robinson Rd, Waterloo Corner SA 5110	Horticulture	Rural Horticulture	Table 7
R09	103-105 Robinson Rd, Waterloo Corner SA 5110	Livestock	Rural Horticulture	Table 7
R11	102 Robinson Rd, Waterloo Corner SA 5110	Horticulture	Rural Horticulture	Table 7
R12	84-96 Robinson Rd, Waterloo Corner SA 5110	Horticulture	Rural Horticulture	Table 7
R13	95-97 Robinson Rd, Waterloo Corner SA 5110	Rural Residential	Rural Horticulture	Table 7
R14	87-89 Robinson Rd, Waterloo Corner SA 5110	Horticulture	Rural Horticulture	Table 7
R15	83-85 Robinson Rd, Waterloo Corner SA 5110	Rural Residential	Rural Horticulture	Table 7
R16	79-81 Robinson Rd, Waterloo Corner SA 5110	Rural Residential	Rural Horticulture	Table 7
R17	2-10 Driver Rd, Waterloo Corner SA 5110	Horticulture	Rural Horticulture	Table 7
	12-20 Driver Rd, Waterloo Corner SA 5110			Table 7
	22-30 Driver Rd, Waterloo Corner SA 5110			Table 7
R20	32-40 Driver Rd, Waterloo Corner SA 5110	Horticulture	Rural Horticulture	Table 7
R21	42-50 Driver Rd, Waterloo Corner SA 5110	Horticulture	Rural Horticulture	Table 7
R22	1-61 Driver Rd, Waterloo Corner SA 5110	Recreation/Reserves	Rural Horticulture / Open Space	Table 7 / Table 9

The relevant Desired Outcome for the Open Space zone is outlined in Table 9.

Table 9 Relevant Desired Outcome—Open Space zone

Desired Outcome	
DO1	Areas of natural and landscaped open space provide for biodiversity, tree canopy cover, urban cooling and visual relief to the built environment for the health and enjoyment of the community.

3.2 Interface between land uses

Interface between Land Uses is a General Development Policy that is relevant to the subject site. The relevant Assessment Provisions relating to noise are outlined in Table 10.

Table 10 Relevant Assessment Provisions—Activities generating noise or vibration

Relevant Assessment Provisions	
Desired Outcome	
DO1	Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses.
Performance Outcome	**Deemed-to-Satisfy Criteria / Designated Performance Feature**
PO 4.1 Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers (or lawfully approved sensitive receivers).	DTS/DPF 4.1 Noise that affects sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.
PO 4.2 Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive receivers (or lawfully approved sensitive receivers) and zones primarily intended to accommodate sensitive receivers due to noise and vibration by adopting techniques including: a) locating openings of buildings and associated services away from the interface with the adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive receivers and zones primarily intended to accommodate sensitive receivers c) housing plant and equipment within an enclosed structure or acoustic enclosure d) providing a suitable acoustic barrier between the plant and / or equipment and the adjacent sensitive receiver boundary or zone.	DTS/DPF 4.2 None are applicable.

4 Noise criteria

4.1 Legislation

The general environmental duty in section 25 of the *Environment Protection Act 1993* (EP Act) states that:

> *A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to present or minimise any resulting environmental harm.*

Under the EP Act, pollution includes the emission of noise.

4.2 Environmental Protection (Noise) Policy

As noted in DTS/DPF 4.1, environmental noise emissions from the subject site should comply with the *Environment Protection (Noise) Policy* 2007 (Noise Policy).

The noise goals in the Noise Policy are based on the zoning of the development and the closest noise affected premises. The land uses primarily promoted by the zones are used to determine the environmental noise criteria with the indicative noise factors shown in Table 11.

Table 11 Excerpt from Noise Policy—Table 2(subclause(1)(b))

Land use category	Indicative noise factor dB(A)	
	Day (7 am to 10 pm)	Night (10 pm to 7 am)
Rural living	47	40
Rural industry	57	50

Based on the zoning and the relevant Assessment Provisions for the zones of the subject site and the adjacent receptors, the primarily promoted land uses and the relevant criteria for the receptors in each zone are outlined in Table 12. In accordance with Part 5 of the Noise Policy, the relevant criteria is the average of the relevant indicative noise factors less 5 dB(A).

Table 12 Summary of zones, land uses, and Noise Policy criteria

Site	Zone	Land use(s)	Criteria	
			Day (7 am to 10 pm)	Night (10 pm to 7 am)
Subject site	Rural Horticulture Zone	Rural Industry	N/A	N/A
R01 to R22	Rural Horticulture Zone	Rural Industry	52	45
R22	Open Space zone	Rural Living	47	40 L_{max} 60(1)

(2) A maximum noise criterion of L_{max} 60 dB(A) at night, 10 pm to 7 am is applicable as the receptors are located within a 'quiet locality' (being a residential and rural living zone).

Penalties can also be applied to a noise source for a variety of characteristics, such as impulsive, low frequency, modulating or tonal characters. For a characteristic penalty to be applied to a noise source it must be fundamental to the impact of the noise and dominate the overall noise impact. Application of the characteristic penalty is discussed in the noise emission assessment.

We note that under Part 5, Clause 20(6) of the Noise Policy, exceedance of the recommended criterion does not necessarily mean action is required under the Noise Policy. Part 5, Clause 20(6) of the Noise Policy as follows:

> If a predicted source noise level (continuous) or predicted source noise level (maximum) for the development exceeds a relevant level prescribed in subclause (3) or (4), the Authority much have regard to the following matters in determining its response:
>
> (a) the amount in dB(A) by which the predicted source noise level (continuous) or predicted source noise level (maximum) exceeds the relevant level and the likely frequency and duration of the noise levels that give rise to that result;
>
> (b) any component f the ambient noise or extraneous noise that—
>
> (i) has a noise level similar to or greater than the predicted source noise level (continuous) or predicted source noise level (maximum); and
>
> (ii) has a similar noise character or similar regularity and duration to the noise from the noise source;
>
> (c) the times of occurrence of the noise from the noise source;
>
> (d) the number of persons likely to be adversely affected by the noise from the noise source and whether there is or is likely to be any special need for quiet at noise-affected premises;
>
> (e) the land uses existing in the vicinity of the noise sources;
>
> (f) any other matter required to be taken into account under section 25 if the Act or determined to be relevant by the Authority.

4.2.1 Construction noise

Noise from construction activity is subject to Part 6, Division 1 of the Noise Policy as follows:

> The following provisions apply to construction activity resulting in noise with an adverse impact on amenity:
>
> (a) subject to paragraph (b), the activity—
>
> (i) must not occur on a Sunday or other public holiday; and
>
> (ii) must not occur on any other day except between 7.00 a.m. and 7.00 p.m.;
>
> (b) a particular operation may occur on a Sunday or other public holiday between 9.00 a.m. and 7.00 p.m., or may commence before 7.00 a.m. on any other day—
>
> (i) to avoid an unreasonable interruption of vehicle or pedestrian traffic movement; or
>
> (ii) if other grounds exist that the Authority or another administering agency determines to be sufficient;
>
> (c) all reasonable and practicable measures must be taken to minimise noise resulting from the activity and to minimise its impact, including (without limitation)—
>
> (i) commencing any particularly noisy part of the activity (such as masonry sawing or jack hammering) after 9.00 a.m.; and
>
> (ii) locating noisy equipment (such as masonry saws or cement mixers) or processes so that their impact on neighbouring premises is minimised (whether by maximising the distance to the premises, using structures or elevations to create barriers or otherwise); and
>
> (iii) shutting or throttling equipment down whenever it is not in actual use; and
>
> (iv) ensuring that noise reduction devices such as mufflers are fitted and operating effectively; and
>
> (v) ensuring that equipment is not operated if maintenance or repairs would eliminate or significantly reduce a characteristic of noise resulting from its operation that is audible at noise-affected premises; and

(vi) operating equipment and handling materials so as to minimise impact noise; and

(vii) using off-site or other alternative processes that eliminate or lessen resulting noise.

…

For the purposes of this clause, construction activity results in noise with an adverse impact on amenity if measurements taken in relation to the noise source and noise-affected premises show—

(a) that the source noise level (continuous) exceeds 45 dB(A); or

(b) that the source noise level (maximum) exceeds 60 dB(A).

However—

(a) if measurements of ambient noise at the noise-affected premises show that the ambient noise level (continuous) exceeds 45 dB(A), the construction activity does not result in noise with an adverse impact on amenity unless the source noise level (continuous) exceeds the ambient noise level (continuous);

(b) if measurements of ambient noise at the noise-affected premises show that the ambient noise level (maximum) consistently exceeds 60 dB(A), the construction activity does not result in noise with an adverse impact on amenity unless the source noise level (maximum) exceeds the ambient noise level (maximum) or the frequency of the occurrence of the ambient noise level (maximum).

Baseline noise measurement results described in Section 5 show that average daytime ambient noise levels are 57 dB(A) L_{eq} or more, and average night time ambient noise levels are 52 dB(A) L_{eq} or more at sensitive receiver locations. On this basis 57 dB(A) L_{eq} is considered to be an appropriate threshold for construction noise which may have an adverse impact on amenity for out-of-hours construction works occurring between 7am and 7pm on Sundays. No out-of-hours night time construction work is proposed.

5 Baseline Noise Environment

5.1 Details

Background noise monitoring was undertaken over a period of 7 days between 21 November to 28 November 2022 to capture the existing ambient noise environment at adjacent land uses near the project. Additional noise monitoring results from a campaign undertaken from 16 February to 3 March 2022 are also included in the summary below.

The monitoring locations with respect to the subject site are presented in Figure 3.

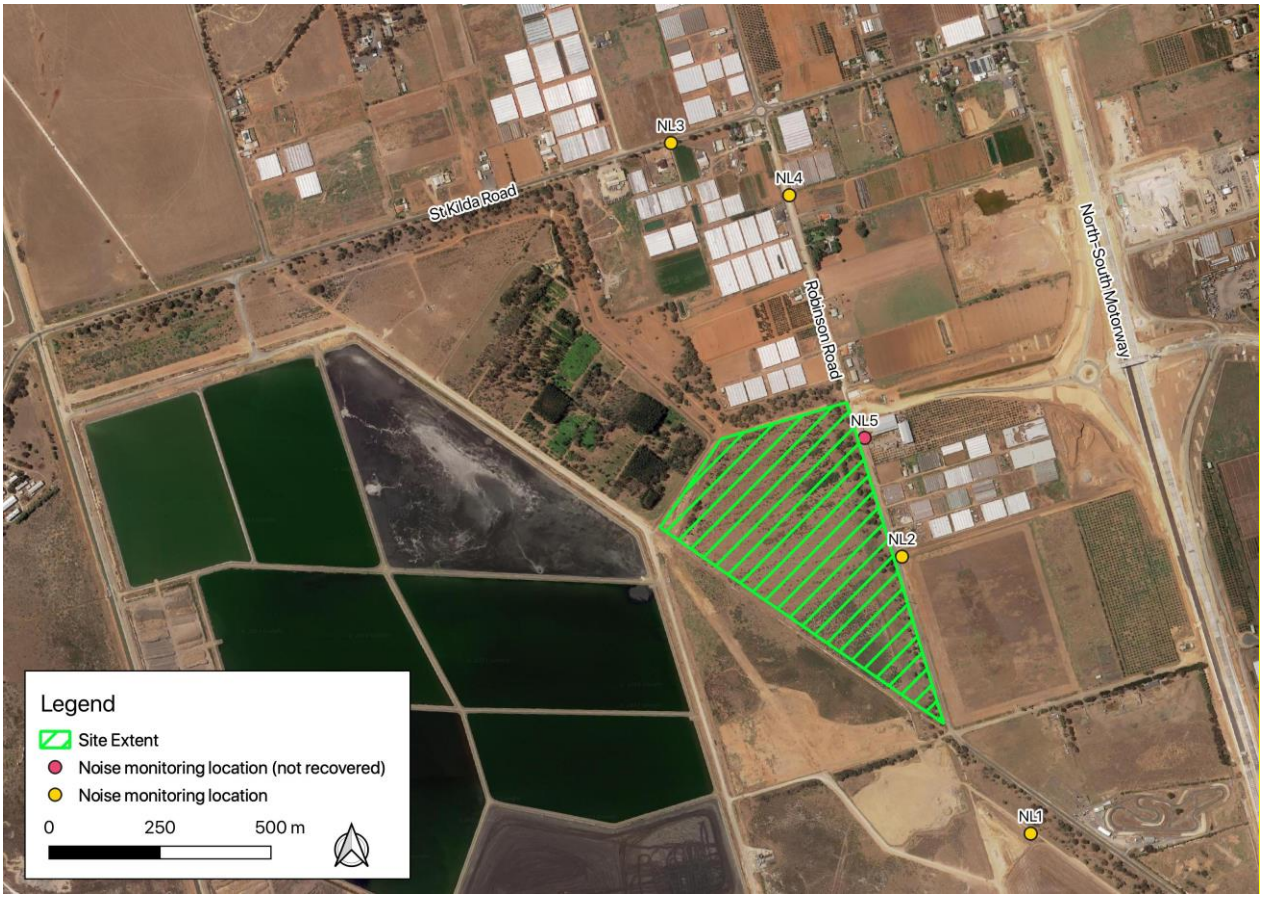


Figure 3 Noise monitoring locations with respect to the subject site

5.2 Instrumentation

The noise measurements were taken with the equipment summarized in Table 13 below. The Rion NL-42 sound level meter is a Type 2 instrument suitable for field and laboratory use. The sound level meter was calibrated both before and after the measurements using a Type 1 Brüel & Kjær 4231 (Serial Number: 2528316) sound level calibrator, and the calibration was found to have not drifted. Both the sound level meters and calibrator carry current calibration certificates from a NATA accredited laboratory. Copies of the calibration certificates are available on request.

Table 13 Background noise monitoring equipment summary

Date	Location ID	Location Name	Equipment	Serial Number
16/02/2022 – 03/03/2022	NL1	SEA Gas pump station	Rion NL-42	00946975
16/02/2022 – 03/03/2022	NL2	Adj. 79 Robinson Road	Rion NL-42	01000315
21/11/2022 – 28/11/2022	NL3	Adelaide Zoo	Rion NL-42	01000248
23/11/2022 – 28/11/2022	NL4(1)	Adj. 102 Robinson Road	Rion NL-42	01000319
21/11/2022 – 28/11/2022	NL5(2)	Adj. 87 Robinson Road	Rion NL-42	01000315

(1) Noise monitor was relocated per stakeholder request. Measured noise levels presented are only after the monitor relocation.

(2) Noise monitor was stolen, and noise data is unattainable.

Exclusions have been made based on periods where the measured noise levels may have been influenced by weather, namely where wind speed exceeded 5 m/s or rainfall exceeded 0.2 mm/hr in a given period, based on weather data recorded at BOM station.

5.3 Results

A brief summary of the average measured noise levels during the monitoring period is presented in Table 14 and Table 15. Plots of the daily measured levels are attached to this report as Appendix B—Daily measured noise levels.

Table 14 Noise monitoring results summary - Day

Location	Type/SN	Date period	Average measured noise level dB(A)		Maximum noise level dB(A)
			$L_{eq, 15min}$	$L_{90, 15 min}$	L_{Fmax}
NL1	NL-42 00946975	16/02/2022 – 03/03/2022	56.7	45.7	97.2
NL2	NL-42 01000315	16/02/2022 – 03/03/2022	57.4	41.4	97.7
NL3	NL-42 01000248	21/11/2022 – 28/11/2022	61.4	37.8	98.7
NL4	NL-42 01000319	23/11/2022 – 28/11/2022	67.1	43.3	91.6
NL5	NL-42 01000315	-	-	-	-

Table 15 Noise monitoring results summary - Night

Location	Type/SN	Date period	Average measured noise level dB(A)		Maximum noise level dB(A)
			$L_{eq, 15min}$	$L_{90, 15 min}$	L_{Fmax}
NL1	NL-42 00946975	16/02/2022 – 03/03/2022	51.8	42.9	92.9
NL2	NL-42 01000315	16/02/2022 – 03/03/2022	52.1	39.3	96.6
NL3	NL-42 01000248	21/11/2022 – 28/11/2022	55.8	36.9	88.3
NL4	NL-42 01000319	23/11/2022 – 28/11/2022	62.3	38.9	90.0
NL5	NL-42 01000315	-	-	-	-

6 Assessment methodology

6.1 Modelling parameters

Noise emissions from site have been modelled in SoundPLAN Environmental Software v8.2 program, using the Conservation of Clean Air and Water in Europe (CONCAWE) algorithms. The model takes into consideration:

- attenuation of noise source due to distance
- barrier effects from buildings, topography and the like
- air absorption
- ground effects
- weather conditions (wind speed, wind direction, time of day, and cloud cover)

CONCAWE has six difference meteorological categories—CONCAWE meteorological category 1 represents weather conditions that are least conducive to noise propagation (best case situation with the lowest predicted noise levels), CONCAWE meteorological category 4 represents neutral weather conditions, and CONCAWE meteorological category 6 represents weather conditions that are the most conducive to noise propagation (the worst case situation with the highest predicted noise levels). In accordance with the *Guidelines for the use of the Environmental Protection (Noise) Policy 2007*, CONCAWE meteorological category 5 has been used for day time noise emissions and CONCAWE meteorological category 6 has been used for night time noise emissions.

6.2 Noise modelling scenarios

Noise emissions from the proposed development have been assessed from the scenarios outlined in Table 16 for a 15-minute assessment period.

Table 16 Noise modelling scenarios

Scenarios	Activity	Criteria
Scenario 1	• Stage 1 construction	Noise Policy Part 6 Division 1 (refer to Section 4.2.1)
Scenario 2	• Stage 1 operation	Noise Policy day and night (refer to Table 12)
Scenario 3	• Stage 1 operation • Stage 2 construction	Noise Policy Part 6 Division 1 (refer to Section 4.2.1)(1)
Scenario 4	• Stage 1 operation • Stage 2 operation	Noise Policy day and night (refer to Table 12)

(3) Noise from Stage 1 operation has been included in this scenario in order to present the most accurate representation of Project noise impacts during Stage 2 construction, however we note that operational noise is not typically assessed against Part 6 Division 1 of the Noise Policy.

6.3 Characteristic noise penalties

Penalties should be applied to noise predictions in accordance with the Noise Policy to recognise annoyance associated with noise that is dominated by tonal, modulating, low frequency, or impulsive characteristics. A 5 dB(A) penalty is applied for one characteristic, an 8 dB(A) penalty is applied for two characteristics, and a 10 dB(A) penalty is applied for three or more characteristics.

For a characteristic penalty to be applied to a noise source it must be fundamental to the noise and dominate the overall noise impact.

Application of a characteristic penalty will depend on the received noise levels compared with the background noise levels, to determine whether or not the characteristic(s) are fundamental to the noise and dominate the overall noise impact.

7 Construction noise assessment

7.1 Construction noise sources

Indicative construction noise sources are presented in Appendix C. In general, construction of each Stage 1 and Stage 2 may occur in two broad sub-stages:

- C1: Site preparation and civil works
- C2: Processing plant construction (structural works)

Noise from each of these construction stages has been assessed on a worst-case basis with all sources assumed to be operating simultaneously.

7.2 Predicted noise levels

Nominal worst-case predicted noise levels during construction are presented in Table 17 overleaf. Note that predicted noise levels from Stage 2 construction includes cumulative noise from Stage 1 operation, assuming mitigation is adopted as described in Section 8.2.

Predicted worst-case construction noise levels are above the Noise Policy limit of 57 dB(A) L_{eq} (based on existing ambient noise levels) for works occurring on Sundays between 7am and 7pm, at up to five noise sensitive receiver locations.

We note that construction noise levels are likely to be significantly less than those presented in Table 17 for the majority of the time, and a variety of construction activities can likely be carried out without exceeding the Noise Policy limit of 57 dB(A) applicable during the daytime on Sundays. In particular, noise emissions from activities which use lower noise equipment or which are undertaken in parts of the site that are more distant or shielded from the nearest noise sensitive receivers can be expected to be within this criteria.

More detailed construction noise predictions can be undertaken (for example as part of a Construction Noise Management Plan) one more detail is known about the construction methodology and equipment, to determine which activities are permissible on Sundays.

Construction noise during standard hours (7am to 7pm Monday to Saturday) will comply with the Noise Policy provided the mitigation measures described below are adopted.

7.3 Construction noise mitigation

We recommend that a construction noise management plan is developed as part of the CEMP once a contractor has been appointed and a detailed construction methodology has been developed.

Construction may occur outside of Standard Hours (during the daytime on Sundays) if an activity is intrinsically low noise, or where it can be demonstrated through monitoring or detailed modelling that works are not expected to have an adverse effect on amenity (that is, the predicted or measured noise level is less than 57 dB(A) L_{eq} at receiver locations).

As a minimum, the following construction noise mitigation measures will be adopted for all works as required by the Noise Policy:

- commencing any particularly noisy part of the activity (such as masonry sawing or jack hammering) after 9.00 a.m.; and

- locating noisy equipment (such as masonry saws or cement mixers) or processes so that their impact on neighbouring premises is minimised (whether by maximising the distance to the premises, using structures or elevations to create barriers or otherwise); and
- (shutting or throttling equipment down whenever it is not in actual use; and
- ensuring that noise reduction devices such as mufflers are fitted and operating effectively; and
- ensuring that equipment is not operated if maintenance or repairs would eliminate or significantly reduce a characteristic of noise resulting from its operation that is audible at noise-affected premises; and
- operating equipment and handling materials so as to minimise impact noise; and
- using off-site or other alternative processes that eliminate or lessen resulting noise.

Additional construction noise and vibration mitigation measures will be developed as part of the Construction Environmental Management Plan (CEMP) prior to commencement of construction. In addition to the above measures required by the Noise Policy, measures could include consulting with potentially affected neighbours and programming high noise works to avoid particularly sensitive times if required.

Table 17 Predicted nominal worst-case construction noise levels

Receiver number	Certificate of Title	Zoning	Building Use	Noise Policy Criteria, L_{eq} dB(A)		Predicted noise levels L_{eq} dB(A)			
				Standard hours	Out of hours (Sunday daytime)	Stage 1		Stage 2[(1)]	
						C1	C2	C1	C2
R01	CT|5710|798	Rural Horticulture	Workshop	No quantitative criteria	-	52	50	47	46
R02	CT|5395|689	Rural Horticulture	Residential		57	52	50	48	46
R03	CT|5427|926	Rural Horticulture	Residential		57	50	49	48	46
R04	CT|5710|802	Rural Horticulture	Residential		57	52	50	48	46
R05	CT|5553|275	Rural Horticulture	Residential		57	51	49	48	46
R06	CT|5755|245	Rural Horticulture	Residential		57	55	53	50	48
R07	CT|6088|360	Rural Horticulture	Residential		57	57	54	53	51
R08	CT|5606|363	Rural Horticulture	Residential		57	42	39	37	36
R09	CT|5808|917	Rural Horticulture	-		-	59	57	55	52
	CT|5808|918	Rural Horticulture	Shed		-	-	-	-	-
R11	CT|6161|442	Rural Horticulture	Residential		57	59	56	53	51
R12	CT|5916|884	Rural Horticulture	-		-	-	-	-	-
R13	CT|6206|190	Rural Horticulture	Office		-	64	61	58	56
	CT|6206|190	Rural Horticulture	Residential		57	61	59	57	55
R14	CT|6179|957	Rural Horticulture	Residential (TBC)		57	66	62	62	58

Receiver number	Certificate of Title	Zoning	Building Use	Noise Policy Criteria, L_{eq} dB(A)		Predicted noise levels L_{eq} dB(A)			
				Standard hours	Out of hours (Sunday daytime)	Stage 1		Stage 2[1]	
						C1	C2	C1	C2
R15	CT|5111|400	Rural Horticulture	Residential		57	65	62	64	60
R16	CT|5383|171	Rural Horticulture	Residential		57	65	62	66	63
R17	CT|5383|536	Rural Horticulture	-		-	-	-	-	-
	CT|5383|157	Rural Horticulture	-		-	-	-	-	-
	CT|5383|534	Rural Horticulture	-		-	-	-	-	-
R20	CT|5383|533	Rural Horticulture	-		-	-	-	-	-
R21	CT|6177|367	Rural Horticulture	-		-	-	-	-	-
R22	CT|5753|590	Open Space	Recreation use		-	48	46	51	49
	CT|5747|216	Rural Horticulture	-		-	-	-	-	-

(1) Includes contribution from Stage 1 operational noise, assuming operational noise mitigation is adopted as described in Section 8.2.

8 Operational noise assessment

8.1 Noise sources

Table 23 shown in *Appendix C—Noise sources* outlines the equipment required on site and the adopted sound power levels.

We note that at this stage of the project, details of the plant design and equipment selections are not finalised and subject to change. Consequently, noise data for each item is indicative for the purpose of assessment, based on preliminary selections. Equipment manufacturer's noise data was used where available, otherwise noise data for equivalent or similar equipment items was obtained from Resonate's database.

8.2 Mitigation

Indicative noise mitigation options have been developed in collaboration with the Project team as an iterative process as design of the Project has progressed. In general, indicative noise mitigation options presented in Table 18 have been targeted to sources which were found through preliminary noise modelling to contribute most significantly to overall noise emissions at receiver locations.

As noted above, details of the plant design and equipment selections are not finalised, therefore mitigation options should be considered to be indicative for the purposes of showing that noise emissions from the project can be reduced to acceptable levels using reasonable and practicable measures. In general, noise data for many sources has been provided or adopted as a reasonable upper limit. If lower noise equipment items are able to be procured during detailed design, the required extent of facade treatment could be reduced, for example.

Table 18 Indicative mitigation options

ID	Mitigation items	Description
M1	Micronising/Spheronising stacks	Install silencers to each micronising and spheronising stack to limit noise exhaust to L_W 70 dB(A)
M2	Train building doors	Close the roller doors to the train buildings at all times other to allow for personnel and vehicle access when necessary.
M3	Train building	Upgrade the walls and roof constructions of the train buildings as follows: • Metal cladding • 1 x 12 mm fibre cement sheet directly flush to the metal cladding on the internal side of the roof and indicative extent of walls as shown in Figure 4 below
M4	Purification Plant building	Fully enclose the purification plant. Upgrade the wall and roof construction of purification building as follows: • Metal cladding • 1 x 12 mm fibre cement sheet directly flush to the metal cladding on the internal side of the roof and indicative extent of walls as shown in Figure 4 below

ID	Mitigation items	Description
M5	Kiln building	Fully enclosing the kiln extent. Upgrade the wall and roof constructions of the kiln building as following: • Metal cladding • 1 x 12 mm fibre cement sheet directly flush to the metal cladding on the internal side of the roof and indicative extent of walls as shown in Figure 4 below
M6	Reagent areas	Equipment selections and detailed design to limit the contribution of reagent areas to achieve L_{eq} 35 dB(A) or less at the nearest receivers.
M7	Kiln exhaust silencer	Install a silencer to both Stage 1 and Stage 2 kiln exhausts to limit exhaust sound power level to L_W 80 dB(A).
M8	Wastewater Treatment Plant sources	Equipment selections and detailed design to limit the contribution of WWTP to achieve L_{eq} 35 dB(A) or less at the nearest receivers.
M9	Demineralisation plant sources	Equipment selections and detailed design to limit the contribution of Demineralisation plant to achieve Leq 35 dB(A) or less at the nearest receivers.
M10	Alkaline scrubber exhaust silencer	Install a silencer to scrubbers to limit exhaust sound power level to L_W 85 dB(A).
M11	Kiln scrubber exhaust silencer	Install a silencer to scrubbers to limit exhaust sound power level to L_W 85 dB(A).
M12	Compressors	Fully enclosing the compressors area extent

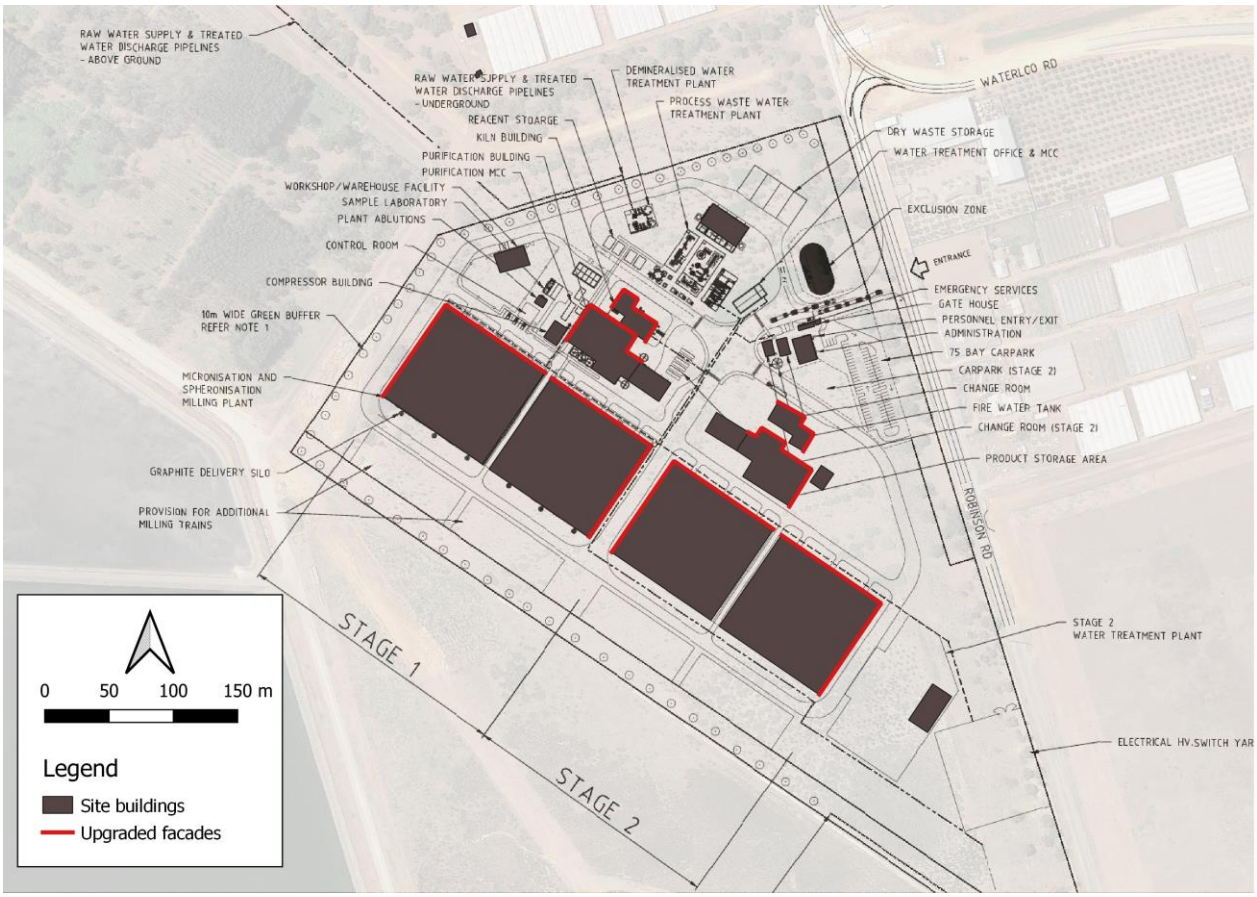


Figure 4 Indicative facade upgrade extent

8.3 Predicted noise levels

The predicted noise levels during operation of Stage 1, and Stage 1 and 2 (with indicative noise mitigation) are presented in Table 19 below. Note that based on the proposed 24/7 operation there is no significant difference in daytime and night time operational activity. Noise predictions have been presented for night time only for brevity (using CONCAWE Category 6 meteorological conditions).

Table 19 Predicted noise levels during operation (with noise mitigation)

Receiver number	Certificate of Title	Zoning	Building Use	Noise Policy Criteria, L_{eq} dB(A)		Predicted noise levels L_{eq} dB(A)	
				Daytime	Night time	Stage 1	Stage 1 and 2
R01	CT|5710|798	Rural Horticulture	Workshop	52	-	35	37
R02	CT|5395|689	Rural Horticulture	Residential	52	45	35	37
R03	CT|5427|926	Rural Horticulture	Residential	52	45	33	35

Receiver number	Certificate of Title	Zoning	Building Use	Noise Policy Criteria, L_{eq} dB(A)		Predicted noise levels L_{eq} dB(A)	
				Daytime	Night time	Stage 1	Stage 1 and 2
R04	CT|5710|802	Rural Horticulture	Residential	52	45	35	36
R05	CT|5553|275	Rural Horticulture	Residential	52	45	34	35
R06	CT|5755|245	Rural Horticulture	Residential	52	45	38	39
R07	CT|6088|360	Rural Horticulture	Residential	52	45	40	41
R08	CT|5606|363	Rural Horticulture	Residential	52	45	26	27
R09	CT|5808|917	Rural Horticulture	-	-	-	-	-
	CT|5808|918	Rural Horticulture	Shed	-	-	42	43
R11	CT|6161|442	Rural Horticulture	Residential	52	45	41	42
R12	CT|5916|884	Rural Horticulture	-	-	-	-	-
R13	CT|6206|190	Rural Horticulture	Office	52	-	45	46
	CT|6206|190	Rural Horticulture	Residential	52	45	43	45
R14	CT|6179|957	Rural Horticulture	Residential(1)	52	45	47	47
R15	CT|5111|400	Rural Horticulture	Residential(2)	52	45	49	49
R16	CT|5383|171	Rural Horticulture	Residential	52	45	50	51
R17	CT|5383|536	Rural Horticulture	-	-	-	-	-
	CT|5383|157	Rural Horticulture	-	-	-	-	-
	CT|5383|534	Rural Horticulture	-	-	-	-	-
R20	CT|5383|533	Rural Horticulture	-	-	-	-	-

Receiver number	Certificate of Title	Zoning	Building Use	Noise Policy Criteria, L_{eq} dB(A)		Predicted noise levels L_{eq} dB(A)	
				Daytime	Night time	Stage 1	Stage 1 and 2
R21	CT|6177|367	Rural Horticulture	-	-	-	-	-
R22	CT|5753|590	Open Space	Recreation use	-	-	34	36
	CT|5747|216	Rural Horticulture	-	-	-	-	-

(1) Horticultural site with a building that is assumed to be an occupied residence, however this has not been confirmed

(2) Not currently inhabited

We note that no character penalties have been applied to noise emissions from the site on the basis that:

- Noise from processing plant items is generally fan, pump and exhaust stack noise which is generally broadband and continuous. There are no items with known significant tonal or low frequency character. In addition, the overall noise processing plant emissions (excluding trucks) at receptor locations include contributions from hundreds of sources with no single item dominating overall levels.
- Modulating character typically associated with noise from trucks is not expected to be fundamental to the impact of the noise and dominate the overall noise impact at receiver locations, because these receivers are exposed to existing noise from trucks travelling on Robinson Road, which are closer and travel at higher speeds.
- Forklifts will be fitted with broadband (i.e. not tonal) reversing alarms. The site layout has been designed to eliminate the need for truck reversing movements.

Worst-case predicted noise levels comply with the day time criteria at all receivers.

Worst-case predicted noise levels at all receivers comply with the night time criteria, other than at:

- R14, where the night time criteria is exceeded by up to 2 dB
- R15, where the night time criteria is exceeded by up to 4 dB
- R16, where the night time criteria is exceeded by up to 5-6 dB

The likely impact of noise emissions is discussed in the following section.

8.4 Discussion

The predicted exceedance of night time criteria is primarily due to truck movements, and may occur up to four times in a per night from a maximum of 1-2 trucks entering and exiting the site during combined operation of Stage 1 and 2.

It should be noted that there are already relatively frequent existing truck movements on Robinson Road, which generate similar or higher noise emissions at noise sensitive receiver locations, that those expected from the proposed Project.

Noise from trucks associated with the Project cannot be further physically mitigated (e.g. through noise barriers or similar) since trucks must enter the site from Robinson Road. The need for a wide vehicle cross-over to accommodate AB-triple or A-double turning movements would result in a large gap in any site acoustic fence which would largely negate any potential reduction of truck noise emissions from the site.

It is understood that feasibility of restricting trucks to daytime hours only has been investigated, and it was found that this is likely to result in unreasonable costs associated with additional storage infrastructure and driver labour. Additionally, flexibility to receive emergency parts or materials via truck delivery during night time hours is essential in order to avoid the significant costs that would otherwise be associated with halting production.

It is recommended that the following noise management and mitigation measures are implemented in relation to truck noise:

- Where practicable, truck movements should be scheduled to arrive and depart the site during daytime hours, and night time movements should only occur where necessary to avoid unreasonable operational costs.
- Trucks should not idle unnecessarily while on site.
- Trucks should be limited to speeds of no more than 20 km/h on site.
- Use of low noise trucks (for example, electric trucks) could be investigated in the future, noting that the site is expected to operate for many years. To be clear, this mitigation measure is not expected to be reasonable or practicable in the immediate future.

For information and context, noise emissions from operation of the Project (excluding trucks) have been predicted and are presented in Table 20 below.

Table 20 Predicted noise levels during operation with mitigation—excluding trucks

Receiver number	Certificate of Title	Zoning	Building Use	Noise Policy Criteria, L_{eq} dB(A)		Predicted noise levels L_{eq} dB(A)	
				Daytime	Night time	Stage 1	Stage 1 and 2
R01	CT|5710|798	Rural Horticulture	Workshop	52	-	33	35
R02	CT|5395|689	Rural Horticulture	Residential	52	45	33	35
R03	CT|5427|926	Rural Horticulture	Residential	52	45	32	33
R04	CT|5710|802	Rural Horticulture	Residential	52	45	33	34
R05	CT|5553|275	Rural Horticulture	Residential	52	45	32	34
R06	CT|5755|245	Rural Horticulture	Residential	52	45	36	37
R07	CT|6088|360	Rural Horticulture	Residential	52	45	37	38
R08	CT|5606|363	Rural Horticulture	Residential	52	45	23	25
R09	CT|5808|917	Rural Horticulture	-	-	-	-	-
	CT|5808|918	Rural Horticulture	Shed	-	-	39	41

Receiver number	Certificate of Title	Zoning	Building Use	Noise Policy Criteria, L_{eq} dB(A)		Predicted noise levels L_{eq} dB(A)	
				Daytime	Night time	Stage 1	Stage 1 and 2
R11	CT|6161|442	Rural Horticulture	Residential	52	45	39	40
R12	CT|5916|884	Rural Horticulture	-	-	-	-	-
R13	CT|6206|190	Rural Horticulture	Office	52	-	42	44
	CT|6206|190	Rural Horticulture	Residential	52	45	40	42
R14	CT|6179|957	Rural Horticulture	Residential (TBC)	52	45	42	43
R15	CT|5111|400	Rural Horticulture	Residential	52	45	45	45
R16	CT|5383|171	Rural Horticulture	Residential	52	45	44	47
R17	CT|5383|536	Rural Horticulture	-	-	-	-	-
	CT|5383|157	Rural Horticulture	-	-	-	-	-
	CT|5383|534	Rural Horticulture	-	-	-	-	-
R20	CT|5383|533	Rural Horticulture	-	-	-	-	-
R21	CT|6177|367	Rural Horticulture	-	-	-	-	-
R22	CT|5753|590	Open Space	Recreation use	-	-	32	35
	CT|5747|216	Rural Horticulture	-	-	-	-	-

Noise emissions from operation of Stage 1 of the Project, in the absence of truck movements, is predicted to comply with the relevant daytime and night time environmental noise criteria at all locations. Cumulative noise from operation of Stage 1 and 2 of the Project, in the absence of truck movements, is predicted to comply with the environmental noise criteria at all locations except at one residence where noise may exceed the night time Noise Policy criteria by up to 2 dB(A) during a nominal worst-case scenario.

As outlined in Section 4.2, exceedance of the objective criteria does not necessarily mean that noise emissions are excessive or that action is required under the Noise Policy. Instead, the matters from Clause 20(6) of the Noise Policy outlined in Table 21 should be considered when assessing the likely impact of the noise. Each item has been addressed with additional commentary.

Table 21 Matters for consideration under Part 5 Clause 20(6) of the Noise Policy

Part 5 Subclause 6	Comments
The amount in dB(A) by which the predicted source noise level (continuous) or predicted source noise level (maximum) exceeds the relevant level and the likely frequency and duration of the noise levels that give rise to that result;	Worst-case noise emissions (including trucks) exceed the relevant night time criteria by up to 6 dB(A), while worst-case noise emissions excluding trucks exceed the relevant criteria by up to 2 dB(A). A maximum of 1-2 truck trips are expected per night (i.e. up to four entry or exit movements). It should also be noted that predictions are based on all noise sources operating simultaneously under worst-case (CONCAWE Category 6) meteorological conditions. These conditions are expected to occur infrequently in practice, and receiver noise levels under neutral or northerly/easterly conditions are expected to be less. Noise predictions are also conservative in the sense that all sources are assumed to be operating simultaneously, and where a range of levels exists in the available data for a particular source, a level representing the upper end of the range has been adopted.
Any component of the ambient noise or extraneous noise that— (i) has a noise level similar to or greater than the predicted source noise level (continuous) or predicted source noise level (maximum); and (ii) has a similar noise character or similar regularity and duration to the noise from the noise source	At R14, R15 and R16, the predicted noise levels are controlled by the truck noise, which has a similar nature to the existing environment which is dominated by road traffic noise, including truck movements on Robinson Road. Measured ambient noise levels described in Section 5 and plots presented in Appendix B show relatively high existing noise levels, with measured existing noise levels at all monitoring locations frequently exceeding 51 dB(A) L_{eq} during night time hours. In the absence of any other significant night time noise sources observed in the vicinity of the site, these levels are assumed to be due to road traffic (including trucks).
The times of occurrence of the noise from the noise source;	The Project will operate on a 24/7 basis, however it should be noted that the majority of truck movements will occur during daytime hours.

Part 5 Subclause 6	Comments
The number of persons likely to be adversely affected by the noise from the noise source and whether there is or is likely to be any special need for quiet at noise-affected premises;	Only three receivers (R14, R15 and R16) are potentially affected by noise levels exceeding the Policy night time criteria. It should also be noted that these noise levels are based on predictions at the western (front yard) side of R15 and R16 and noise levels to the rear (where outdoor living spaces are more likely to be situated) are less. Renascor have attempted to determine which residences on Robinson Road were in use or not, and we were able to determine the following: R14 – possibly inhabited R15 – uninhabited R16 – inhabited We note that the Rural Horticulture zoning is likely to limit the addition of any other noise sensitive development on these sites under the Planning & Design Code.
The land uses existing in the vicinity of the noise source;	The subject site and all potentially affected receivers are situated in a Rural Horticulture with horticultural land uses, including dwellings on some sites. Subjectively the area does not currently enjoy high levels of residential or rural amenity, with a number of other relatively high-noise land uses in the vicinity, including the SA Gun Club, Southern Go Kart Club, SA Water facilities, and the Northern Connector (North-South Motorway).
Any other matter required to be taken into account under section 25 of the Act or determined to be relevant by the Authority.	Section 25 of the Environment Protection Act 1993 (EP Act) states that: *A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to present or minimise any resulting environmental harm.* Extensive investigation and modelling of noise mitigation options has been undertaken, resulting in the list of indicative options presented in Table 18. Renascor have committed in principle to implementing these measures, noting that they may be subject to refinement during detailed design. Renascor will continue to explore any additional measures during detailed design, construction, and operation; and is committed to implementing measures which are found to be reasonable and practicable.

Summary

Clause 20(6) of the Noise Policy acknowledges that a potential inability to meet the objective night time criteria is, in itself, not an indication that excessive or unreasonable noise would be generated by the proposed development.

When considering the likely magnitude and frequency of predicted noise levels in the context of the existing noise environment, noise emissions from the Project are not expected to have a significant adverse impact on noise sensitive receivers.

All reasonable and practicable noise mitigation measures will be taken to minimise the potential noise impact of the Project.

9 Conclusion

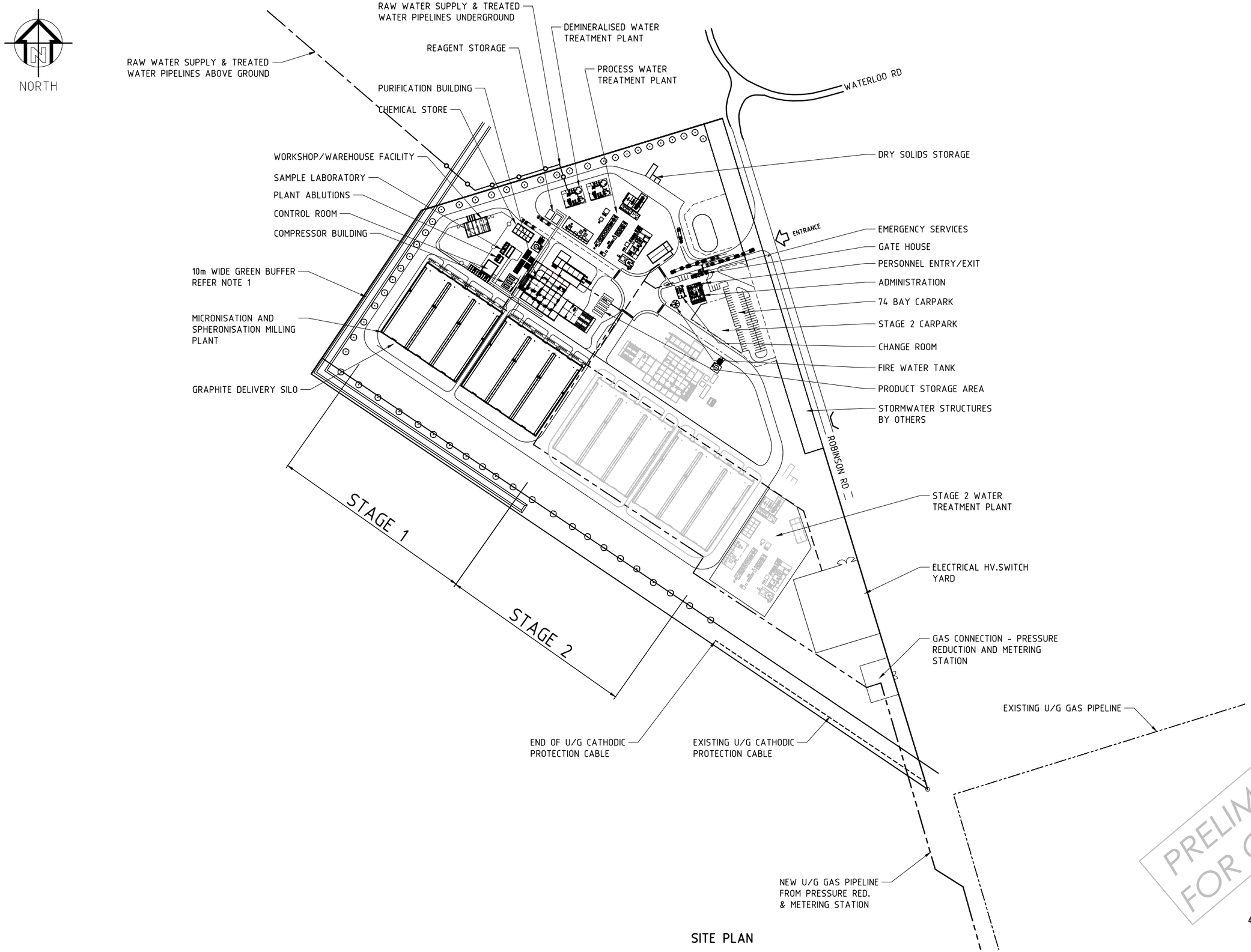
An environmental noise impact assessment has been undertaken for the proposed Battery Anode Material (BAM) Facility at Robinson Road, Bolivar.

This assessment has demonstrated that, with the indicative on-site noise mitigation treatments detailed in this report, the noise emissions from construction and operation of the proposed development will be able to comply with the relevant environmental noise criteria, except at three neighbouring receiver locations where noise from operation of the project could exceed the night time Noise Policy criteria by up to 6 dB.

When considering relevant factors in accordance with Clause 20(6) of the Noise Policy, noise emissions from the Project are not expected to have a significant adverse impact on noise sensitive receivers in the context of the existing noise environment. All reasonable and practicable measures will be implemented to minimise the impact of noise emissions from construction and operation of the Project.

On this basis the proposed development will be able to operate within the relevant noise provisions in the Planning & Design Code, Environmental Protection (Noise) Policy, and Environment Protection Act.

Appendix A—Site layout



SITE PLAN

GENERAL NOTES

1-THIS DEVELOPMENT WILL INCLUDE A GREEN BUFFER ZONE 10m WIDE ON THE NORTH, NORTH-WEST & SOUTH-WEST BOUNDARIES. NATIVE TREES AND VEGETATION WILL CREATE A SCREEN FOR PROCESS PLANT INFRASTRUCTURE.

2-STORMWATER STRUCTURES IN CORRIDOR ALONG ROBINSON ROAD BY OTHERS.

LEGEND

- EXISTING U/G GAS PIPELINE
- NEW U/G GAS PIPELINE TO BAM INFRASTRUCTURE
- EXISTING U/G CATHODIC PROTECTION CABLE
- U/G ELECTRICAL CABLES
- RAW WATER SUPPLY & TREATED WATER ABOVE GROUND
- RAW WATER SUPPLY & TREATED WATER UNDERGROUND

REFERENCE DRAWINGS	DWG No	REV	DATE	REVISIONS	DRN	CHK	DSGN	TECH APP	PROJ APP

WHEN IN DOUBT-ASK DO NOT SCALE

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DRAWN	TL 12/07/2023
CHECKED	
DESIGNED	
TECH APP	
PROJ APP	
CLIENT APP	

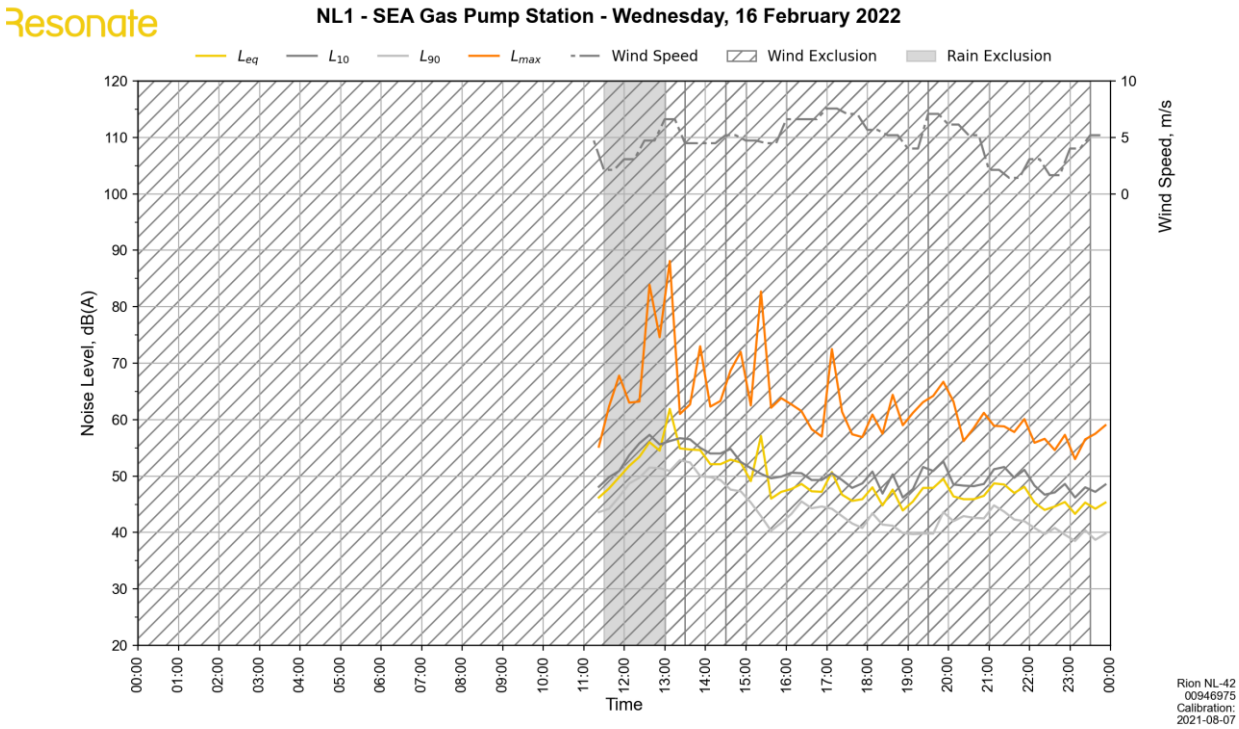
RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - UPSG
SITE LAYOUT
GENERAL ARRANGEMENT

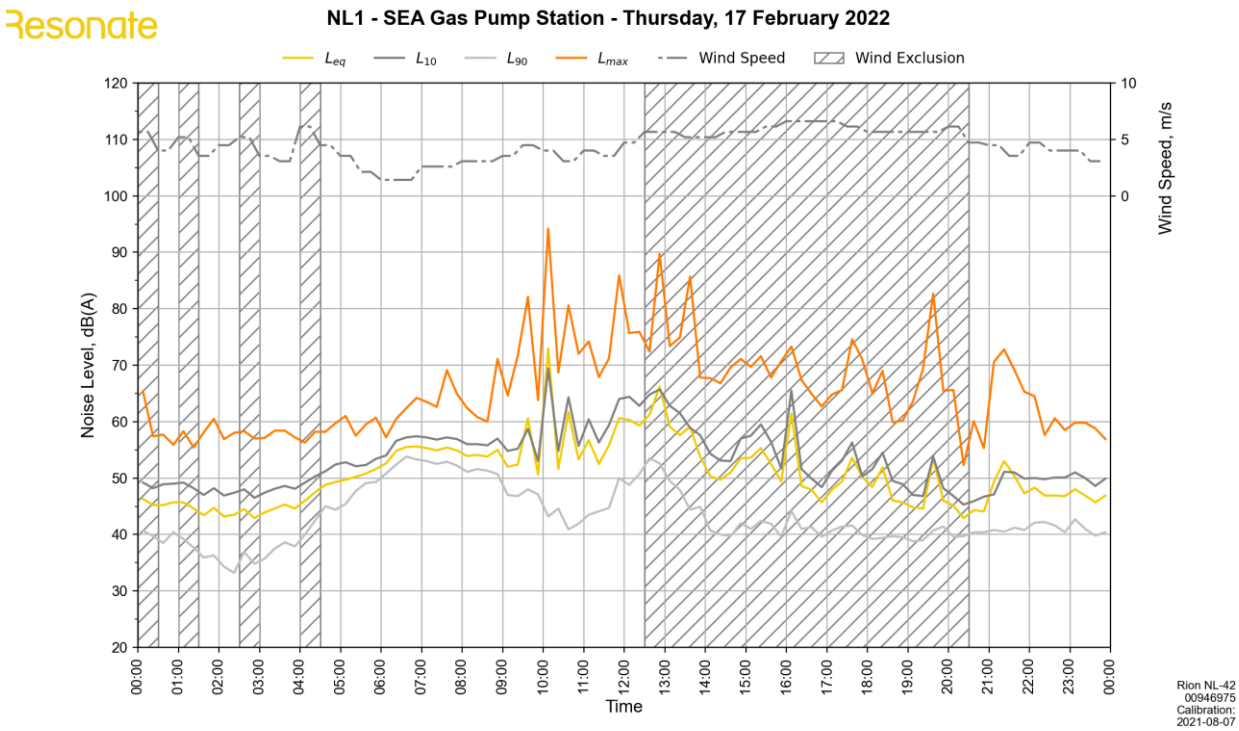
A1	SCALE 1:2000	JOB No 12813	DRG No 12813-L-200	REV A

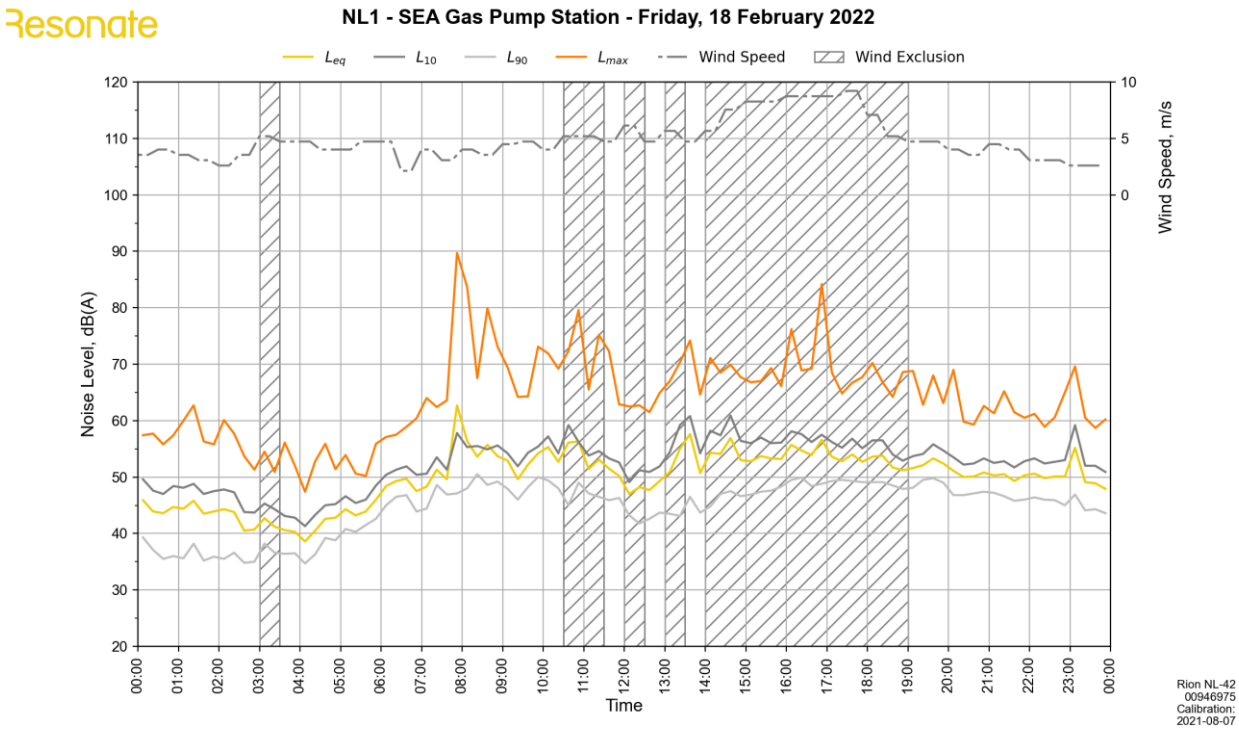
M:\1-PROJECT STUDIES\12813 - Siviour\Misc\Layout\UPSG\InfoRemoved\12813L200.dwg - 13/07/2023 - 8:54am - john.lynn

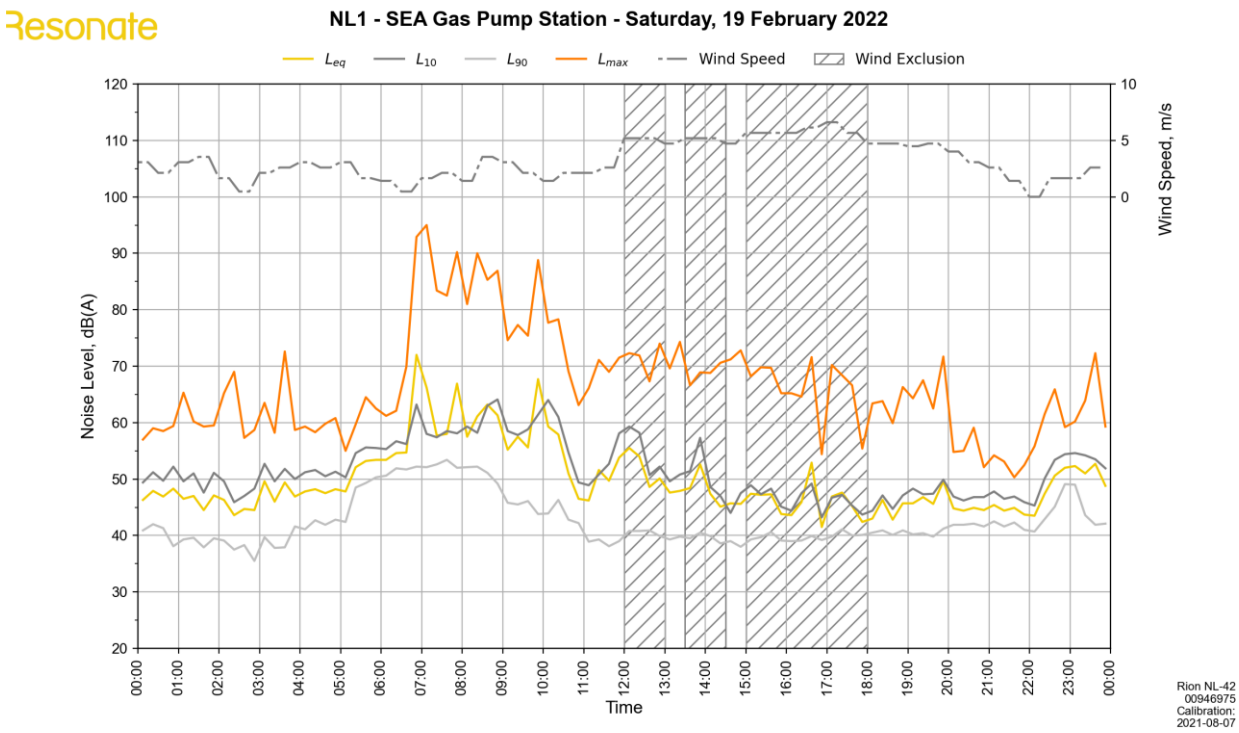
Appendix B—Daily measured noise levels

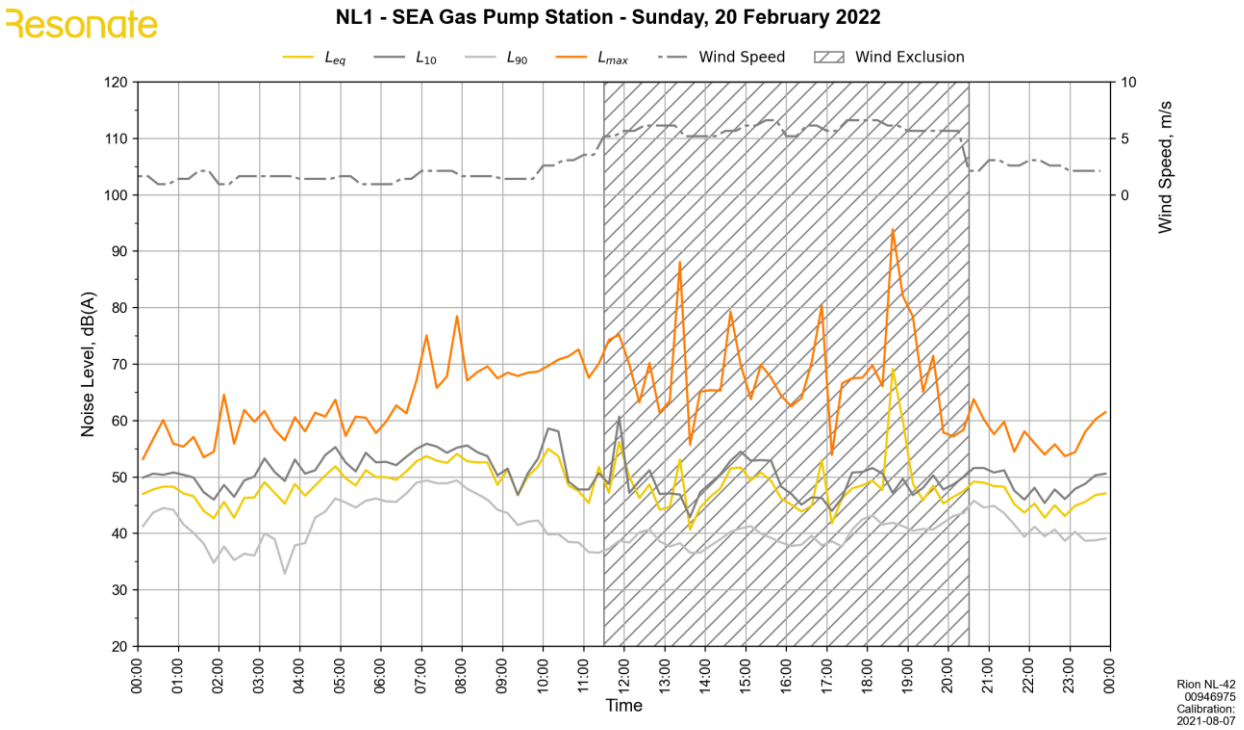
NL1 – SEA Gas pump station

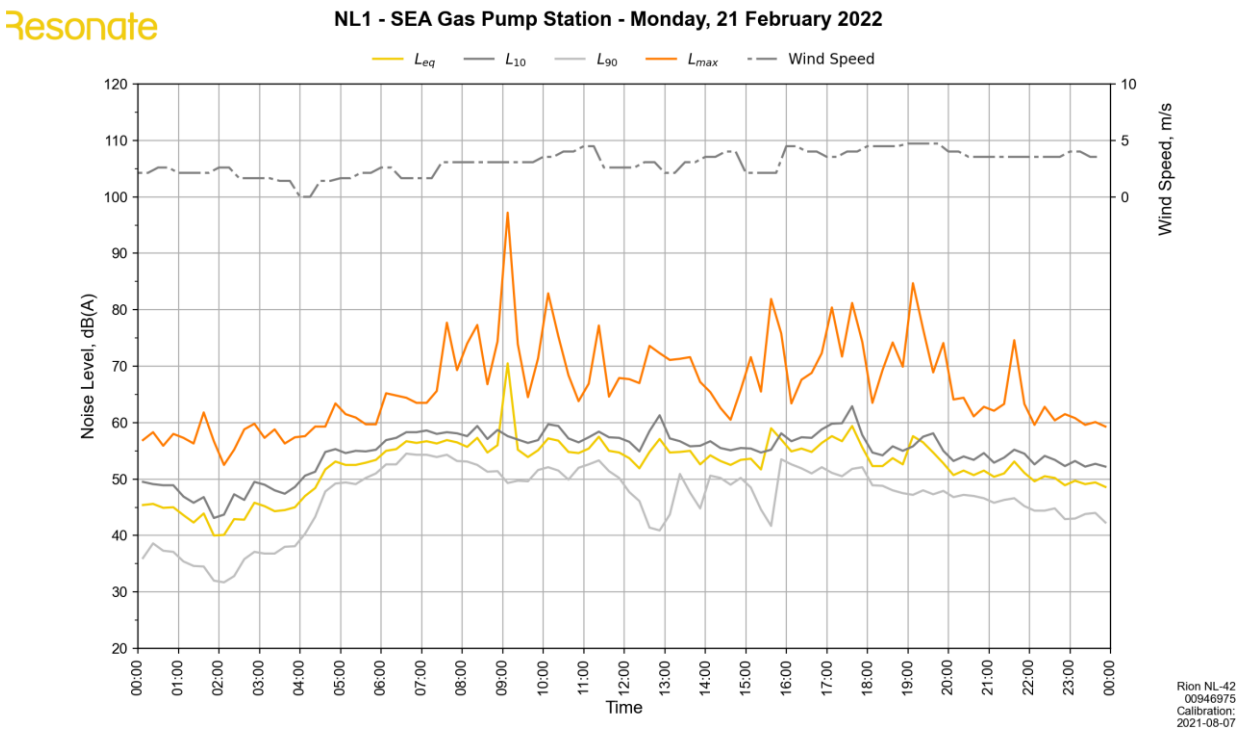


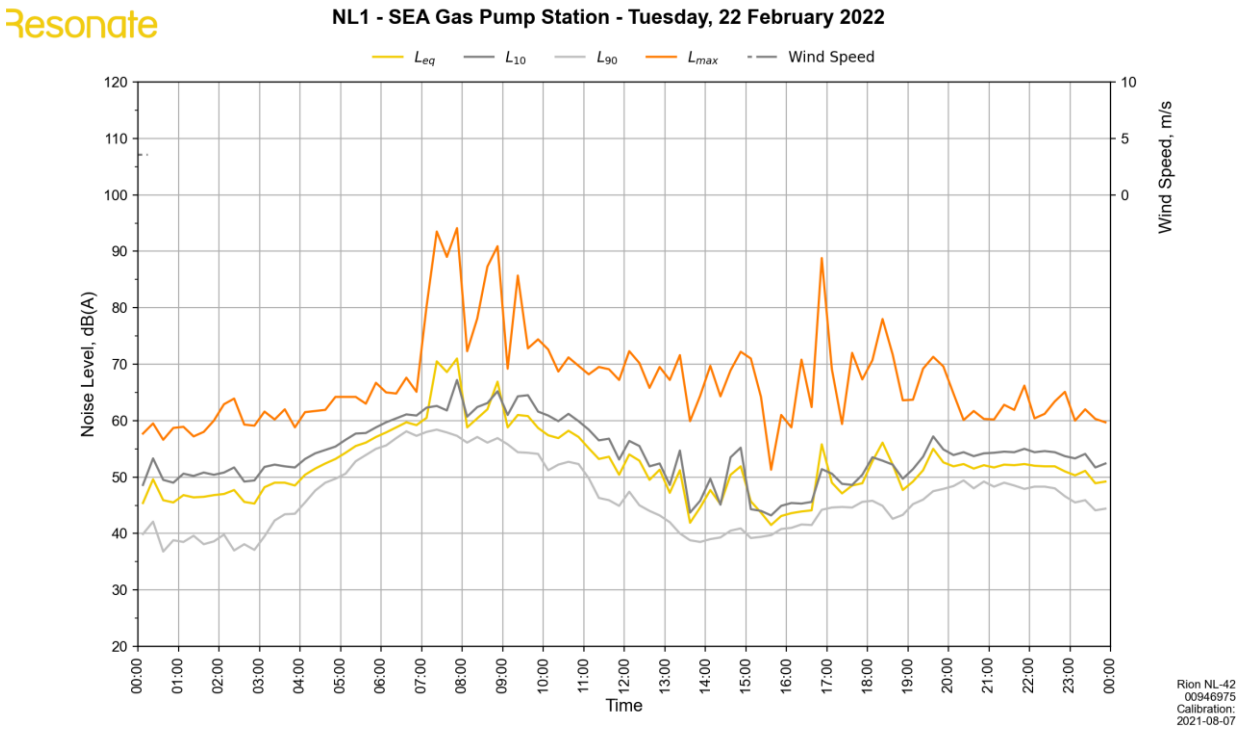


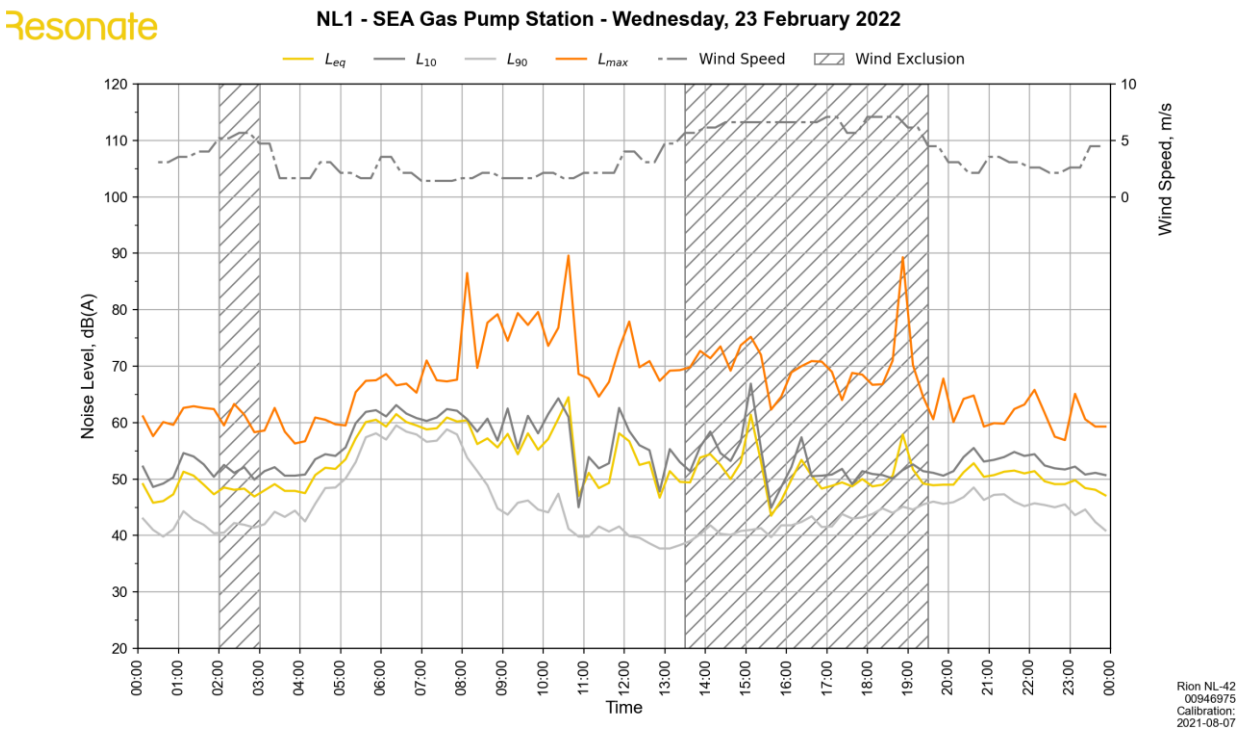

Resonate
NL1 - SEA Gas Pump Station - Friday, 18 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

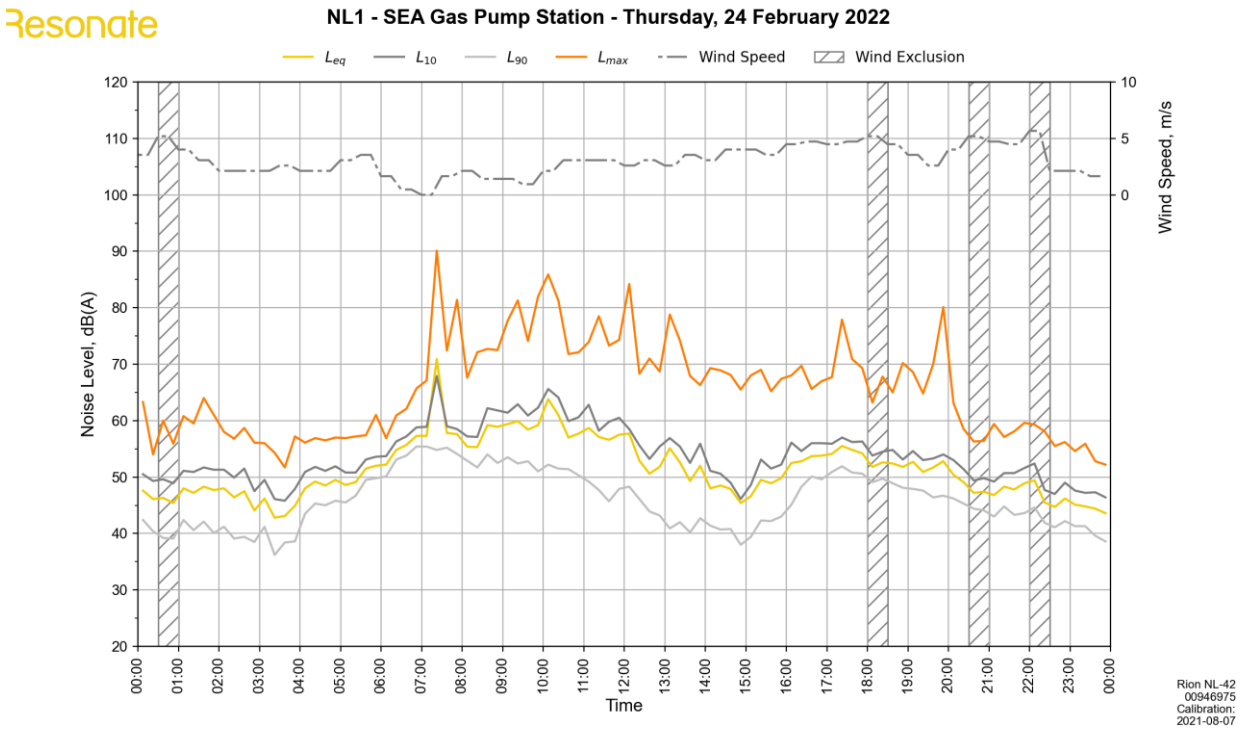

Resonate
NL1 - SEA Gas Pump Station - Saturday, 19 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

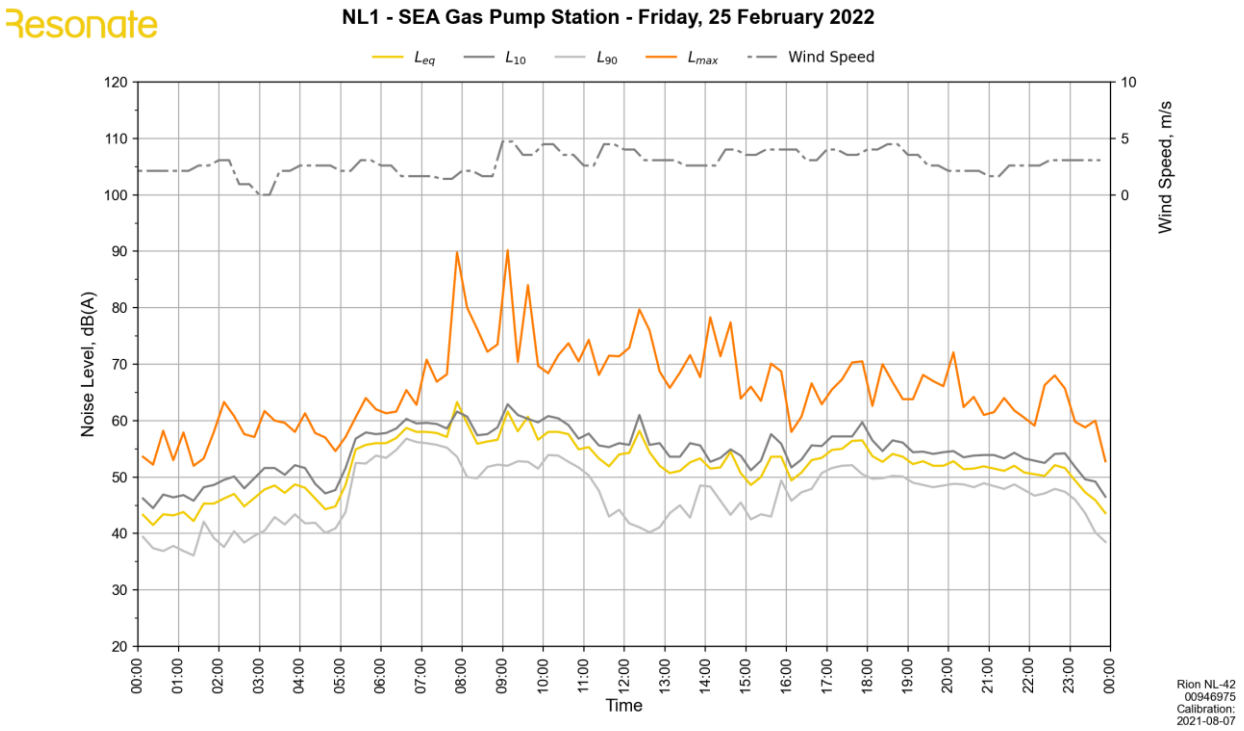

Resonate
NL1 - SEA Gas Pump Station - Sunday, 20 February 2022
Leq
L10
L90
Lmax
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

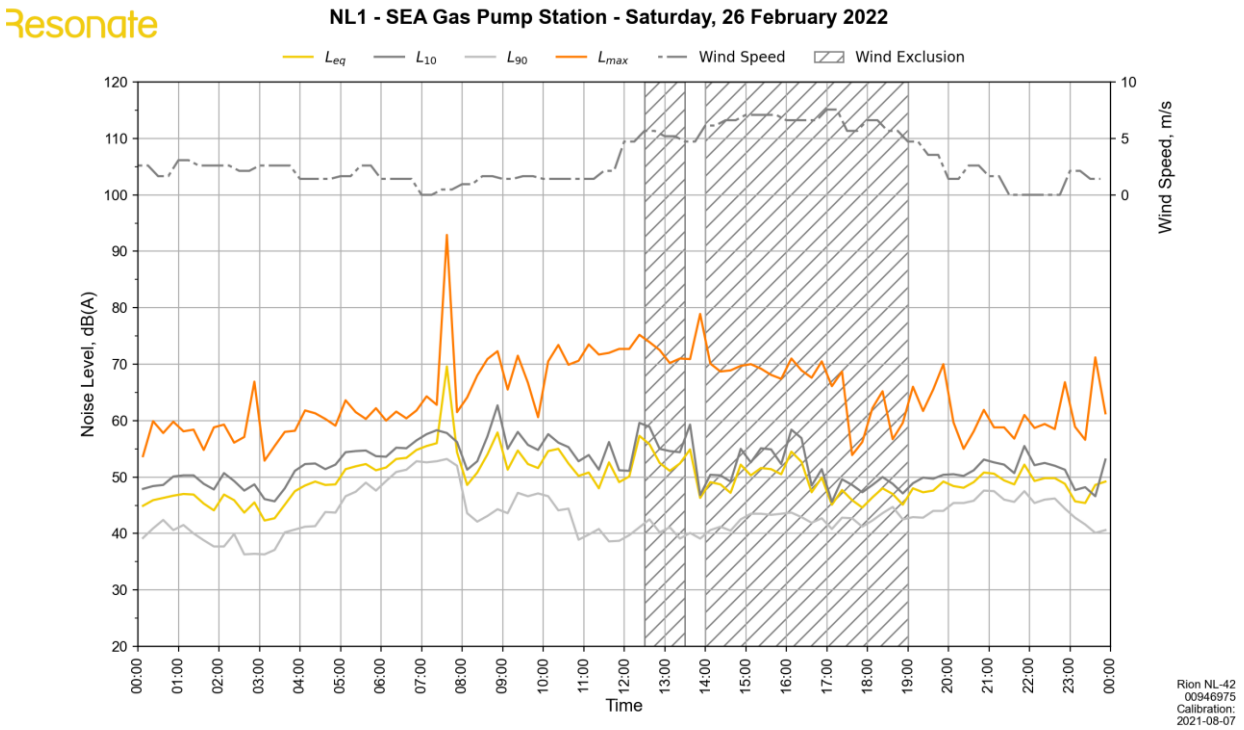

Resonate
NL1 - SEA Gas Pump Station - Monday, 21 February 2022
Leq
L10
L90
Lmax
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

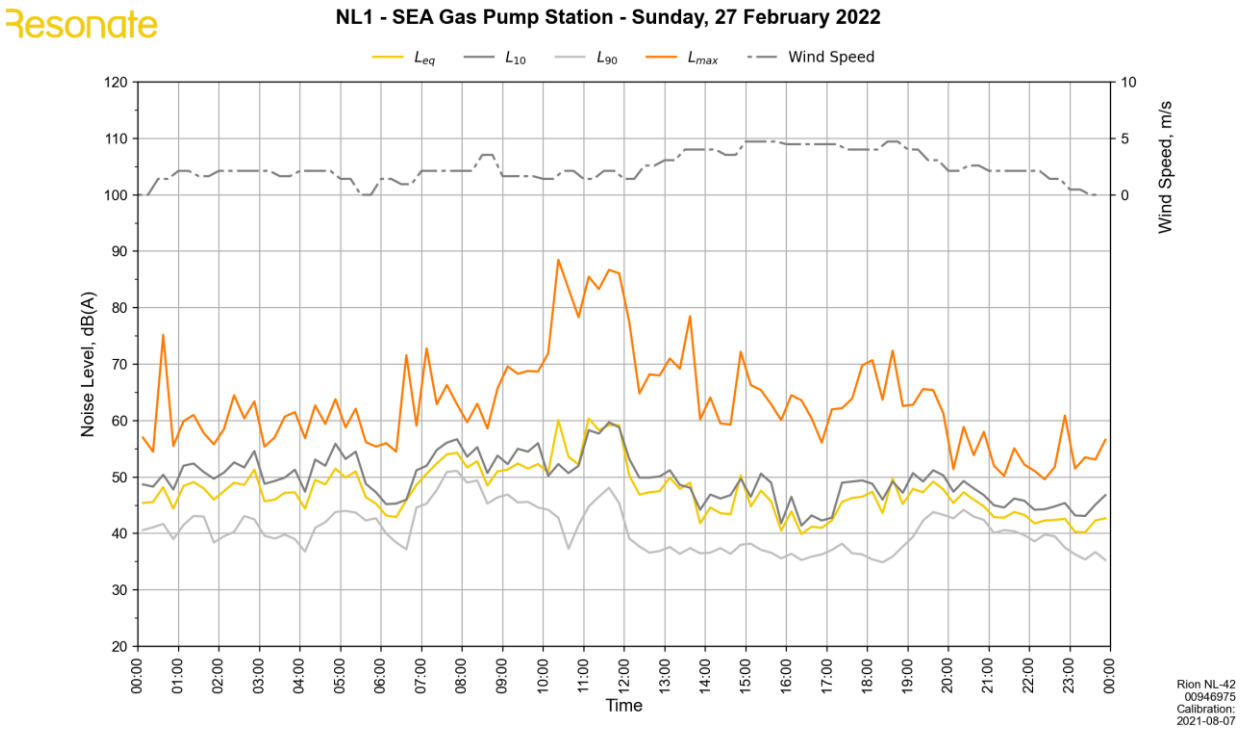

Resonate
NL1 - SEA Gas Pump Station - Tuesday, 22 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

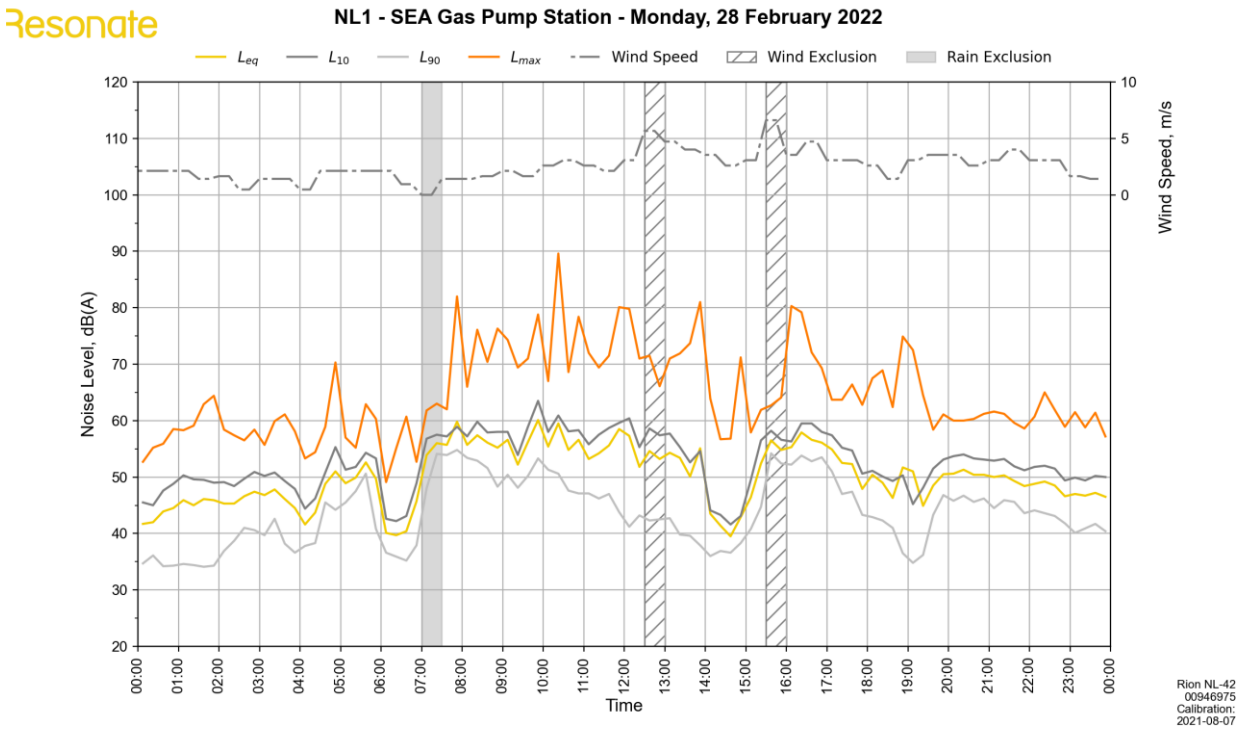

Resonate
NL1 - SEA Gas Pump Station - Wednesday, 23 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

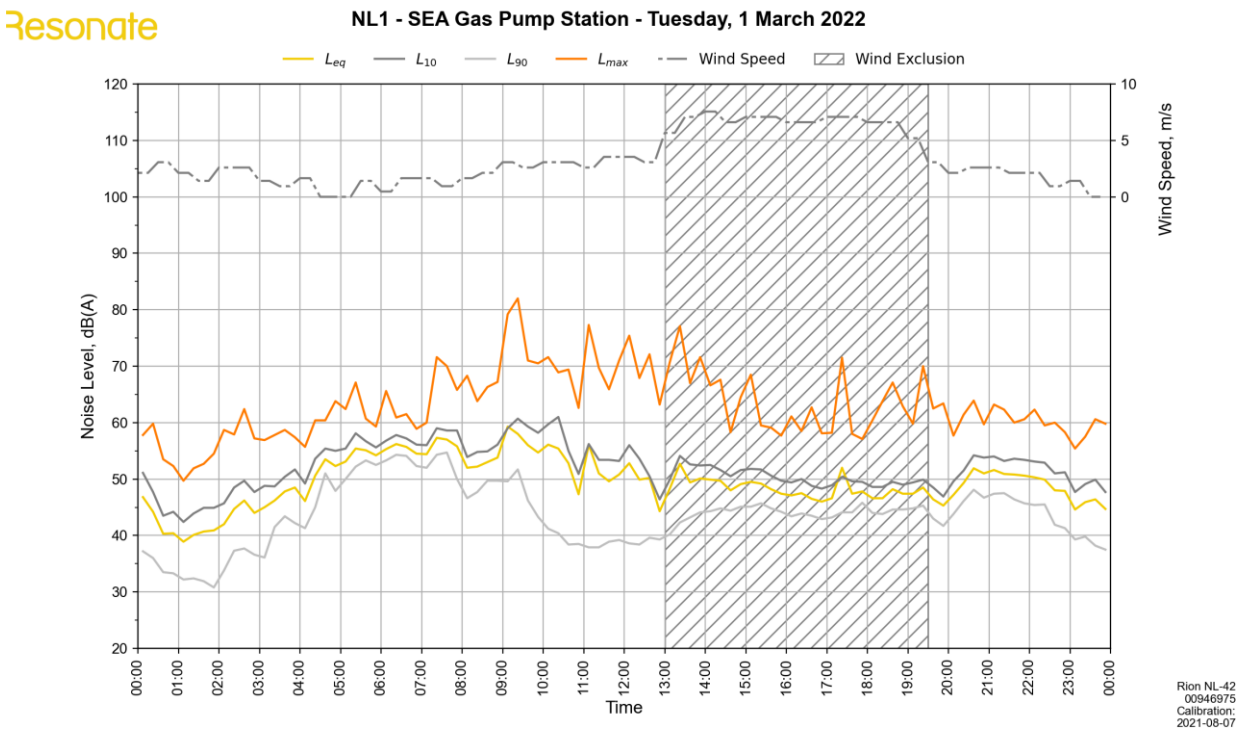

Resonate
NL1 - SEA Gas Pump Station - Thursday, 24 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

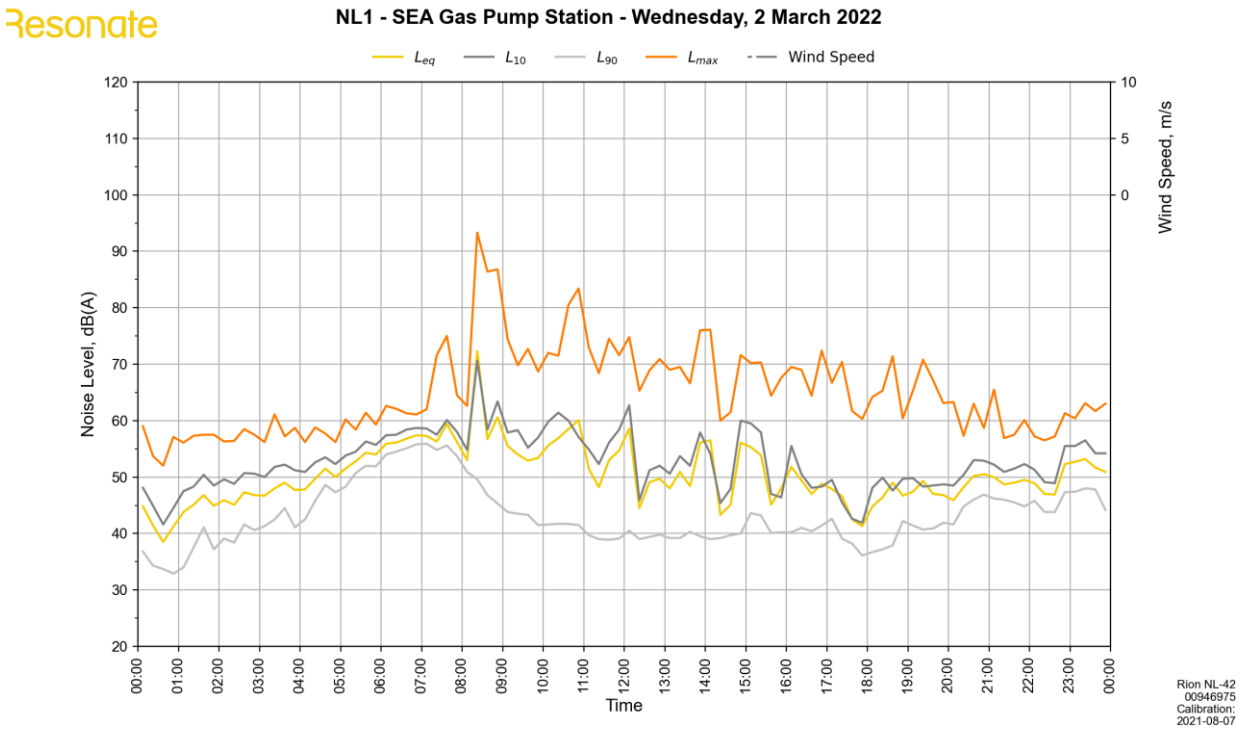

Resonate
NL1 - SEA Gas Pump Station - Friday, 25 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

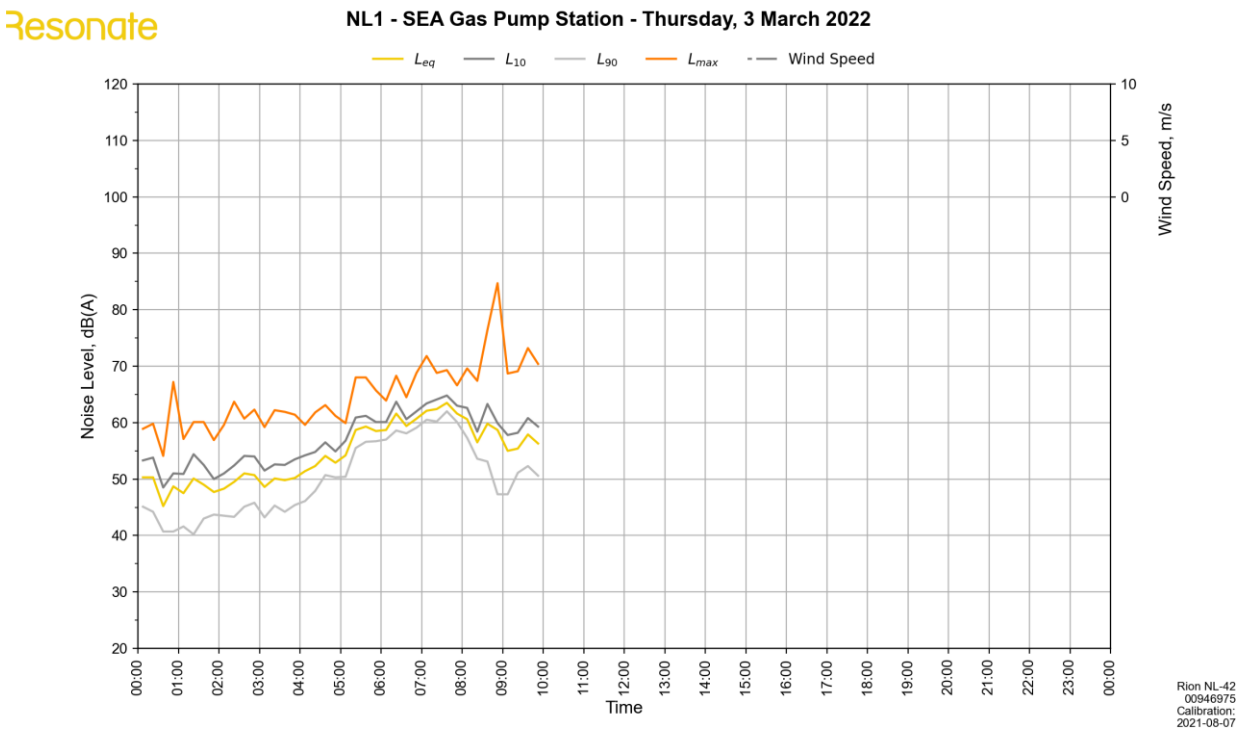

Resonate
NL1 - SEA Gas Pump Station - Saturday, 26 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07


Resonate
NL1 - SEA Gas Pump Station - Sunday, 27 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

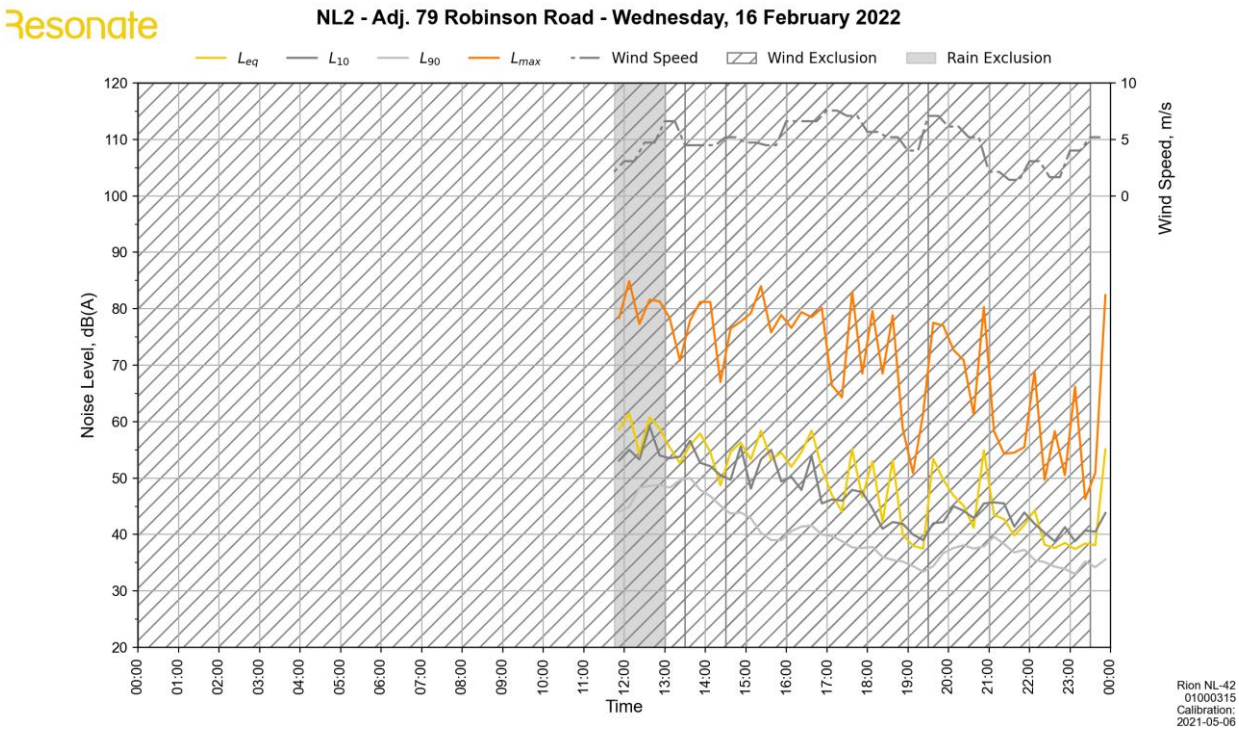

Resonate
NL1 - SEA Gas Pump Station - Monday, 28 February 2022
Leq
L10
L90
Lmax
Wind Speed
Wind Exclusion
Rain Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

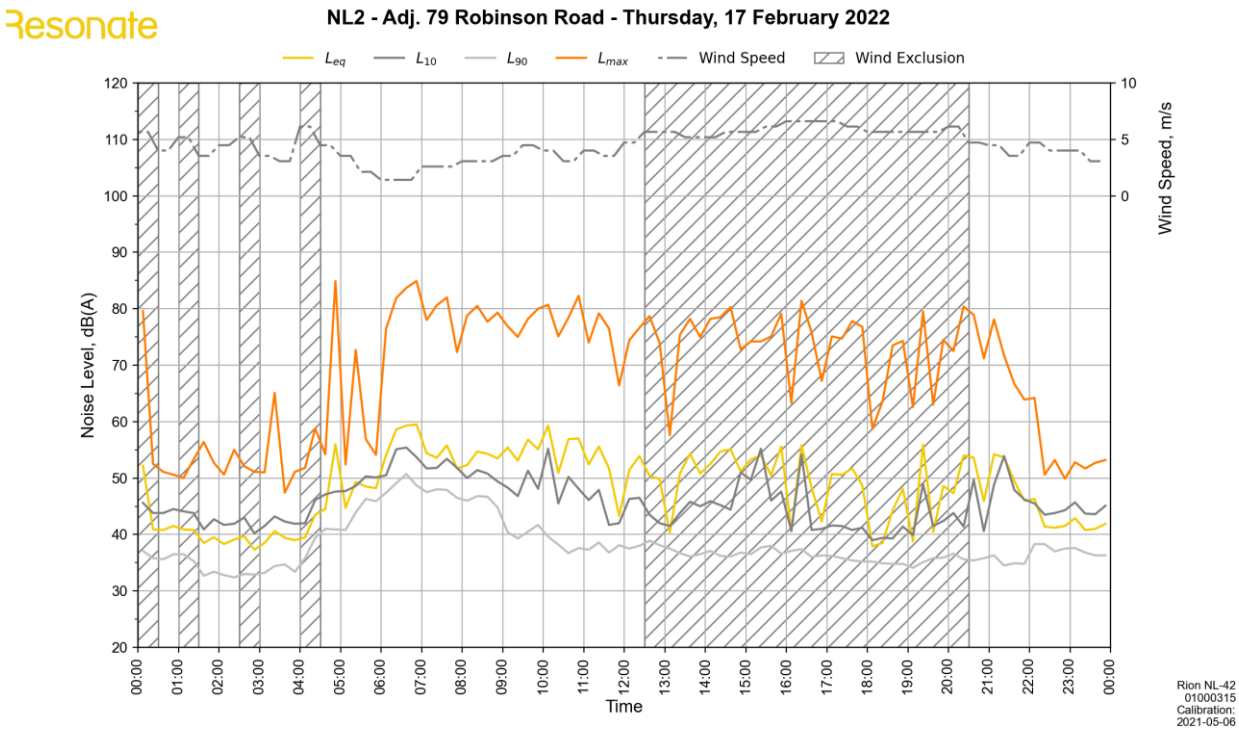

Resonate
NL1 - SEA Gas Pump Station - Tuesday, 1 March 2022
Leq
L10
L90
Lmax
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

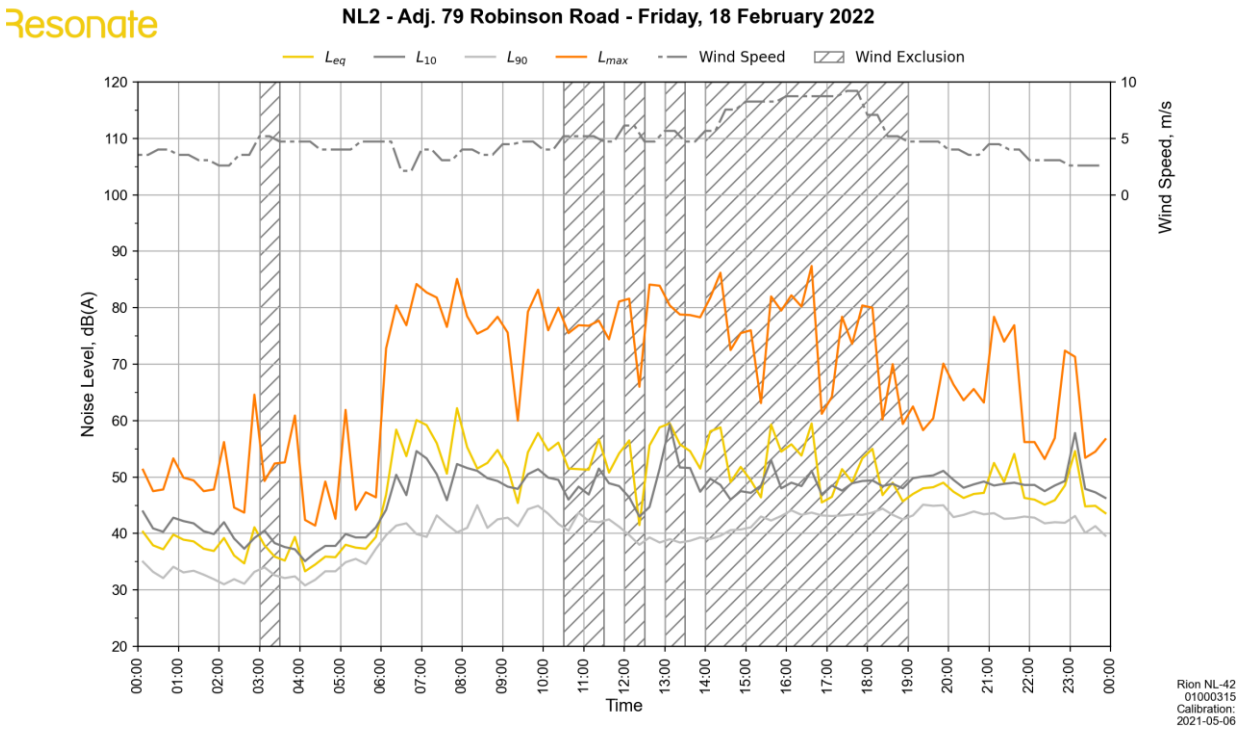

Resonate
NL1 - SEA Gas Pump Station - Wednesday, 2 March 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

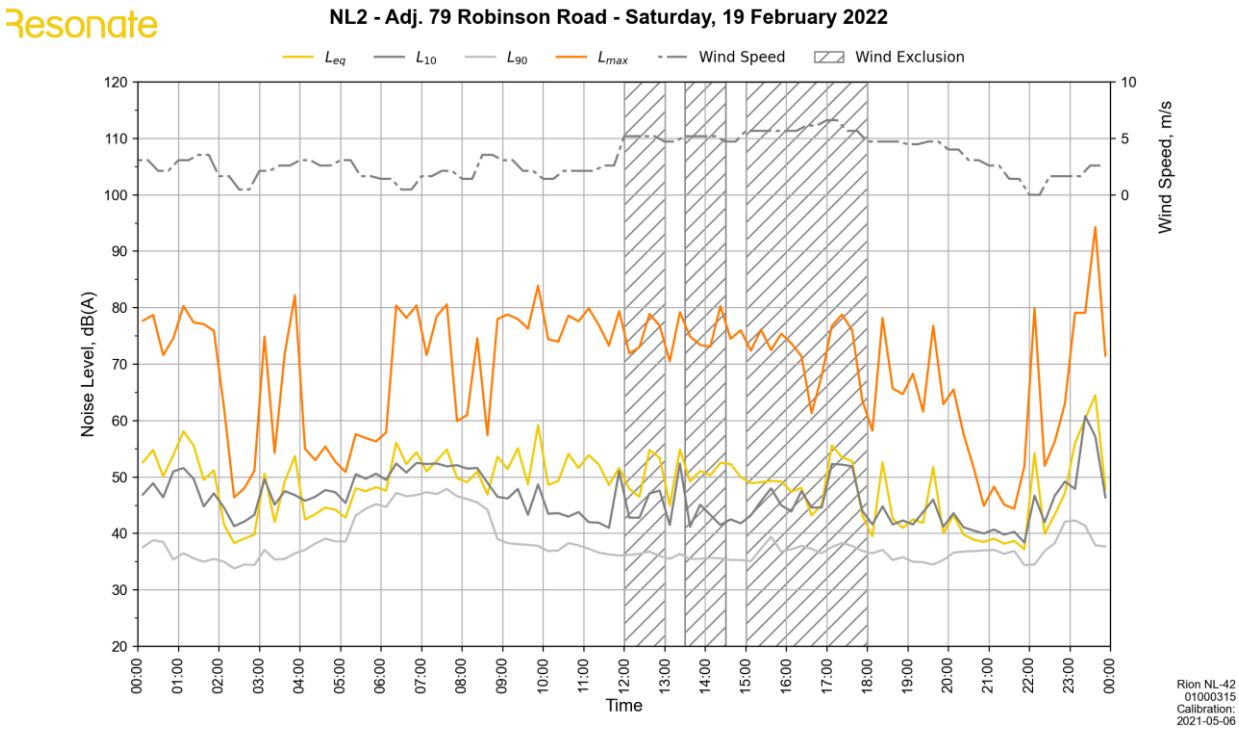

Resonate
NL1 - SEA Gas Pump Station - Thursday, 3 March 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
00946975
Calibration:
2021-08-07

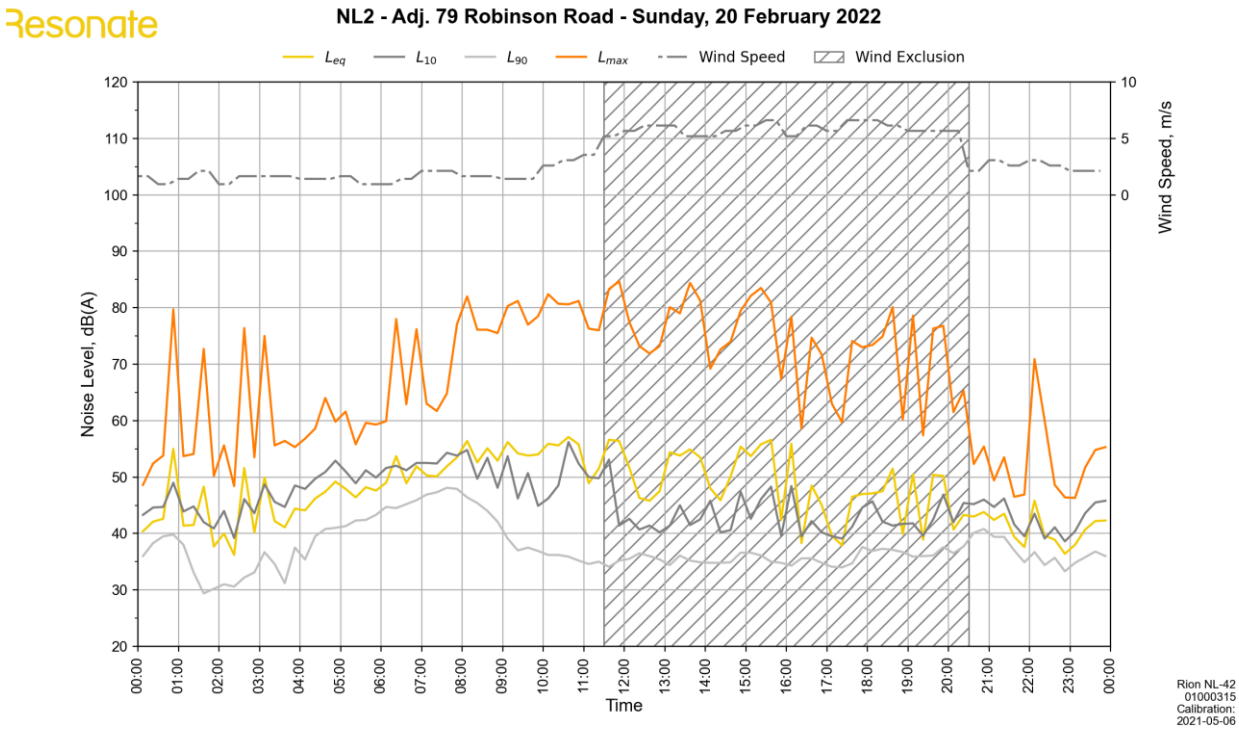
NL2

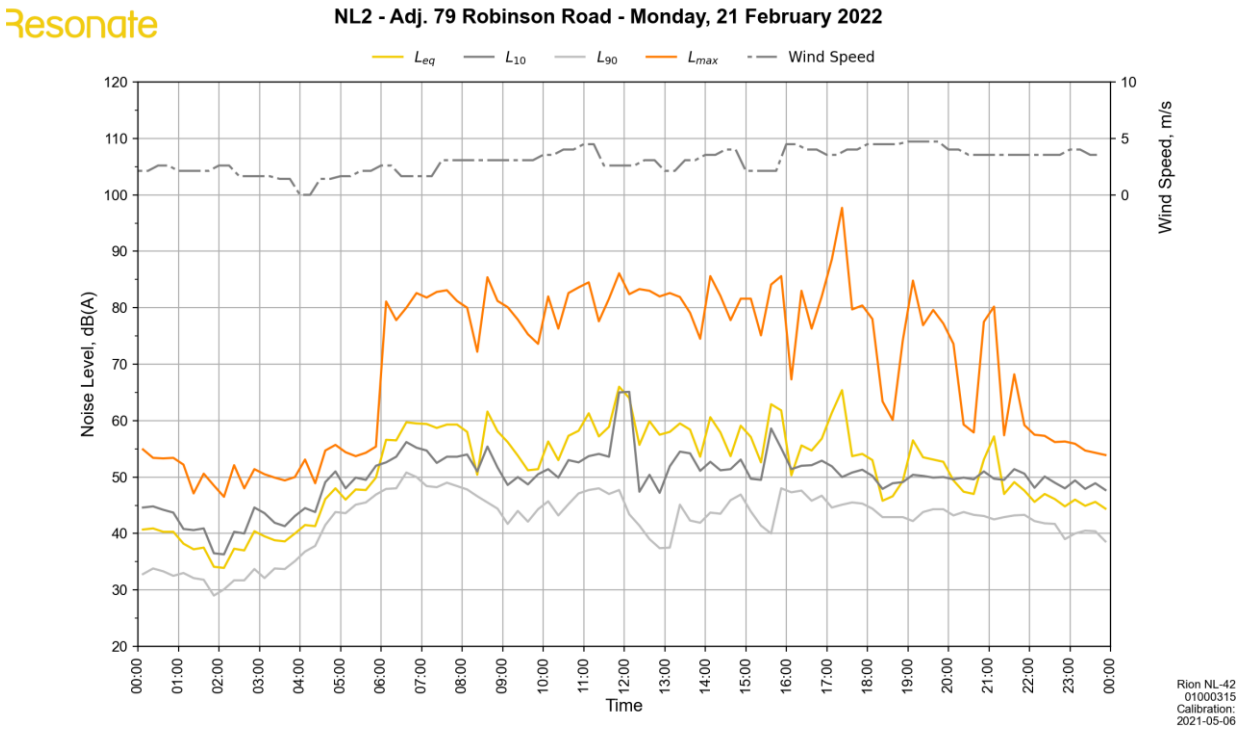

Resonate
NL2 - Adj. 79 Robinson Road - Wednesday, 16 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Rain Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

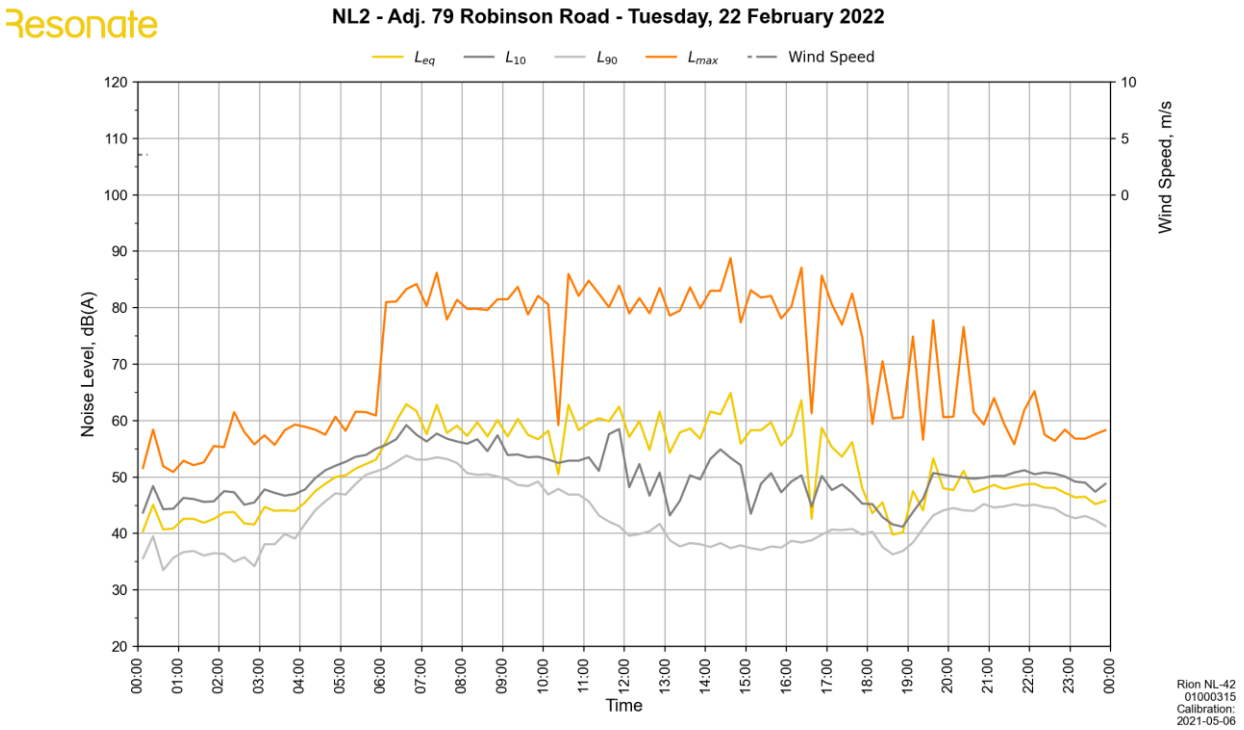

Resonate
NL2 - Adj. 79 Robinson Road - Thursday, 17 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

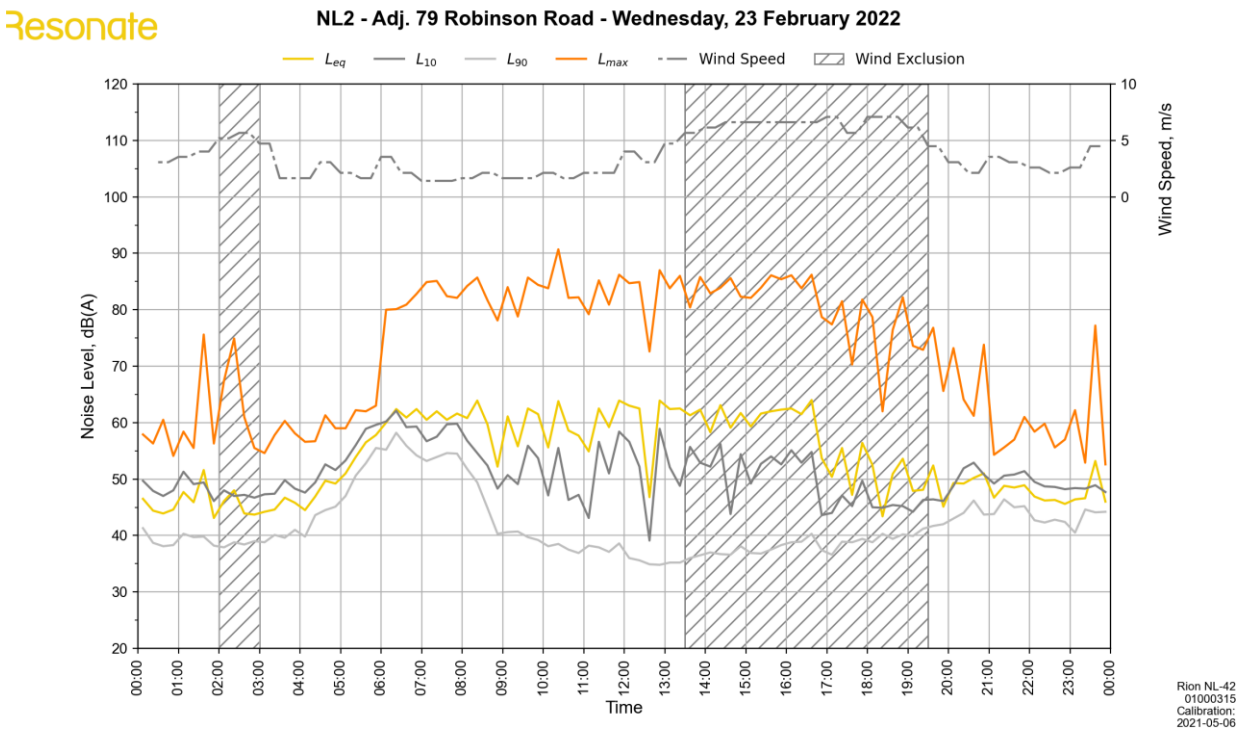

Resonate
NL2 - Adj. 79 Robinson Road - Friday, 18 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

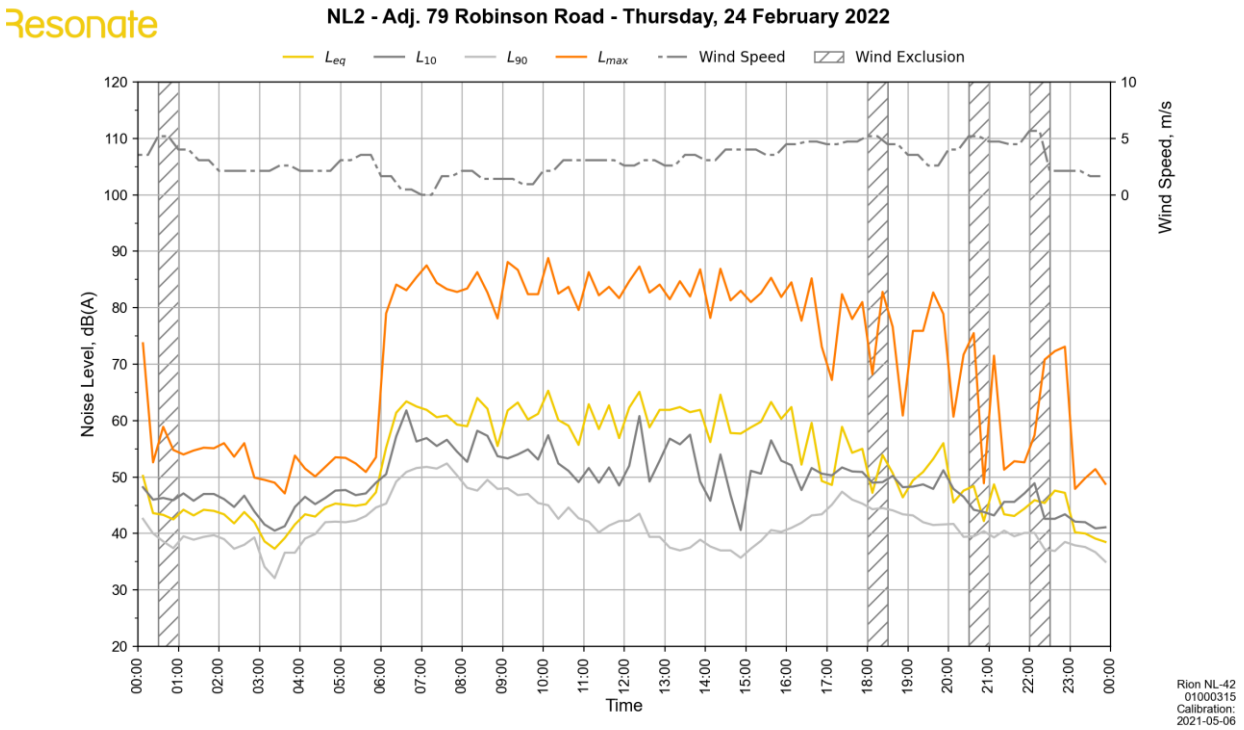

Resonate
NL2 - Adj. 79 Robinson Road - Saturday, 19 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

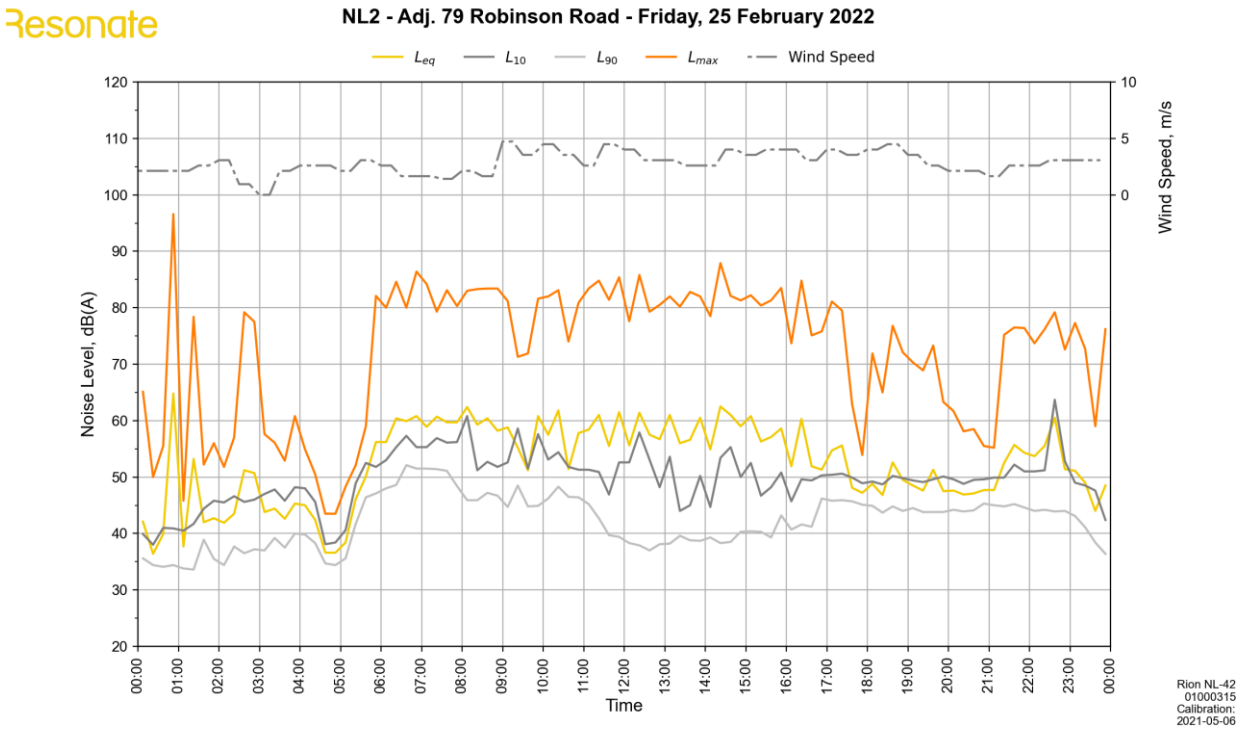

Resonate
NL2 - Adj. 79 Robinson Road - Sunday, 20 February 2022
Leq
L10
L90
Lmax
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

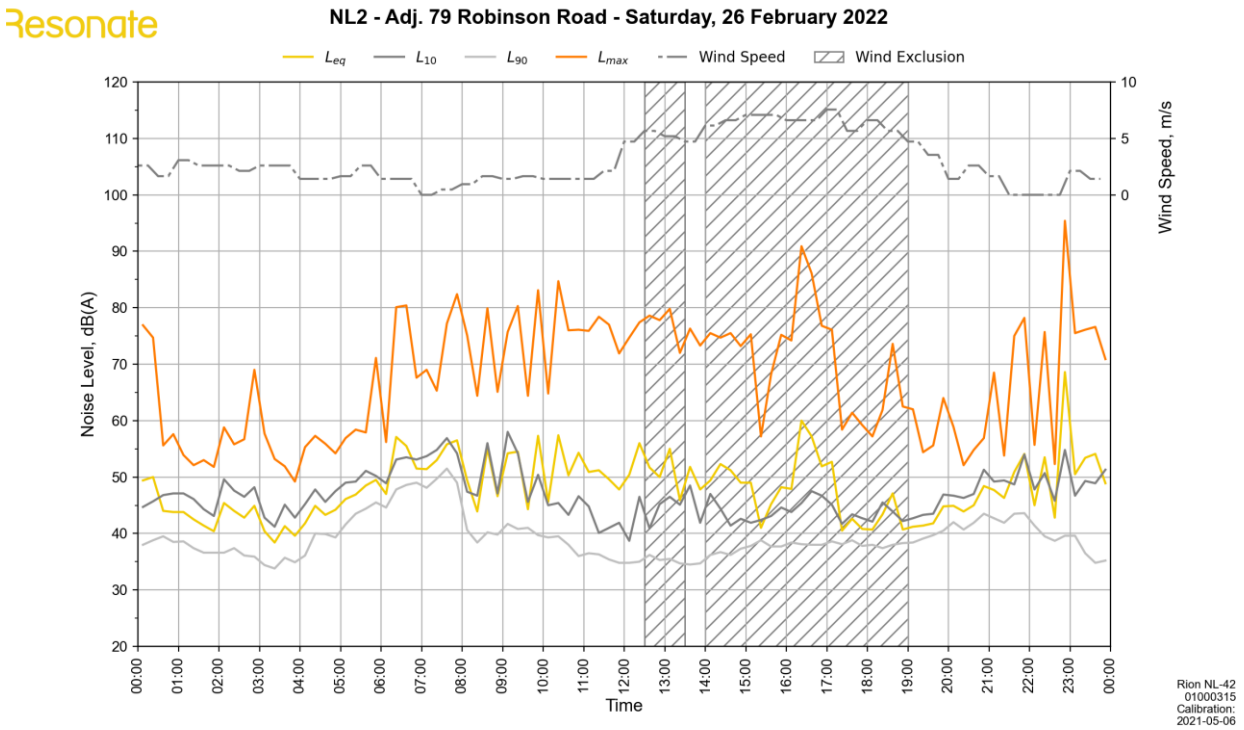

Resonate
NL2 - Adj. 79 Robinson Road - Monday, 21 February 2022
Leq
L10
L90
Lmax
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

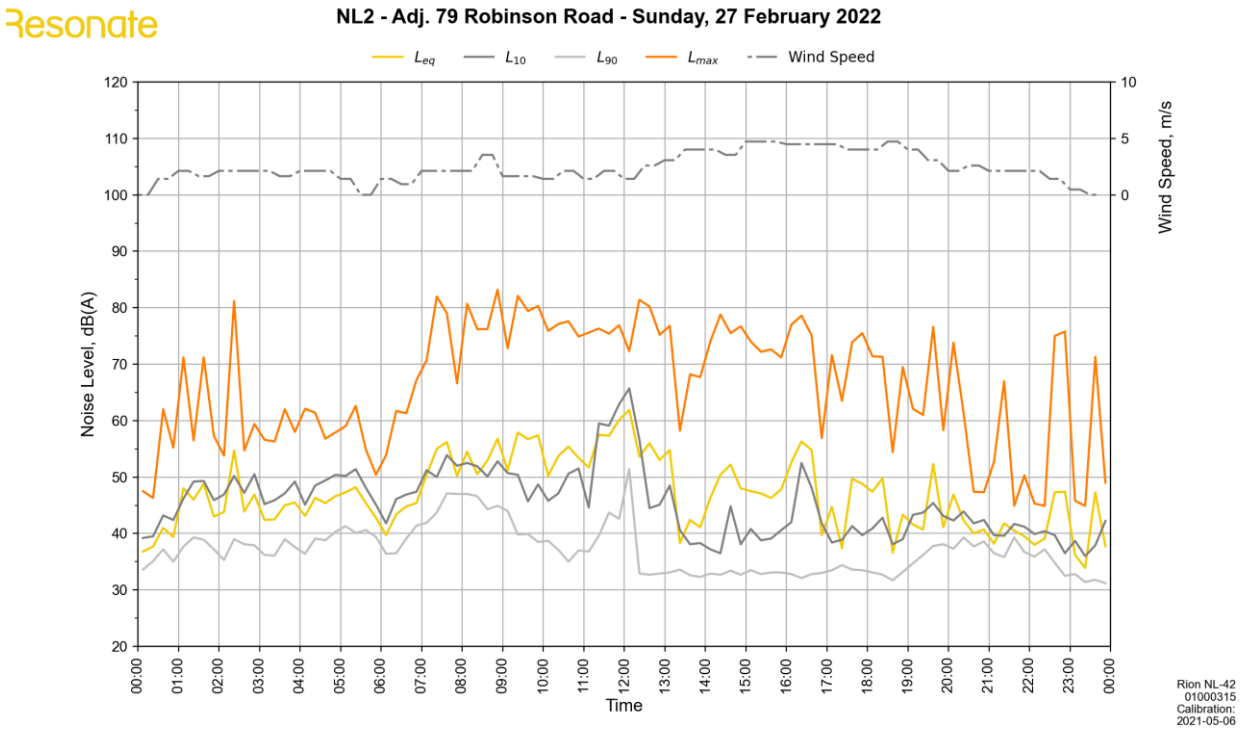

NL2 - Adj. 79 Robinson Road - Tuesday, 22 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

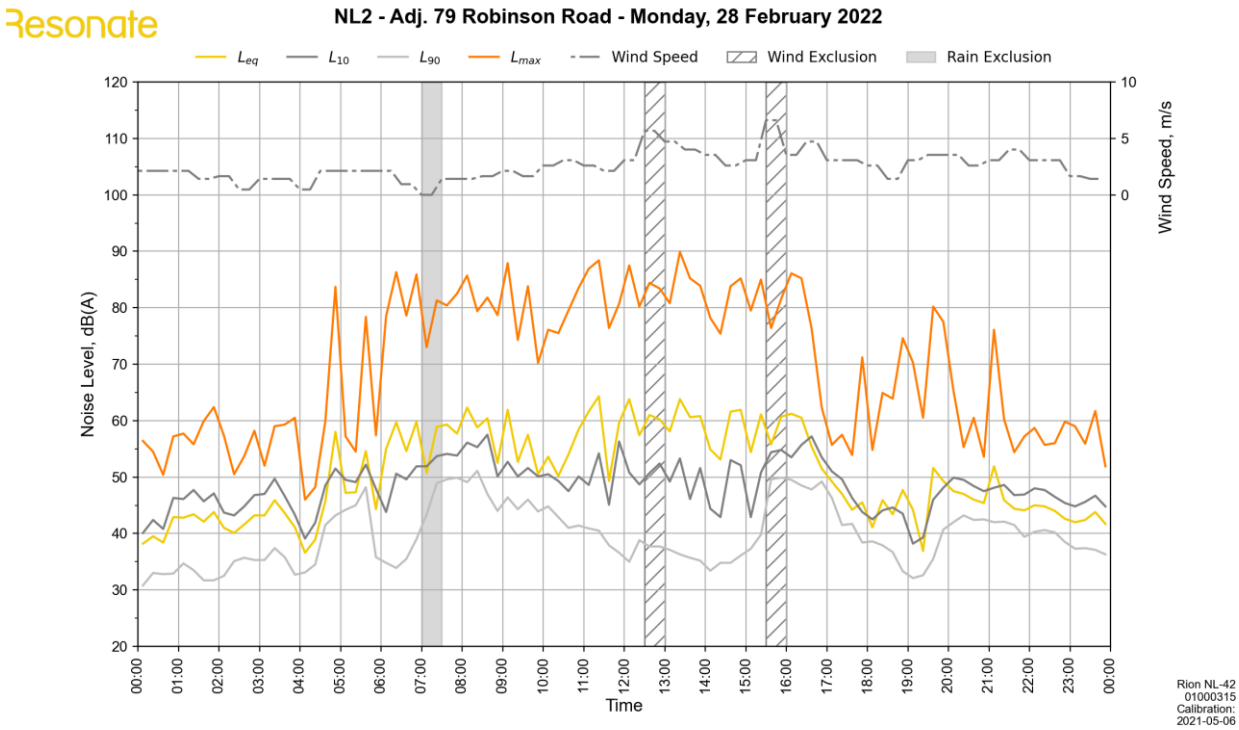

NL2 - Adj. 79 Robinson Road - Wednesday, 23 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

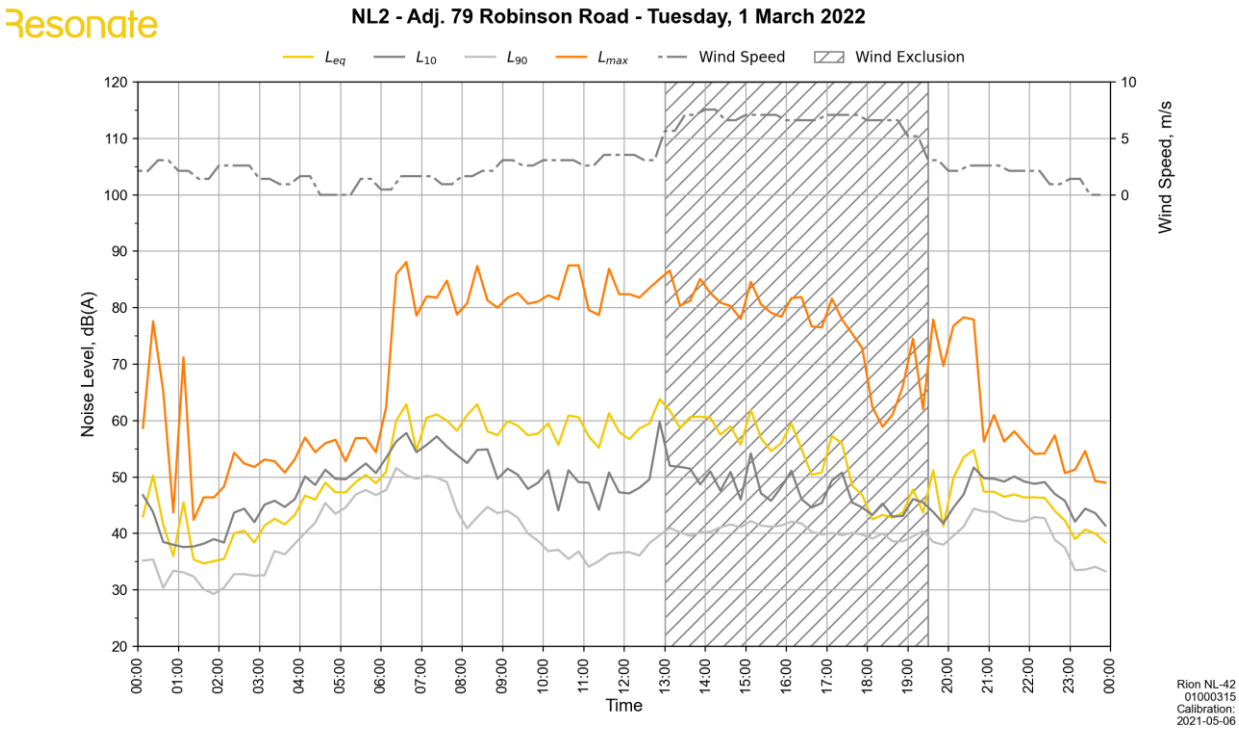

NL2 - Adj. 79 Robinson Road - Thursday, 24 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

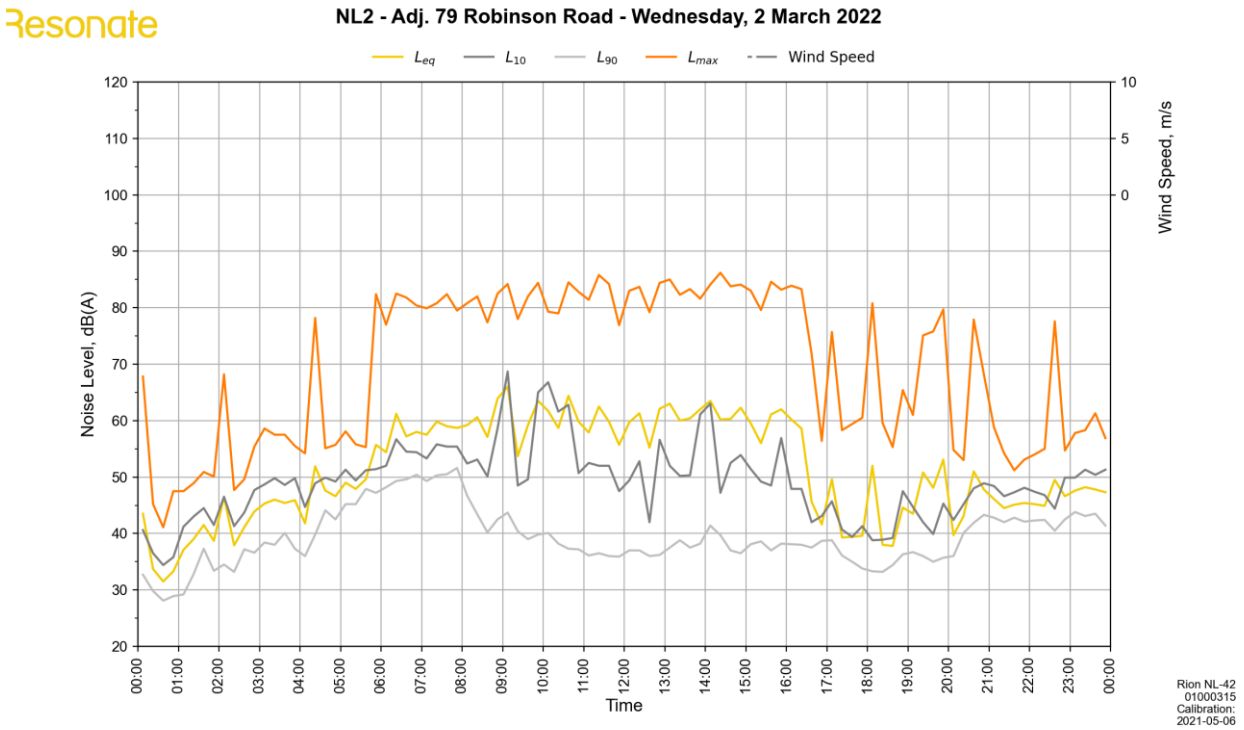

NL2 - Adj. 79 Robinson Road - Friday, 25 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

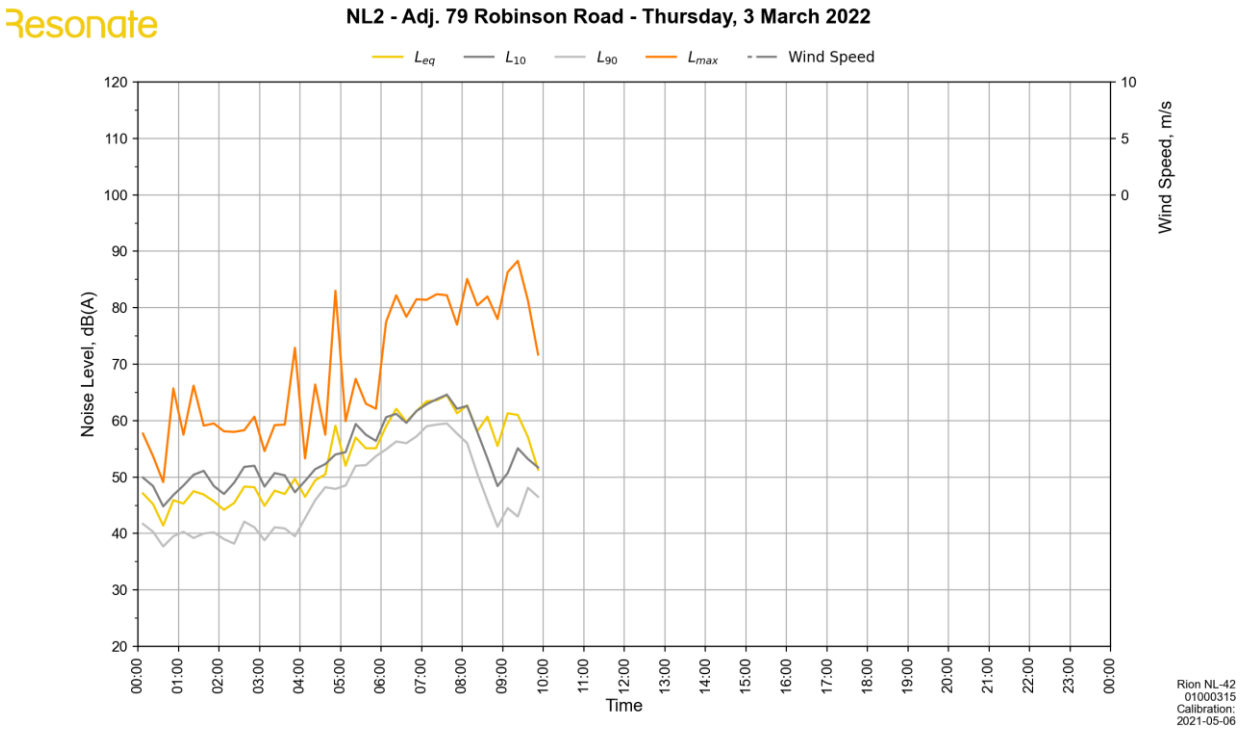

Resonate
NL2 - Adj. 79 Robinson Road - Saturday, 26 February 2022
Leq
L10
L90
Lmax
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06


Resonate
NL2 - Adj. 79 Robinson Road - Sunday, 27 February 2022
Leq
L10
L90
Lmax
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

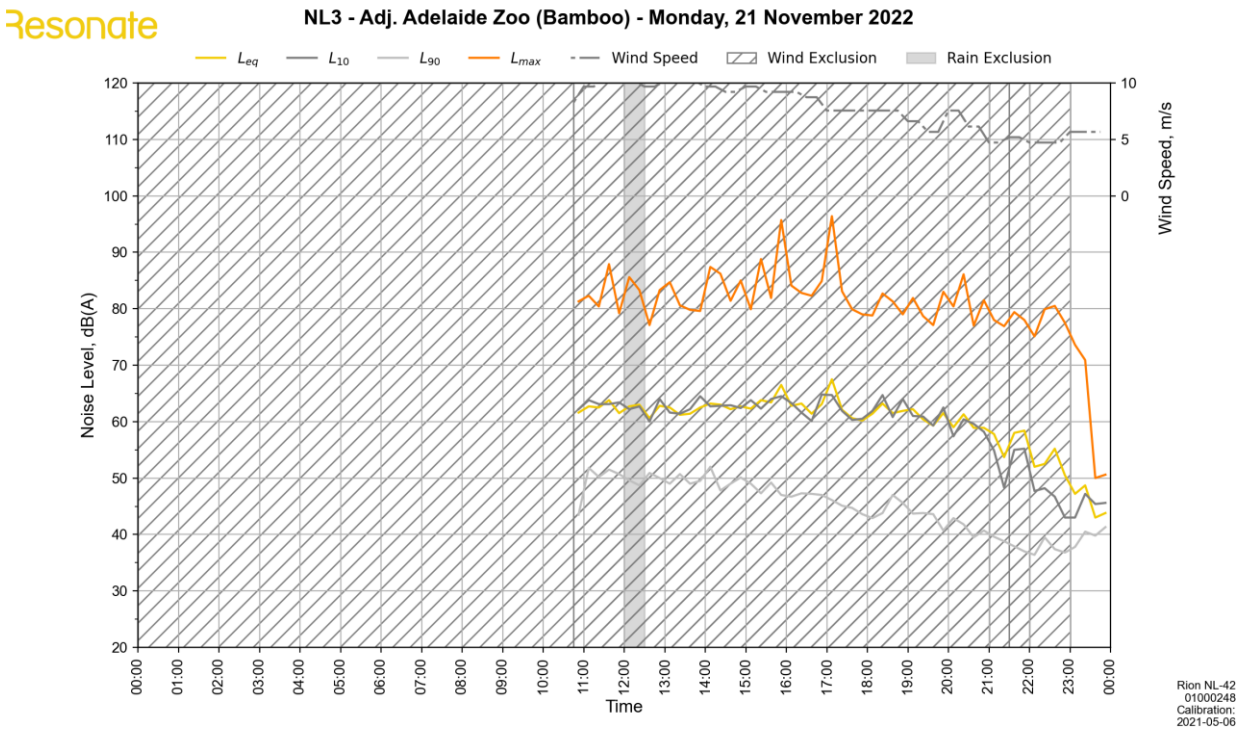

Resonate
NL2 - Adj. 79 Robinson Road - Monday, 28 February 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Rain Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

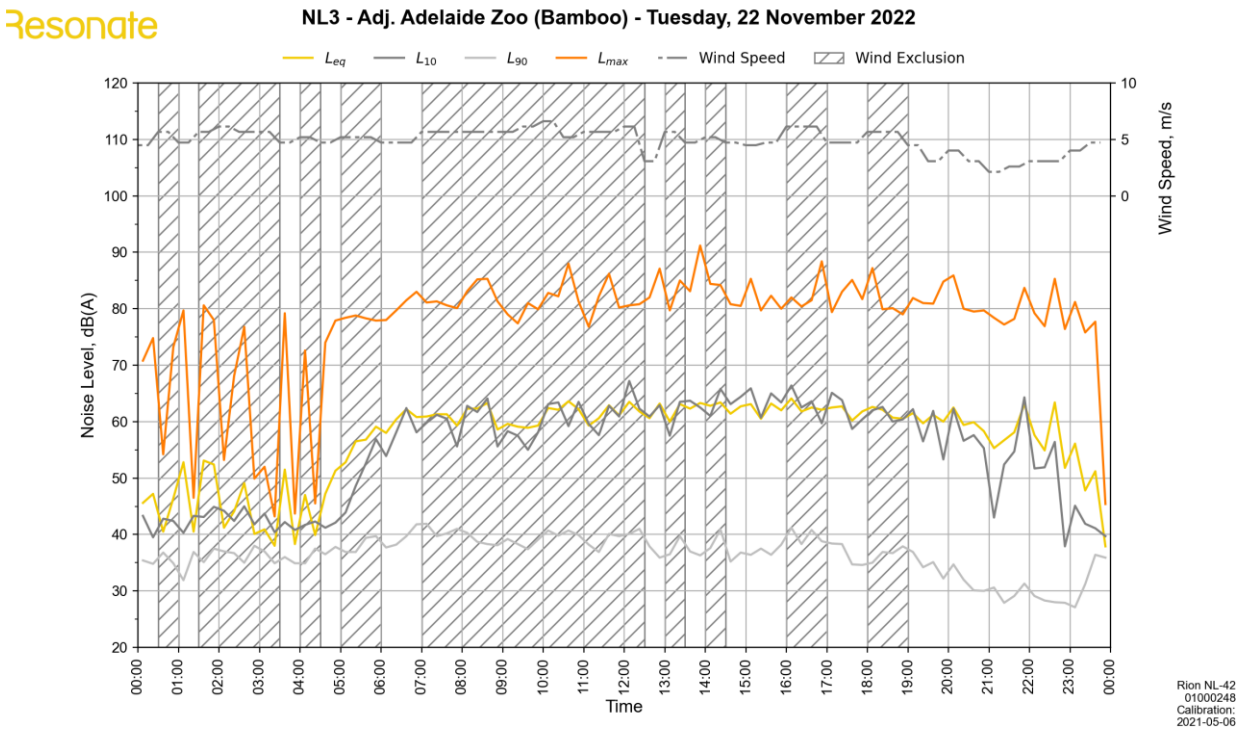

Resonate
NL2 - Adj. 79 Robinson Road - Tuesday, 1 March 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

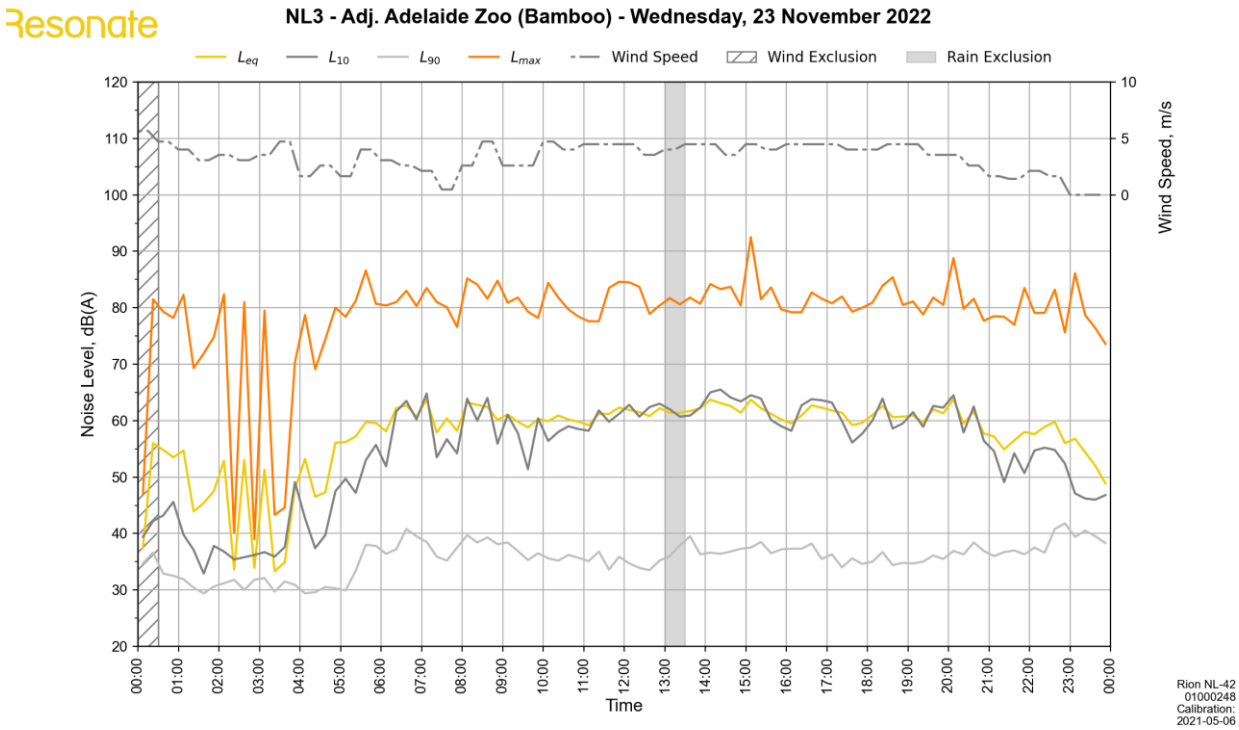

Resonate
NL2 - Adj. 79 Robinson Road - Wednesday, 2 March 2022
Leq
L10
L90
Lmax
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06


Resonate
NL2 - Adj. 79 Robinson Road - Thursday, 3 March 2022
Leq
L10
L90
Lmax
Wind Speed
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000315
Calibration:
2021-05-06

NL3


Resonate
NL3 - Adj. Adelaide Zoo (Bamboo) - Monday, 21 November 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Rain Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000248
Calibration:
2021-05-06


Resonate
NL3 - Adj. Adelaide Zoo (Bamboo) - Tuesday, 22 November 2022
L_{eq}
L_{10}
L_{90}
L_{max}
Wind Speed
Wind Exclusion
Noise Level, dB(A)
Wind Speed, m/s
Time
Rion NL-42
01000248
Calibration:
2021-05-06


Resonate
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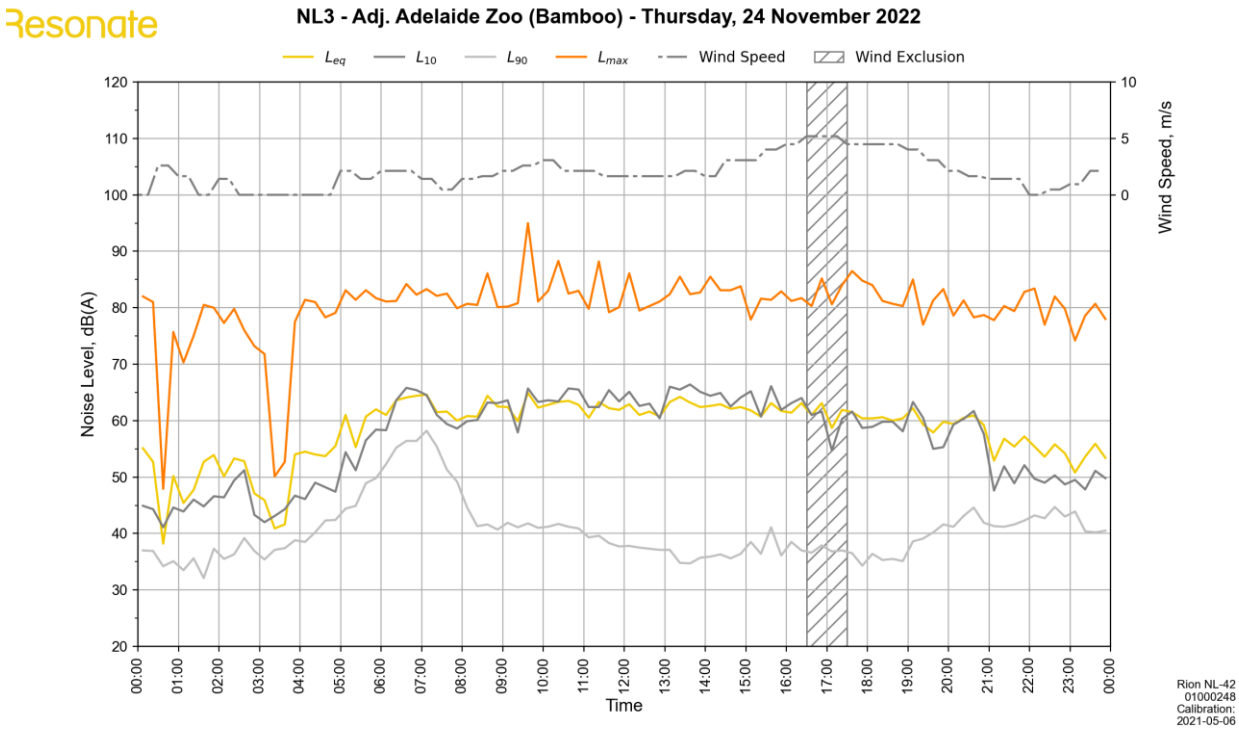
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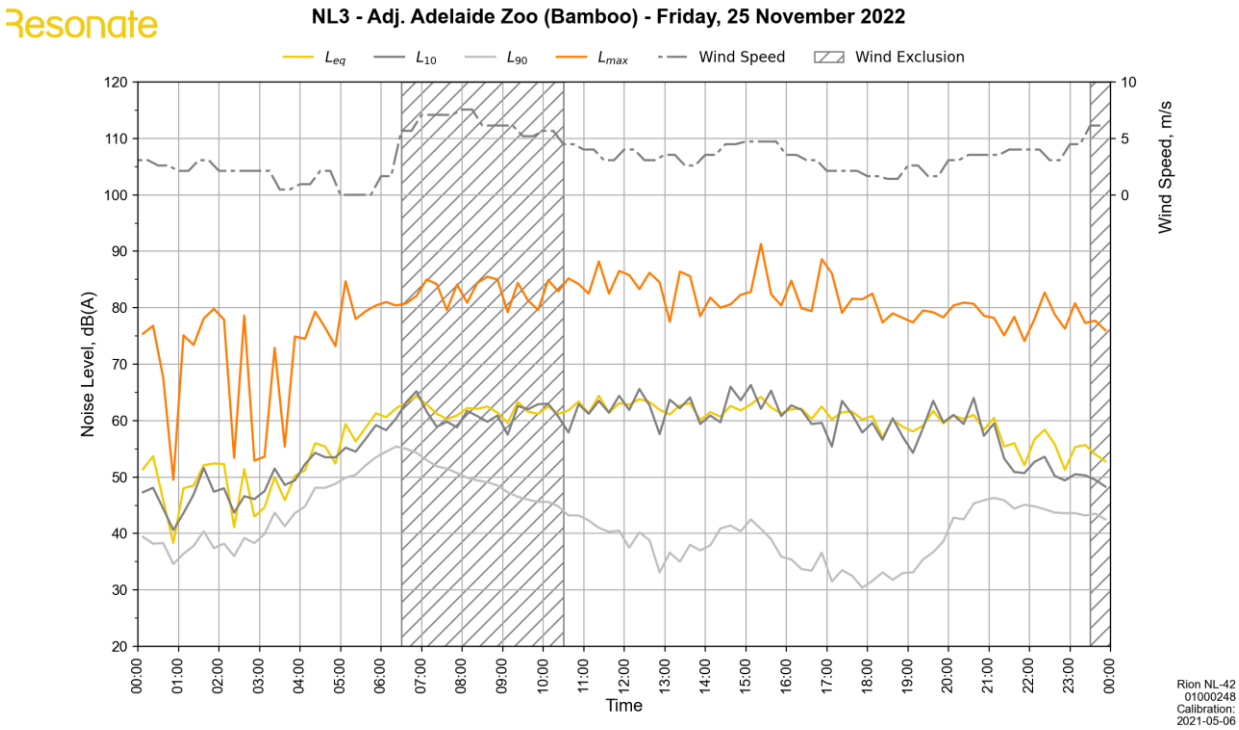
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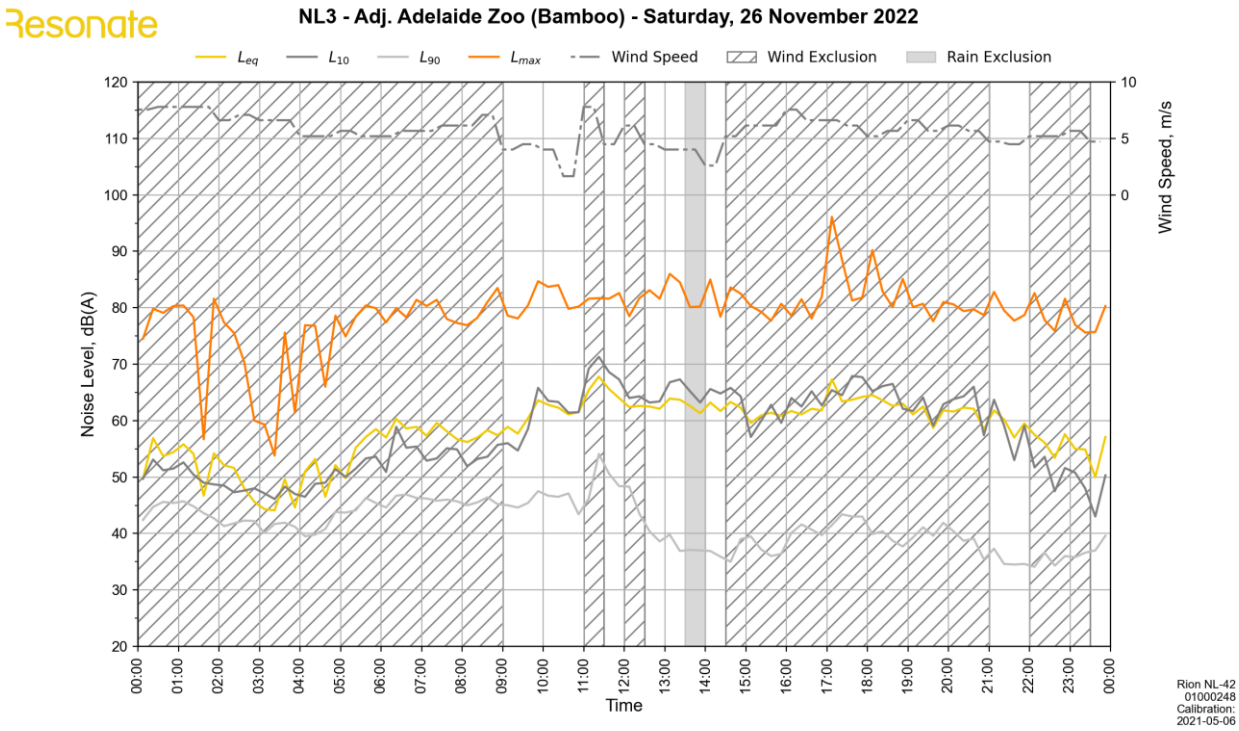
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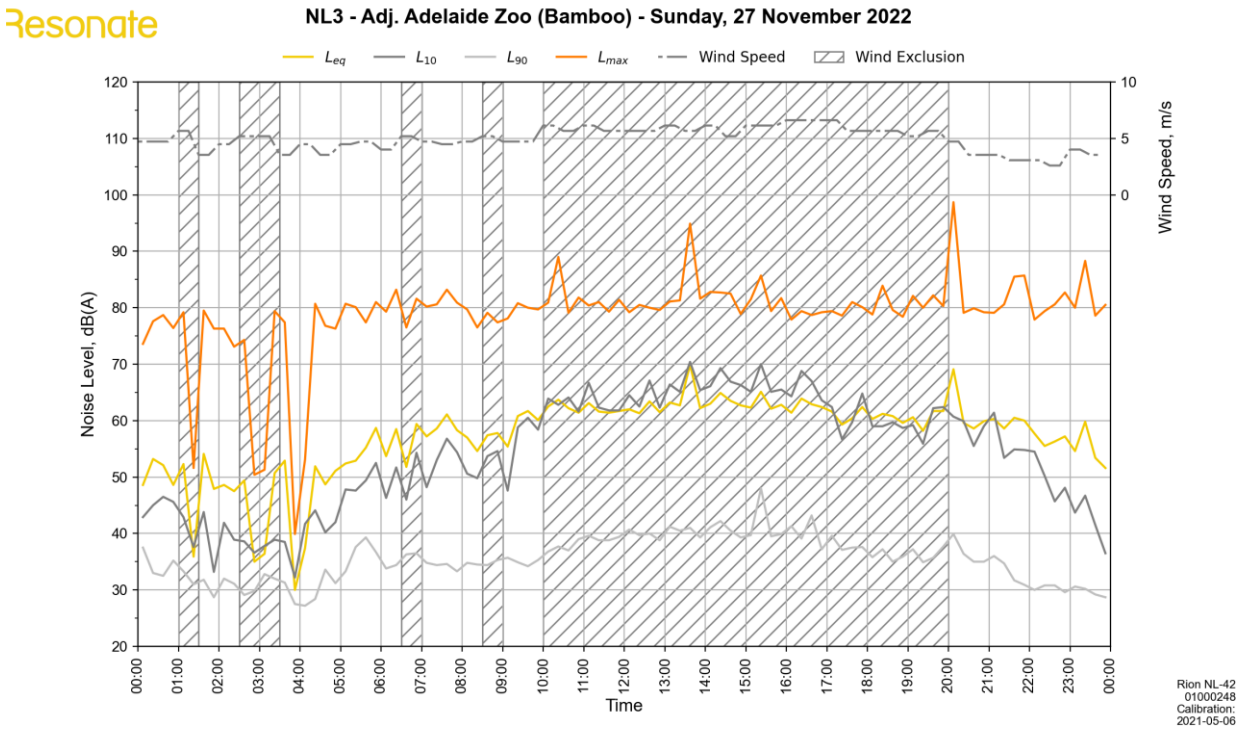
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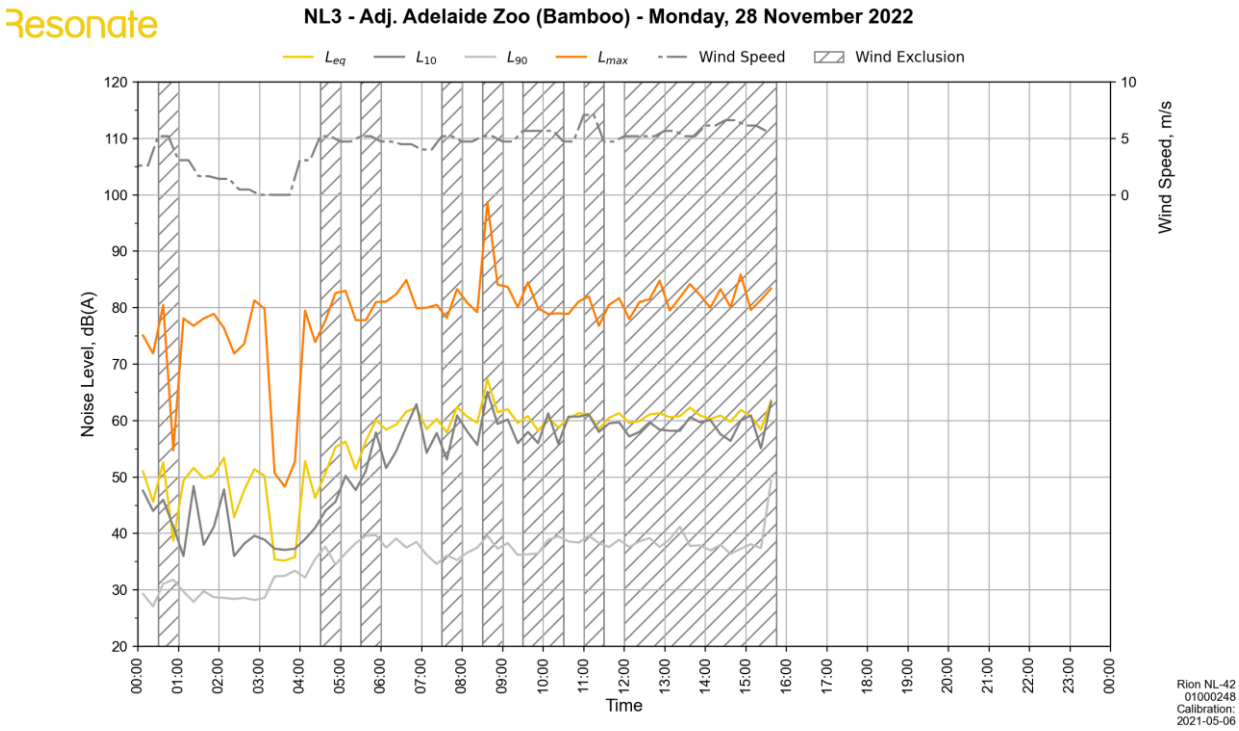
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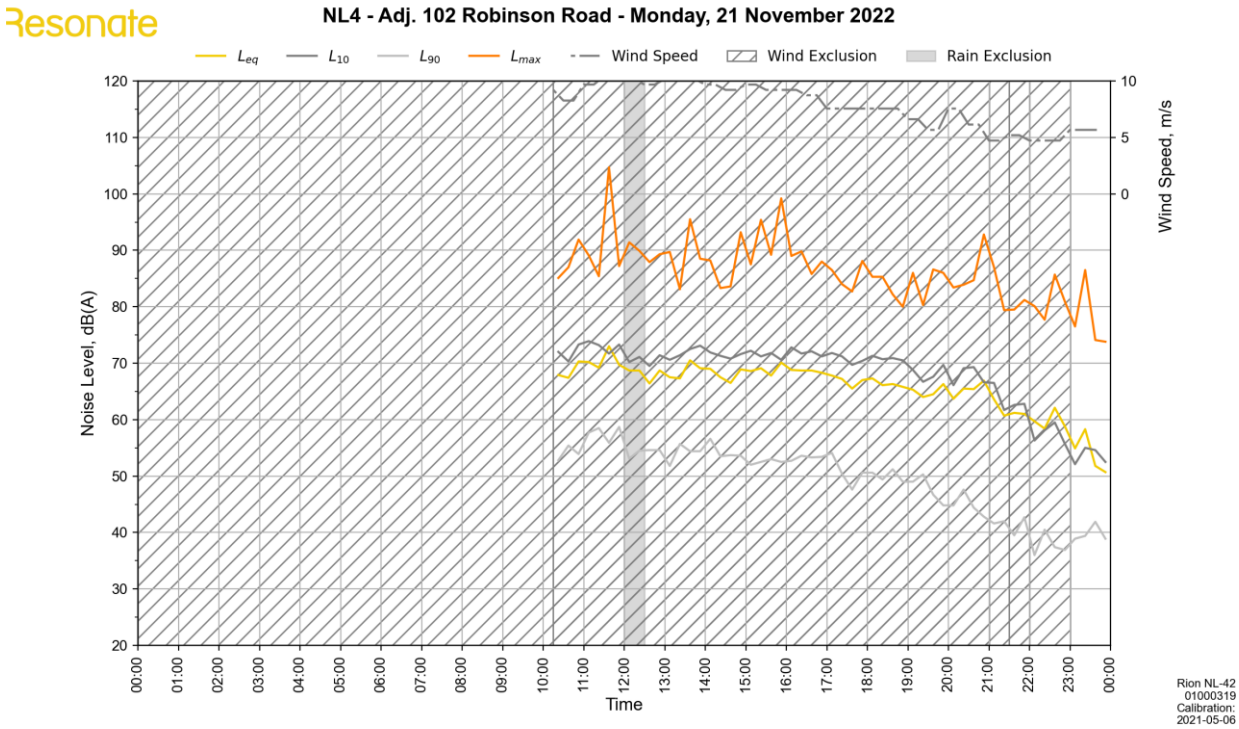
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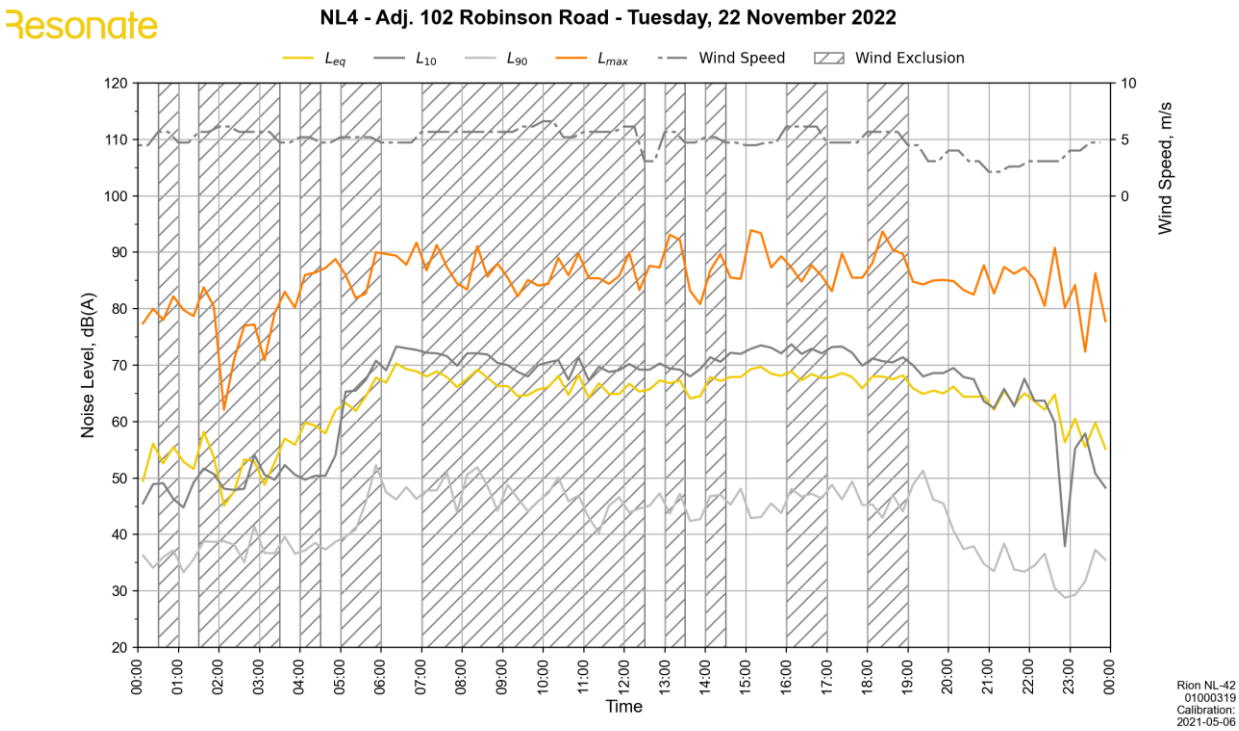
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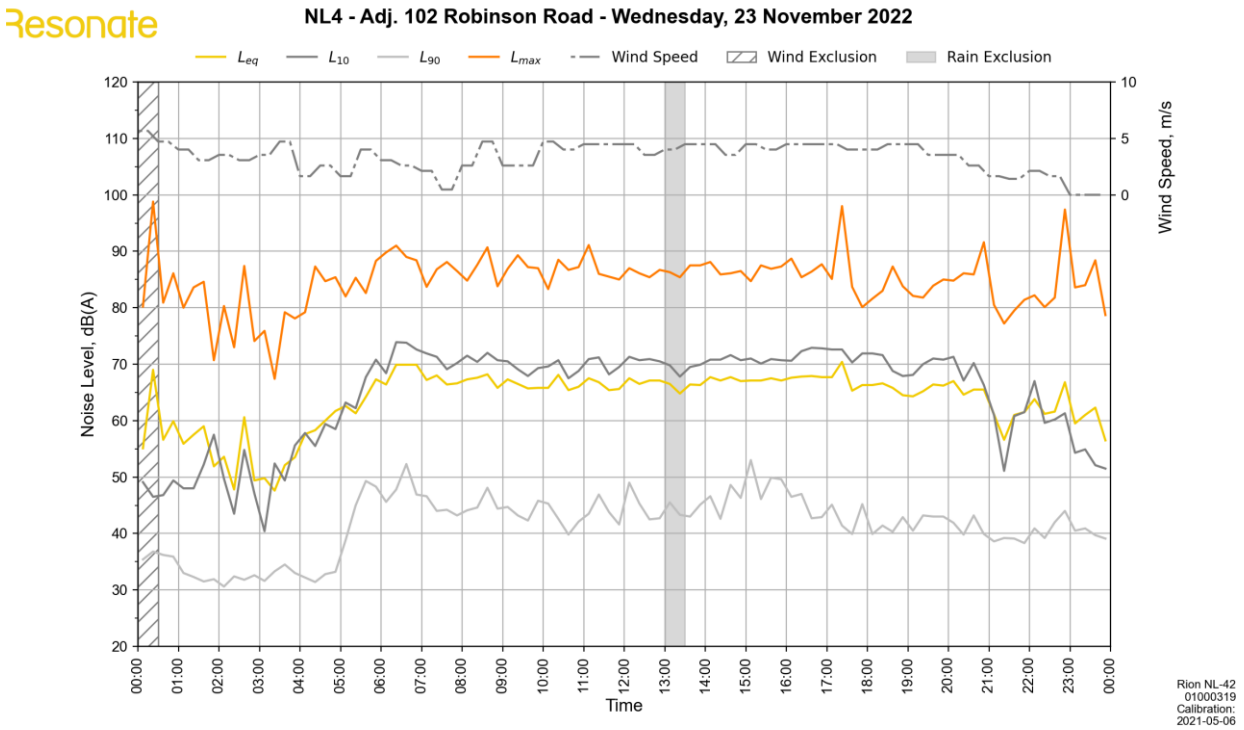
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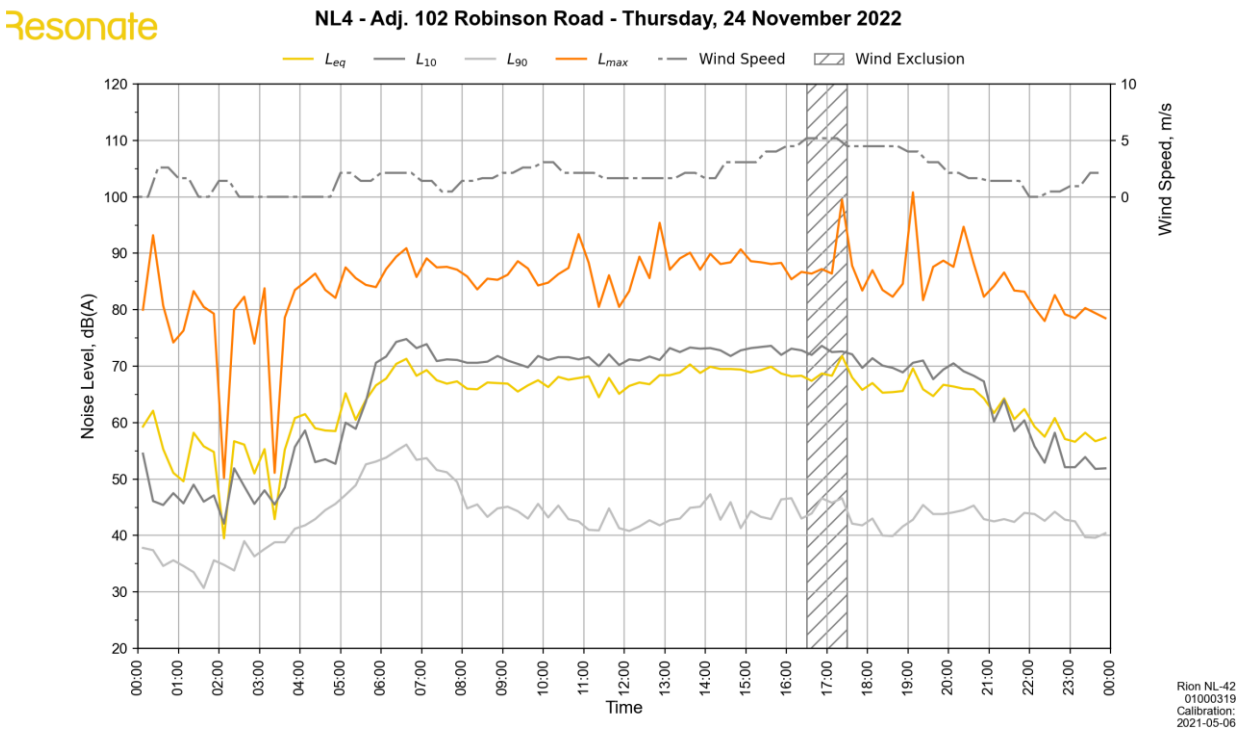
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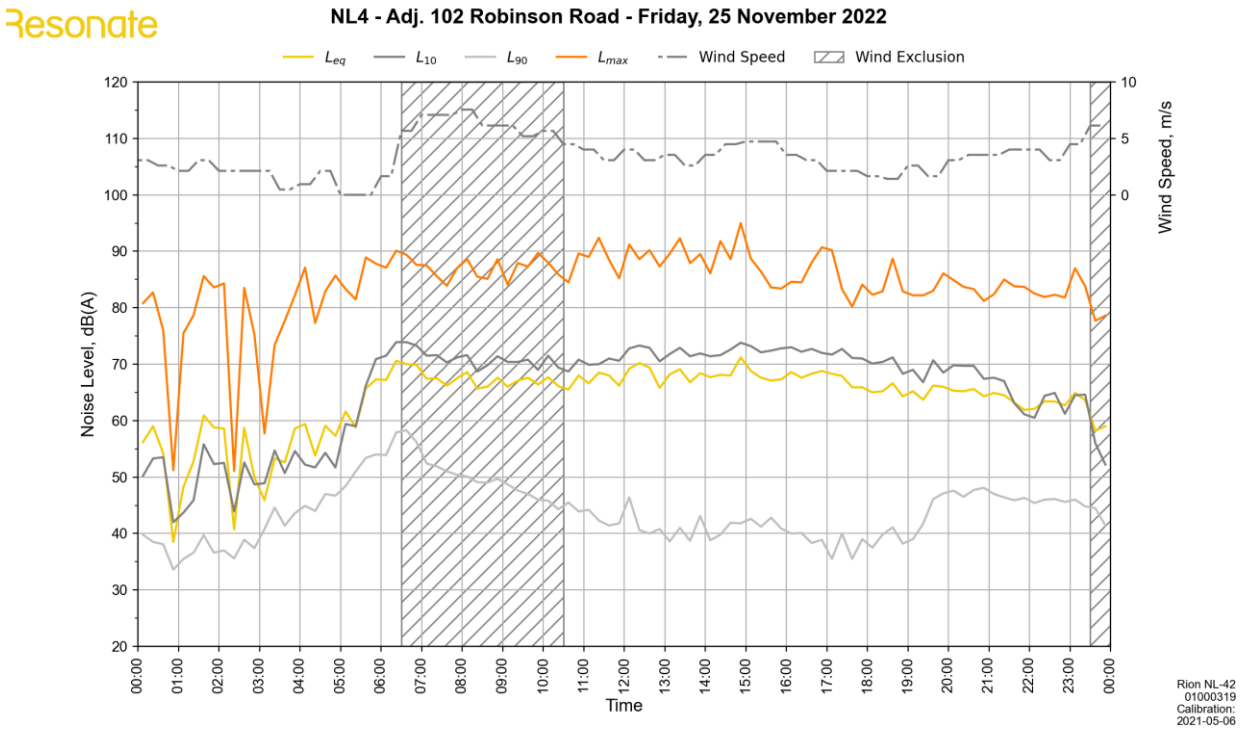
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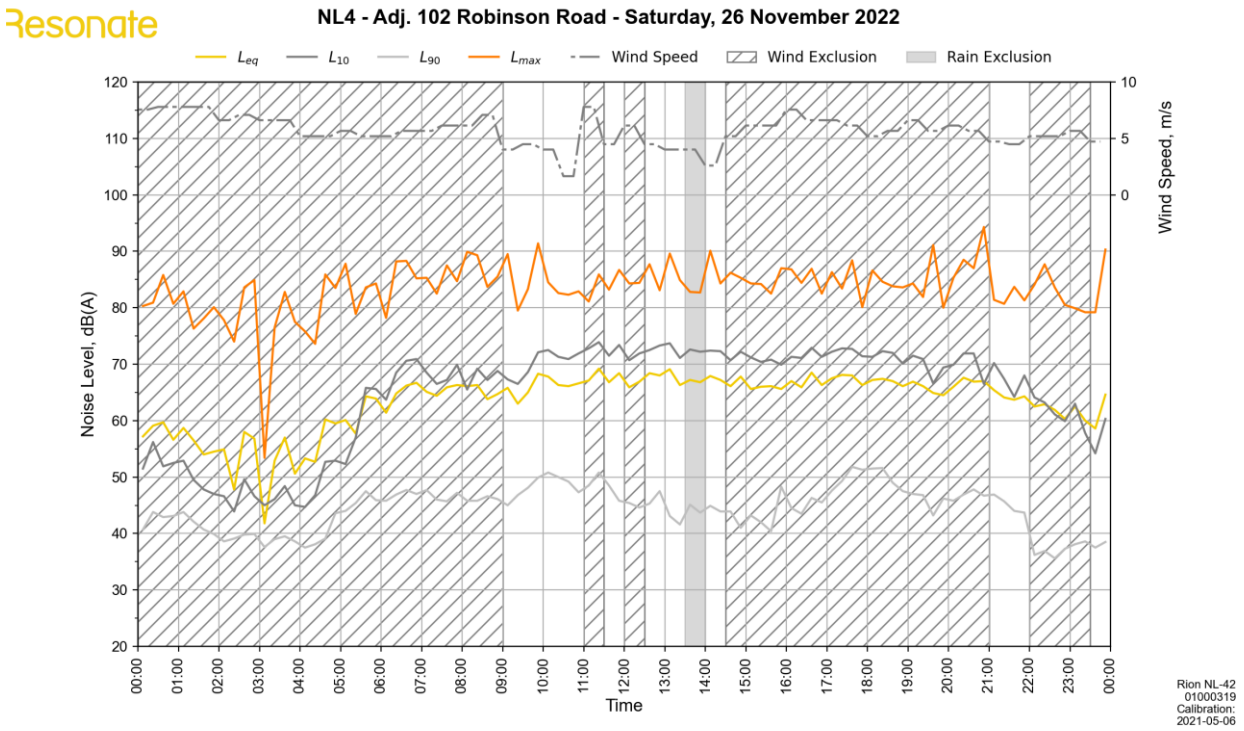
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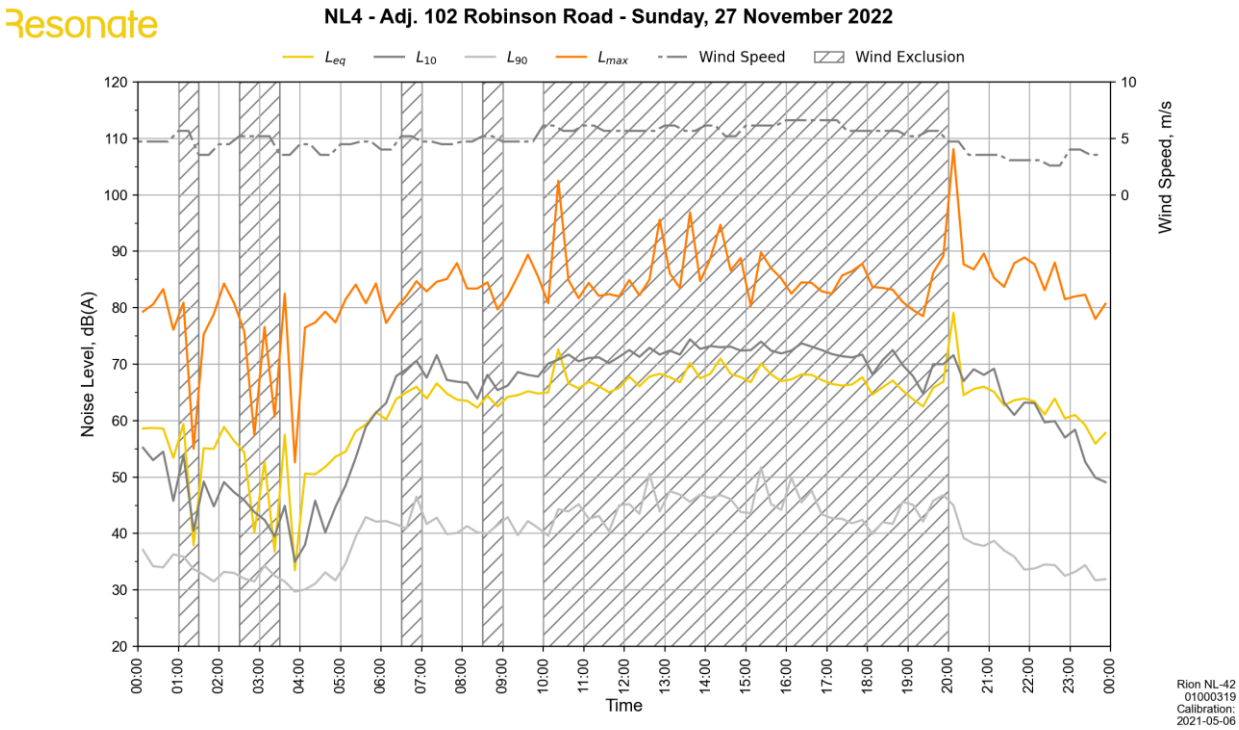
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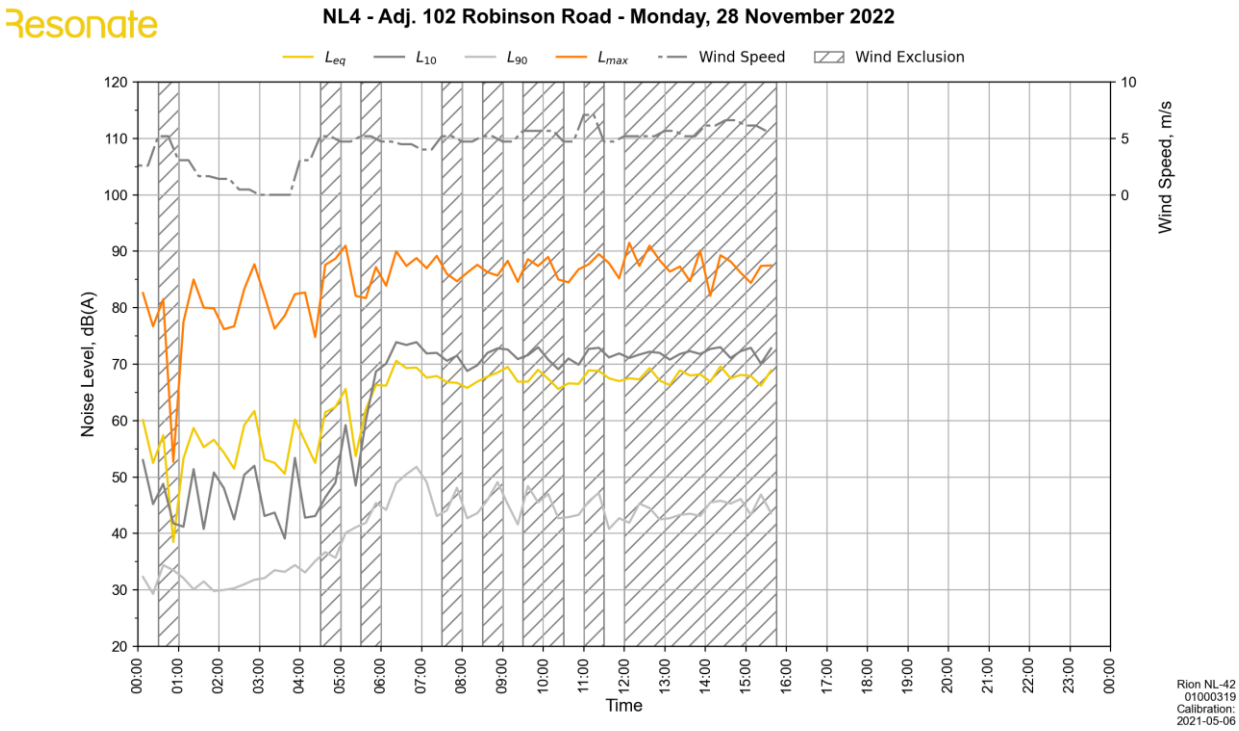
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Calibration:
2021-05-06

Appendix C—Noise sources

Plant items which may be used on site during construction are presented below. Equipment is indicative based on our experience on similar sites.

Table 22 Indicative construction noise sources

Equipment item	Quantity on site	Sound power level, dB(A) Leq
C1: Site preparation and civil works		
Concrete batching	1	115
Concrete truck	1	107
Dozer	1	110
Excavator 30T	2	103
Mulcher	1	114
Dump truck / tipper truck	2	108
Water truck	1	108
Grader	1	115
Vibratory roller	1	102
Generators	2	102
Indicative activity sound power level		**121**
C2: Processing plant construction (structural works)		
Crane	2	110
Franna crane	1	99
Trucks	3	108
Generator	2	102
Air compressor	1	91
Lighting towers	2	95
Hand tools	5	105
Indicative activity sound power level		**118**

Table 23 Operational noise sources

Sources	Equipment	Quantity	Sound level (per item)
Micronising & Spheronising Mill Building	Micronising exhaust stack	TBC(1)	L_W 70 dB(A)
	Mill	TBC(1)	L_p 85 dB(A) at 1 m
Kiln Building	Scrubber exhaust	1 each stage	L_W 85 dB(A)
	Rotary kiln muffle exhaust stack	1 each stage	L_W 80 dB(A)
	Alkaline gas scrubber stack	1 each stage	L_W 85 dB(A)
	All other internal equipment	1 each stage	L_W 99 dB(A)
Purification Building	Spiral flash dryer stack	1 each stage	L_W 75 dB(A)
	All internal equipment	1 each stage	L_W 94dB(A)
Compressors	Compressors	3 each stage	L_W 88 dB(A)
Waste Water Treatment Plant (WWTP)	External equipment	1 each stage	L_W 85 dB(A)
	Pumps (internal)	4 each stage	L_W 80 dB(A)
Demineralisation Plant	All equipment	1 each stage	L_W 90 dB(A)
Workshop and Warehouse Facility	Workshop activities	1	L_p 85 dB(A)
Sulphuric Acid Reagents	All equipment	1 each stage	L_W 80 dB(A)
Caustic Reagents	All equipment	1 each stage	L_W 82 dB(A)
Sodium Aluminate Reagents	All equipment	1 each stage	L_W 78 dB(A)
Lime Silo Reagents	All equipment	1 each stage	L_W 88 dB(A)
Administration Building	Externally located air conditioning condenser	10	L_W 78 dB(A)
Emergency Response and First Aid Facility	Externally located air conditioning condenser	2	L_W 78 dB(A)
Security Gate House	Externally located air conditioning condenser	1	L_W 78 dB(A)
Deliveries and Service Vehicles	Heavy vehicles	1 per 15-minute assessment period	L_W 104 dB(A)
Light vehicles and Car Park	Light vehicles	20 vehicle movements per 15-minute assessment period and 50 number of parking space	L_W 85 dB(A)
Storage / bagging	Gas forklift	2 per stage	L_W 96 dB(A)

(1) A conservative number of stacks were modelled based on preliminary engineering design. Final number of stacks to be determined through detailed engineering

Appendix 13 A) Traffic Impact Assessment

Renascor Resources Purified Spherical Graphite Facility

Traffic Impact Assessment

Prepared for JBS&G Australia Pty Ltd

22 May 2023
Ref: 221875

tonkin

Building exceptional outcomes together

Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
A	Draft TIA for Client Review	EA	PS	PS	25/1/23
B	Updates from Client	EA	PS	PS	23/3/23
C	Final	EA	PS	PS	22/5/23

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Contents

Project: Renascor Resources Purified Spherical Graphite Facility | Traffic Impact Assessment
Client: Prepared for JBS&G Australia Pty Ltd
Ref: 221875

1 Introduction 6

1.1 Site Description 6

1.2 Summary of Development 7

2 Existing Conditions 9

2.1 Project Location – Land Uses 9

2.2 Road Network 10

2.3 Public Transport 12

2.4 Pedestrian or Cycling Infrastructure 12

3 Traffic Demands for the Proposal 13

3.1 During Construction 13

3.2 During Operation 13

3.3 Siviour to Bolivar Travel Route 14

3.4 BAM Site Access 15

3.5 Heavy Vehicle Route Assessment (HVRA) - Tonkin 16

3.6 Bolivar to OHCT Travel Route 18

3.7 Carparking Requirements 19

4 Impact Assessment 20

4.1 Construction – Stage 1 20

4.2 Operational – Stage 1 23

4.3 Stage 1 Operational and Stage 2 Construction Phase 26

4.4 Operational – Stage 2 30

4.5 Key Intersection Impacts 33

5 Summary and Conclusions 46

Appendices

Appendix A – BAM Site Plan

Appendix B – Intersection Turn Counts (DIT)

Tables

Table 1: Construction Related Activities 13
Table 2: Delivery Types to Bolivar Facility 13
Table 3: Off-Site Deliveries to OHCT 14
Table 4: Miscellaneous Bolivar Site Activities 14
Table 5: Daily Movements According to Vehicle – Construction Stage 21
Table 6: Road Link Daily Volume Increases – Construction Stage 22
Table 7: Peak AM Traffic (~6:30am-7:30am) – Construction Stage 23
Table 8: Peak PM Traffic (~3:30pm-4:30pm) – Construction Stage 23
Table 9: Daily Movements According to Vehicle – Stage 1 Operation 24
Table 10: Road Link Daily Volume Increases – Stage 1 Operation 25
Table 11: Peak AM Traffic Movements (~6:30am-7:30am) –Stage 1 Operation 26
Table 12: Peak PM Traffic Movements (~6:30pm-7:30pm) – Stage 1 Operation 26
Table 13: Daily Movements According to Vehicle – Stage 1 Operational/Stage 2 Construction 27
Table 14: Road Link Daily Volume Increases – Stage 1 Operational/Stage 2 Construction 28
Table 15: Peak AM Traffic Movements (~6:30am-7:30am) – Stage 1 Operational/Stage 2 Construction 29
Table 16: Peak PM Traffic Movements (~6:30pm-7:30pm) – Stage 1 Operational/Stage 2 Construction 29
Table 17: Daily Movements According to Vehicle - Stage 2 Operational 30
Table 18: Road Link Daily Volume Increases - Stage 2 Operational 31
Table 19: Peak AM Traffic Movements (~6:30am-7:30pm) - Stage 2 Operational 32
Table 20: Peak PM Traffic Movements (~6:30pm-7:30pm) – Stage 2 Operational 32

Figures

Figure 1: Bolivar Site Description 6
Figure 2: Siviour Graphite Mine Location 7
Figure 3: Outer Harbour Container Terminal (OHCT) Location 7
Figure 4: Site Planning Zoning Map (Plan SA Planning and Design Code Maps) 9
Figure 5: Waterloo Corner Road - Approved Heavy Vehicle Routes (RAVnet) 10
Figure 6: Key Intersection Volumes 11
Figure 7: Siviour to Bolivar Travel Route 15
Figure 8: Approved Heavy Vehicle Routing - Bolivar Site (RAVnet) 16
Figure 9: Robinson Road Existing Seal Condition 17
Figure 10: Bolivar Site - Approved PBS Level 3B routes (RAVnet 2022) 18
Figure 11: Bolivar to OHCT Travel Route 19
Figure 12: Estimated Distribution of Traffic - Entering Facility 20
Figure 13: Estimated Distribution of Traffic - Exiting Facility 20
Figure 14: Robinson Rd/Waterloo Cnr Rd AM Peak - Stage 1 Operational 34
Figure 15: Robinson Rd/Waterloo Cnr Rd PM Peak - Stage 1 Operational 34
Figure 16: Robinson Rd/Waterloo Cnr Rd AM Peak - Stage 1 Operational/Stage 2 Construction 35
Figure 17: Robinson Rd/Waterloo Cnr Rd PM Peak - Stage 1 Operational/Stage 2 Construction 35
Figure 18: Robinson Rd/Waterloo Cnr Rd AM Peak - Stage 2 Operational 36
Figure 19: Robinson Rd/Waterloo Cnr Rd PM Peak - Stage 2 Operational 36
Figure 20: Waterloo Cnr Rd/North-South Motorway Slip Lanes AM Peak – Stage 1 Operational 37
Figure 21: Waterloo Cnr Rd/North-South Motorway Slip Lanes PM Peak – Stage 1 Operational 37

Figure 22: Waterloo Cnr Rd/North-South Motorway Slip Lanes AM Peak – Stage 1 Operational/Stage 2 Construction 38
Figure 23: Waterloo Cnr Rd/North-South Motorway Slip Lanes PM Peak – Stage 1 Operational/Stage 2 Construction 38
Figure 24: Waterloo Cnr Rd/North-South Motorway Slip Lanes AM Peak – Stage 2 Operational 39
Figure 25: Waterloo Cnr Rd/North-South Motorway Slip Lanes PM Peak – Stage 2 Operational 39
Figure 26: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) AM Peak - Stage 1 Operational ... 40
Figure 27: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) PM Peak - Stage 1 Operational ... 40
Figure 28: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) AM Peak - Stage 1 Operational/Stage 2 Construction 41
Figure 29: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) PM Peak - Stage 1 Operational/Stage 2 Construction 41
Figure 30: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) AM Peak - Stage 2 Operational ... 42
Figure 31: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) PM Peak - Stage 2 Operational ... 42
Figure 32: Port Wakefield Road/Waterloo Corner Road AM Peak - Stage 1 Operational 43
Figure 33: Port Wakefield Road/Waterloo Corner Road PM Peak - Stage 1 Operational 43
Figure 34: Port Wakefield Road/Waterloo Corner Road AM Peak - Stage 1 Operational/Stage 2 Construction 44
Figure 35: Port Wakefield Road/Waterloo Corner Road PM Peak - Stage 1 Operational/Stage 2 Construction 44
Figure 36: Port Wakefield Road/Waterloo Corner Road AM Peak - Stage 2 Operational 45
Figure 37: Port Wakefield Road/Waterloo Corner Road PM Peak - Stage 2 Operational 45

1 Introduction

Tonkin has been engaged by JBS&G Australia Pty Ltd to undertake a Traffic Impact Assessment for the proposed development of a Battery Anode Material Facility (BAM Facility) at Bolivar, South Australia. The proposed site will be accessed via Robinson Road and Waterloo Corner Road.

This report documents how the proposed BAM site will impact the existing traffic network in the surrounding area. This was completed using information on the existing traffic volumes and planned movements within the BAM site.

1.1 Site Description

The subject site is located 7km north-west of Salisbury and 3km east of St Kilda. The surrounding area is largely open space, with horticulture and housing typically seen in the immediate vicinity. It has convenient access to the North-South Motorway. Figure 1 provides an aerial perspective of the site's location and a map of the proposed site can be found in Appendix A of this TIA.

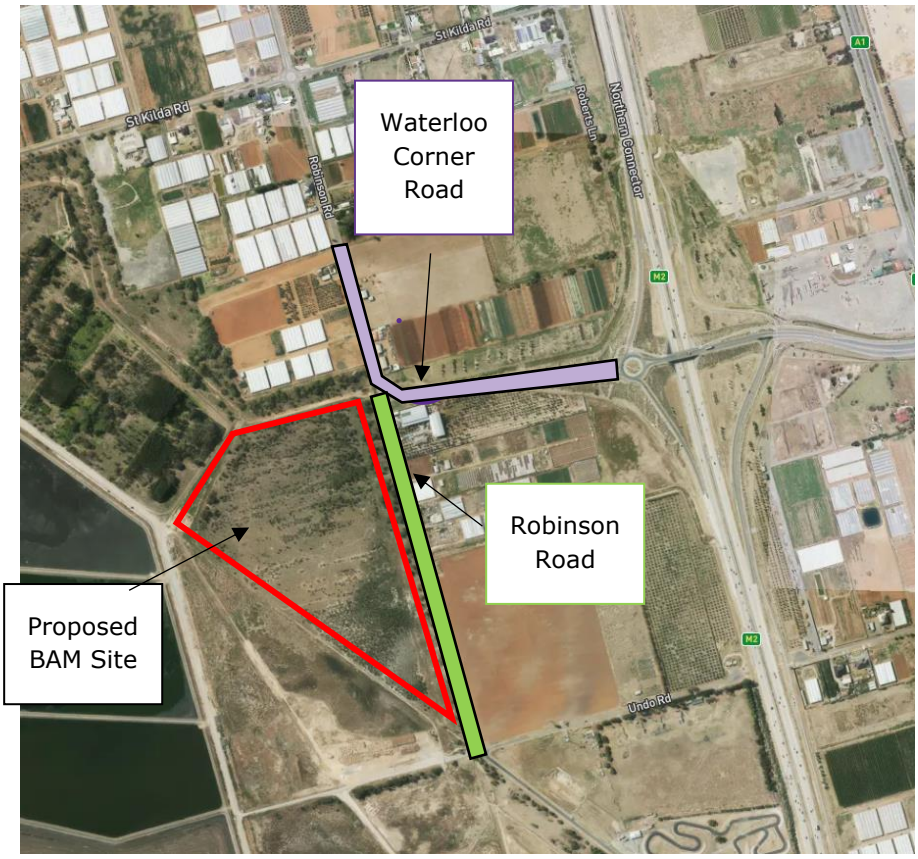


Figure 1: Bolivar Site Description

1.2 Summary of Development

Renascor Resources is an Australian-based mineral exploration and resource development company. Their leading project is the Siviour Graphite Mine located approximately 120km northeast of Port Lincoln, South Australia (Figure 2). Through the company's commitment to clean energy, it has developed a vertically integrated graphite mine with the aim of producing battery anode material, supplying into the battery manufacturing market. This production has the potential to provide sustainable energy within Australia.

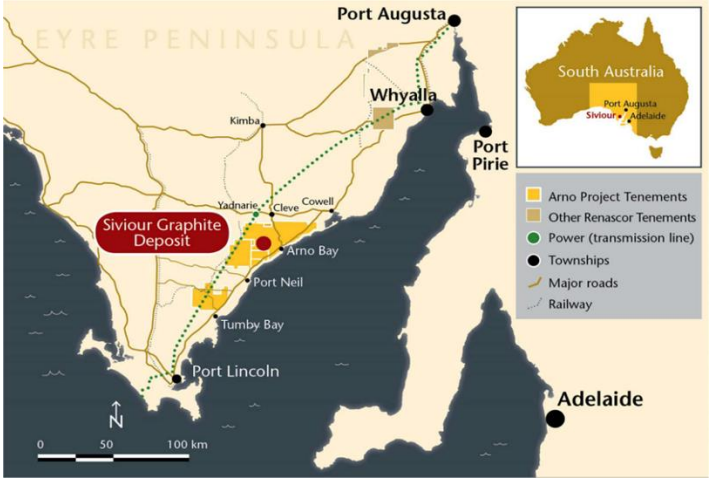


Figure 2: Siviour Graphite Mine Location

To process the graphite, Renascor has proposed a new facility located at Bolivar capable of processing the materials collected from the Siviour mine. The site (Figure 1) will receive the graphite from Siviour mine, produce the purified graphite and transport the final product to the Outer Harbour Container Terminal (OHCT) at Port Adelaide for distribution overseas (Figure 3). Transport between these facilities will be conducted using road trains.

Figure 3: Outer Harbour Container Terminal (OHCT) Location

The construction of the new Bolivar site will be conducted in two stages. Stage 1 operations are scheduled to begin in 2025. The site is expected to run 24 hours a day with two separate shifts (day and night) changing every 12 hours. The expected shift hours will be 7am to 7pm and vice versa.

Stage 2 operations are scheduled to begin between 2027-2030, with the site's facilities being doubled over Stage 2 construction. The Stage 1 Operational phase will continue during the construction of Stage 2. Renascor expects that production of the purified graphite at the Bolivar site will also double when stage 2 operations begin. Staff numbers will increase by approximately 35%.

2 Existing Conditions

This section of the report details the existing traffic and road conditions based on desktop investigations and data obtained from JBS&G and Renascor concerning the road network surrounding the proposed site location.

2.1 Project Location – Land Uses

The proposed BAM facility is located on Robinson Road, Bolivar, within the north-western areas of the City of Salisbury LGA.

Surrounding areas of the site contain several types of zoning. These include Infrastructure, Open Space and Rural. Robinson Road and the proposed BAM facility are zoned as Rural Horticulture from the Salisbury Planning & Development Code Maps. This information is shown in Figure 4.

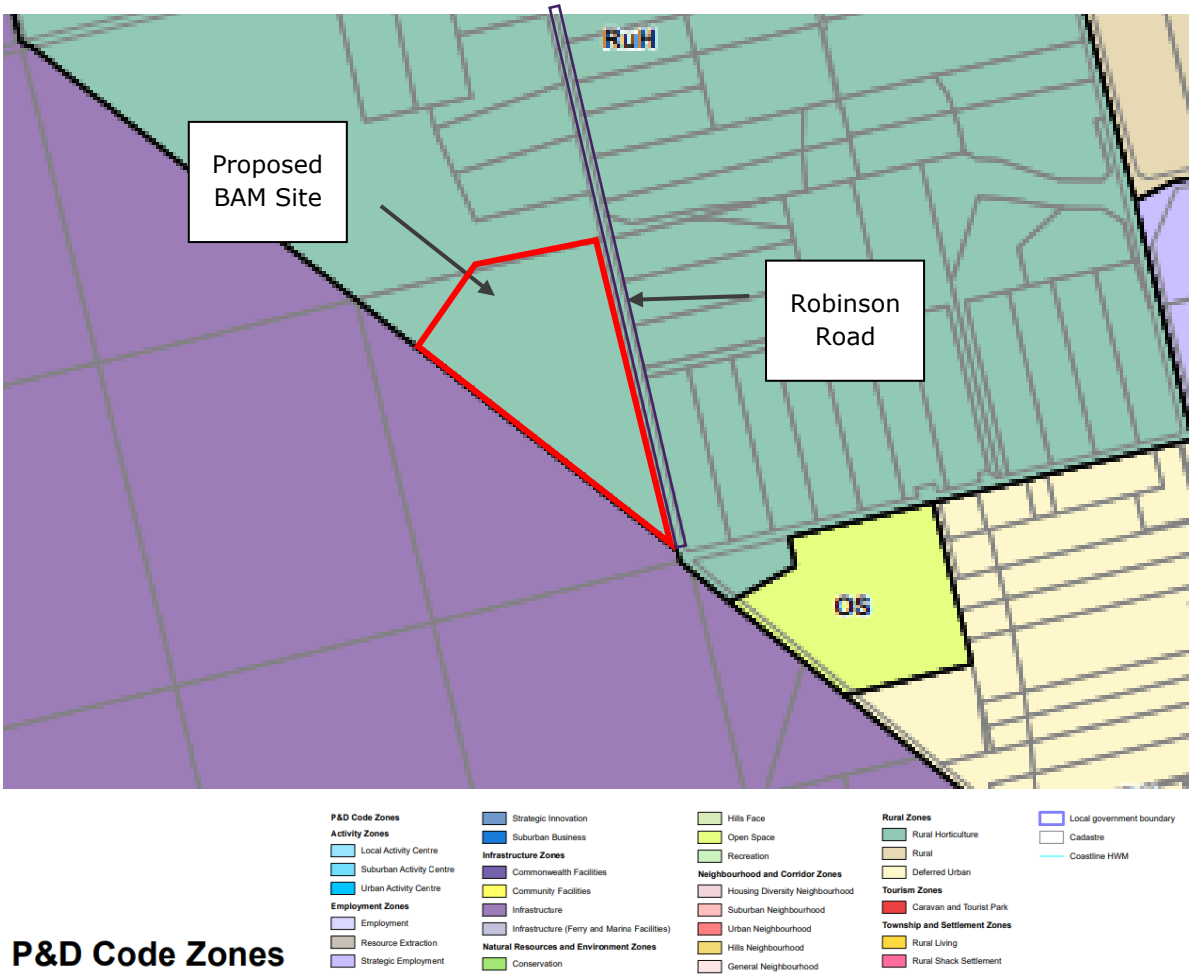


Figure 4: Site Planning Zoning Map (Plan SA Planning and Design Code Maps)

2.2 Road Network

2.2.1 Robinson Road

Robinson Road is a local street that provides direct access to properties and small facilities within the Bolivar area. It is a two-lane road with traffic flowing in both directions and experiences approximately 1200 vehicles per day in its northern section. It is currently not gazetted for the use of road trains.

2.2.2 Waterloo Corner Road

Waterloo Corner Road is a sub-arterial road that connects Robinson Road to local areas such as Burton and Elizabeth to the North-South Motorway. It is a two-way road with traffic flowing in both directions. It transports approximately 3000 vehicles per day at the western areas. Sections of the road are gazetted for 36.5 metre road trains. However, it is currently not gazetted for road trains at the necessary areas for the proposed site (Figure 5). Road carriageways boldened represent approved traffic routes for 36.5m or smaller heavy vehicles. Roads not boldened represent traffic routes not approved for 53.5m or higher heavy vehicles.

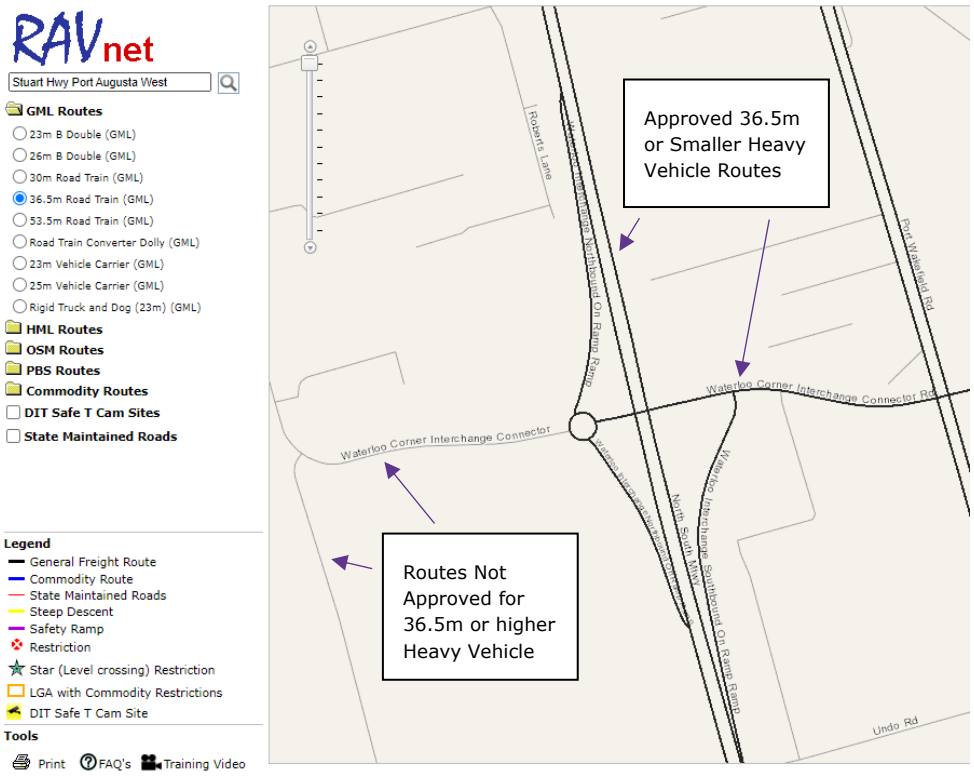


Figure 5: Waterloo Corner Road - Approved Heavy Vehicle Routes (RAVnet)

Waterloo Corner Road is also the main access point to the SA Water Bolivar Wastewater Treatment Plant. Heavy vehicle usage is currently utilized along Robinson Road and Waterloo Corner Road to this facility.

2.2.3 North-South Motorway

The North-South motorway is a DIT controlled road that connect large parts of Adelaide. It runs approximately 1km east from the Bolivar site and will be a key road in transporting material between the Siviour, Bolivar and Port Adelaide sites. It typically sees several thousand vehicles per day, with approximately 50,000 vehicles detected near the BAM site daily. It is gazetted for all road trains in the Bolivar area, excluding 53.5m trucks.

2.2.4 Port Wakefield Road

Port Wakefield Road is a SA Department for Infrastructure and Transport (DIT) controlled road that forms an essential link between Adelaide and Port Wakefield. It is runs parallel to the North-South Motorway in the Bolivar area. It will be important in transferring the road trains between Bolivar and the Siviour mine. In the Bolivar area, it carries approximately 15000 vehicle per day. It is gazetted for all road trains in the Bolivar area, excluding 53.5 trucks.

2.2.5 Key Intersection Network

Figure 6 provides a summary of the key intersections for the BAM site and their existing volumes. Most road links in the area experience volumes of several thousands of vehicles per day.

Figure 6: Key Intersection Volumes

2.3 Public Transport

There is currently no public transport route travelling on Robinson Road or Waterloo Corner Road with direct impact of the proposed site. This has been considered with the expected traffic generation of the site requiring all access via motor vehicle.

2.4 Pedestrian or Cycling Infrastructure

There is minimal existing pedestrian or cycling infrastructure in the area, with no footpaths or cycling lanes along Robinson Road. This has been considered with the expected traffic generation of the site requiring all access via motor vehicle.

3 Traffic Demands for the Proposal

3.1 During Construction

The construction stage at Bolivar will require heavy and light vehicles to transport materials and staff to the site. The anticipated types of activities and required vehicles are produced in Table 1.

Table 1: Construction Related Activities

Activity	Vehicle Type
Equipment Deliveries	Heavy Vehicle
Fuel	Heavy Vehicle
Utes	Light Vehicle
Food Truck	Light Vehicle

3.2 During Operation

The BAM facility will receive and produce several types of materials across its operations, thus different vehicle types will require access onto the site. Table 2 and Table 3 provide the materials delivered to the site from the Siviour mine (Eyre Peninsula) and the Off-Site products taken from Bolivar to Port Adelaide.

Also included is the likely form of vehicle required to transport these materials. A combination of B- Double and AB Triple Road trains is the likely arrangement needed to effectively move the products. A majority of these deliveries will occur during the daytime shift between 7am-7pm.

Table 2: Delivery Types to Bolivar Facility

Deliveries	Likely Vehicle Type
Graphite Concentrate	AB Triple
Caustic	AB Triple
Sulphuric Acid	B Double
Sodium Aluminate	AB Triple
Lime	AB Triple

Table 3: Off-Site Deliveries to OHCT

Off Site	Likely Vehicle Type
BAM Products	B Double
Fines	B Double
Solid Silica Aluminate/ Sodium Silicate	AB Triple
Calcium and Magnesium Carbonate	AB Triple
Calcium Sulphate	AB Triple

The on-site staff at Bolivar will also generate significant traffic. With the lack of public transport and cycling facilities available, it is assumed that all staff members will use personal vehicles to enter and exit the site. Miscellaneous generated movements also include the potential for small parts deliveries, fuel etc. A majority of these movements will also be conducted during the daytime shift, with the exception of night shift workers (7pm-7am).

Table 4: Miscellaneous Bolivar Site Activities

Miscellaneous	Likely Vehicle Type
Staff	Light Vehicle
Food/Other	Two Axle Truck

Further details on the estimated traffic volumes are outlined in Section 4 below.

3.3 Siviour to Bolivar Travel Route

The selected route from Siviour mine to the Bolivar BAM site will utilize the Lincoln Highway and National Highway A1, Port Wakefield Road, Waterloo Corner Road and Robinson Road (Figure 7). It is approximately 523km long. The arterial, state controlled roads on this route are all gazetted for PBS Level 3A vehicles. The volumes along this route (before reaching Waterloo Corner) range between 1000-10,000 vehicles per day. The number of vehicles travelling this route are likely to not exceed 6 movements per day, a maximum increase of 0.5% on the least trafficked roads.

Figure 7: Siviour to Bolivar Travel Route

Renascor had originally proposed in their Preliminary Feasibility Study (PFS) that the transition between the mine site and the Lincoln Highway would be completed at the Siviour Road – Lincoln Highway intersection. However, it was deemed to be a possible traffic hazard. A new 1 km sealed connecting link between Schmitt and Five Cross Roads was investigated in the Definitive Feasibility Study (DFS) in conjunction with the District Council of Cleve. This would allow for road trains to utilise the existing Lincoln Highway – Schmitt Road vehicle entrance and turning lanes opposite the Viterra grain handling facility.

Renascor have stated (Logistics Options Study 2022) an allocation in the Project's Capital Expenditure (CAPEX) has been made in the DFS to allow for the upgrade of local roads and the construction of this link road between Five Cross and Schmitt Roads.

3.4 BAM Site Access

The Robinson Road entrance will act as the access point for all vehicles entering and exiting the site. Staff vehicles will predominantly access the site through Waterloo Corner Road. Road Trains delivering materials from the Siviour mine and transporting to Port Adelaide will utilize the North South Motorway and Waterloo Corner Road to enter and exit the Bolivar site.

Waterloo Corner Road and Robinson Road are not gazetted for heavy vehicles, including the road trains specified for transport at this site. Tonkin has previously undertaken a Heavy Vehicle Route Assessment for Renascor to consider road upgrading between the proposed processing site at Bolivar and the Waterloo Corner Road roundabout. This is currently under review by Renascor. The current gazetted road train routes can be seen in Figure 8.

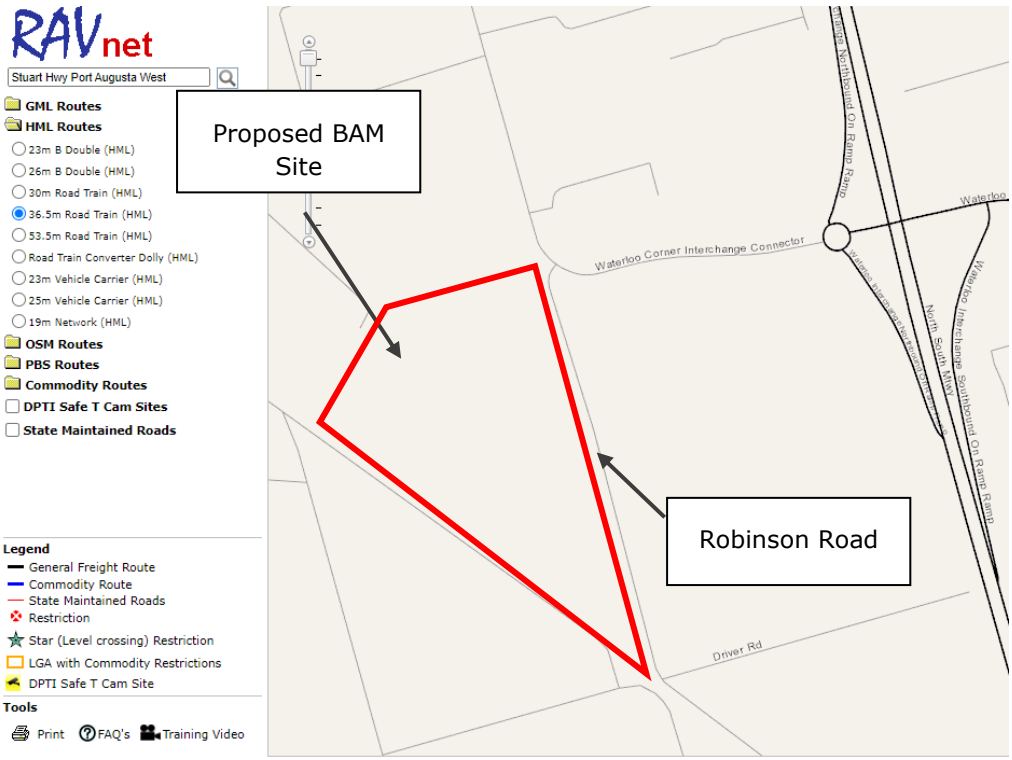


Figure 8: Approved Heavy Vehicle Routing - Bolivar Site (RAVnet)

3.5 Heavy Vehicle Route Assessment (HVRA) - Tonkin

Tonkin are currently in the final phases of completing a Heavy Vehicle Route Assessment (HVRA) for Renascor, focussed on the Robinson Road/Waterloo Corner Road intersection. Currently, the necessary sections of Waterloo Corner and Robinson are not gazetted for any PBS class of vehicle. Robinson Road is confirmed to be upgraded following the recommendations of this report. The SA Water Waste Treatment Plant also requires the movement of heavy vehicles to support truck movements to their facility

Graphite concentrates from the Siviour mine are proposed to be transported in:

- 26m B-Doubles
- 36.5m AB Triples
- and possibly 40.7m AB Triples

The report has assessed the feasibility of transporting goods using heavy vehicles through the intersection and reviewed the conditions of Waterloo Corner Road and 300 metres of Robinson Road. Tonkin conducted site reviews of the existing road pavement condition combined with analysis of volume and crash data to provide recommendations to Renascor about any potential treatments required. The assessment prioritises any risks the selected heavy vehicles could experience found within the project scope.

The HVRA identified four high risk issues associated with the condition and road width on Robinson Road. Tonkin also recommend that a trial turning assessment be undertaken using the 36.5m AB Triple and 40.7m AB triple to assess the turn path of these vehicles through the Waterloo Corner Road/ Robinson Road intersection. Five moderate risk issues were also detected along Robinson Road and Waterloo Corner Road (such as the crocodile cracking in Figure 9). Once these recommendations have been implemented, there would be no identified high or moderate risks on the Robinson Road component of the haulage route.

Figure 9: Robinson Road Existing Seal Condition

It should also be noted that the 40.7m AB Triple is a PBS Level 3B vehicle, and that currently Port Wakefield Road is not a gazetted PBS Level 3B route south of the Northern Connector/Northern Expressway interchange (Figure 10). Tonkin is currently undergoing a separate HVRA on this section of road for Level 3B vehicles.

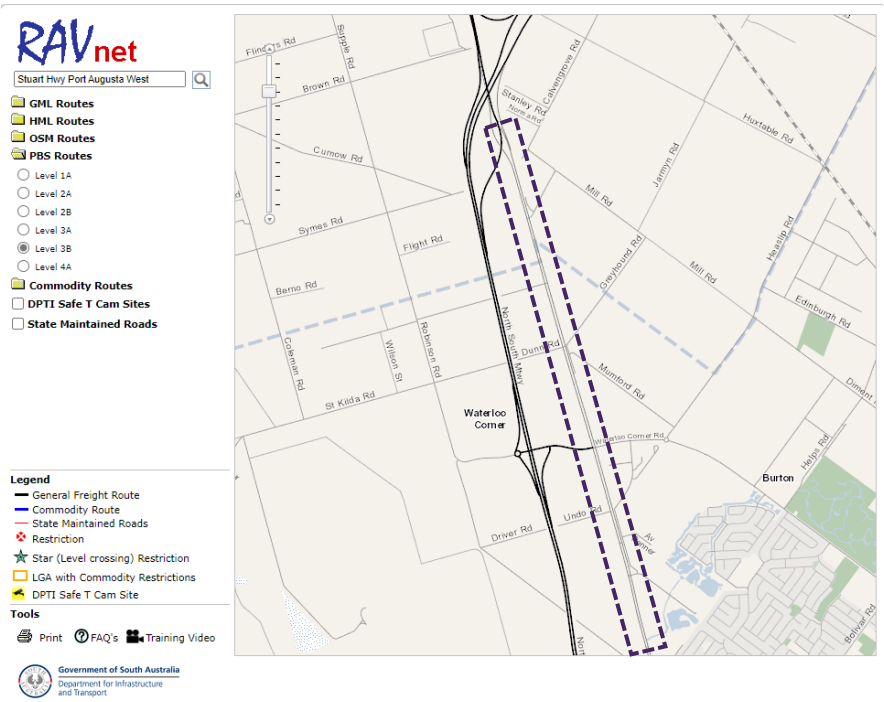


Figure 10: Bolivar Site - Approved PBS Level 3B routes (RAVnet 2022)

3.6 Bolivar to OHCT Travel Route

After the graphite has been processed, transport of "bulka bags" carrying graphite products will be completed at the OHCT facility. Renascor will then ship overseas from this port. The route will utilize the North-South Motorway, Port River Expressway and Victoria Road. All of these roads are gazetted for PBS Level 3A vehicles. These roads typically experience between 30,000 to 60,000 vehicles per day. Similar to the calculations for the journeys between Siviour and Bolivar, the increases in traffic volumes is less than 0.1% to the existing conditions.

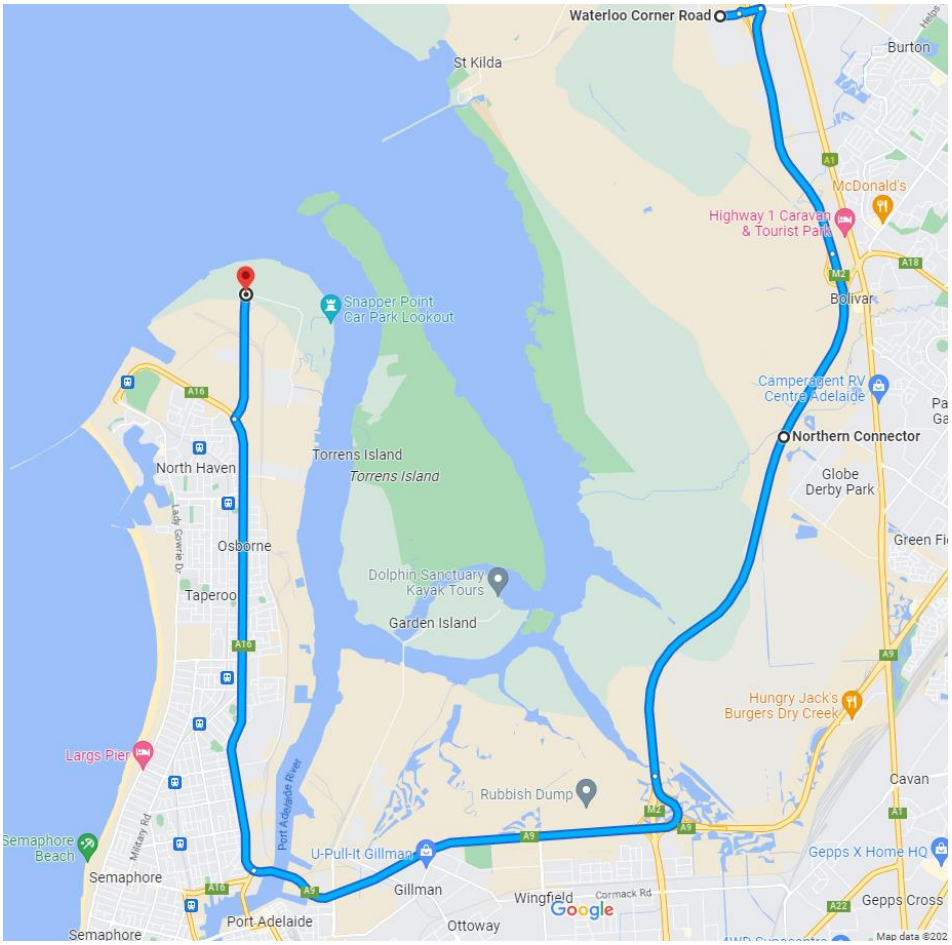


Figure 11: Bolivar to OHCT Travel Route

3.7 Carparking Requirements

The SA Planning and Design Code states that for every 100m^2 of Industry floor space, 1.5 off street carparks must be provided on the premises. However, at the conclusion of stage 2 construction the facility will contain approximately 140,000m^2 of floor space. This would translate to the facility requiring approximately 2,100 off street carparks. It is acknowledged that the number of people present at the Bolivar site during work hours is significantly lower than that. A proposed number of carparks would accommodate for the end of shift changeover, where employees from both shifts would be overlapping at the same time, plus additional carparking for visitation and miscellaneous activities.

Renascor have currently accommodated for the inclusion of 120 car parks. The final stage 2 staffing numbers across both shift times is approximated currently at 70 people. It is likely that each person will use a vehicle to travel to and from the facility. The proposed number of 120 car parks is deemed as satisfactory for the BAM facility operation. Design of the carparks will need to comply with AS2890.1 Off-Street Parking.

4 Impact Assessment

4.1 Construction – Stage 1

During the construction stage, a mixture of heavy vehicles and light vehicles will be used to transport equipment, fuel, staff, and other miscellaneous goods.

4.1.1 Daily Traffic

Daily traffic generated by the BAM site was assessed using the Feasibility Study conducted by Rensacor Resources in 2022. Within this study the estimated numbers of movements were provided for staff and equipment deliveries. This also included any miscellaneous activities on the site. This totalled an estimated eighty movements per day at the site.

A distribution analysis of the traffic entering and exiting the facility was conducted to accurately measure the number of new movements each road link would acquire. Figure 12 and Figure 13 provide a representation of the distribution split for the Bolivar site.

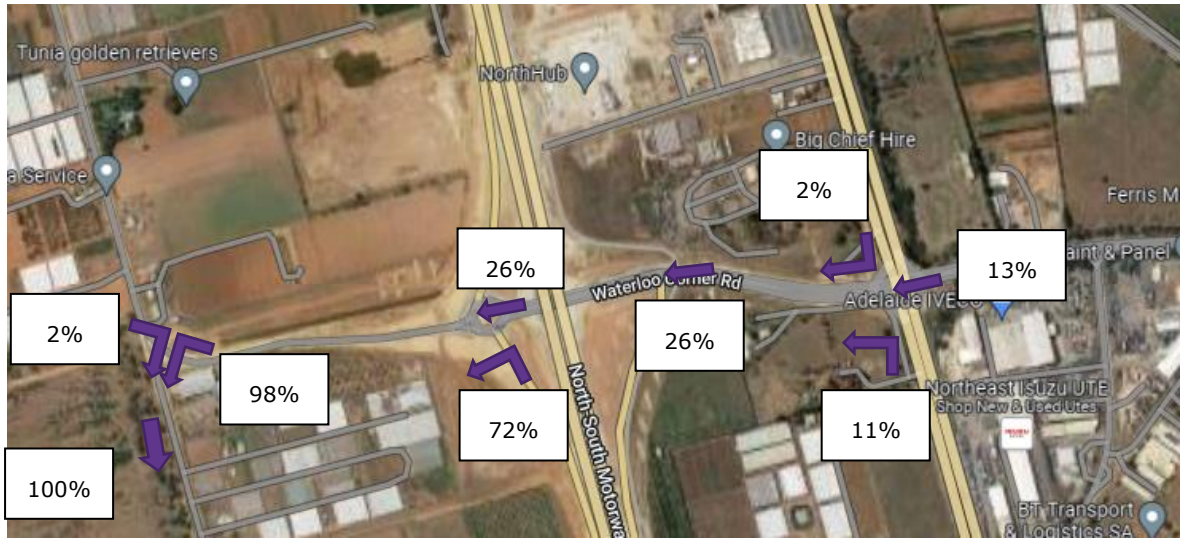


Figure 12: Estimated Distribution of Traffic - Entering Facility

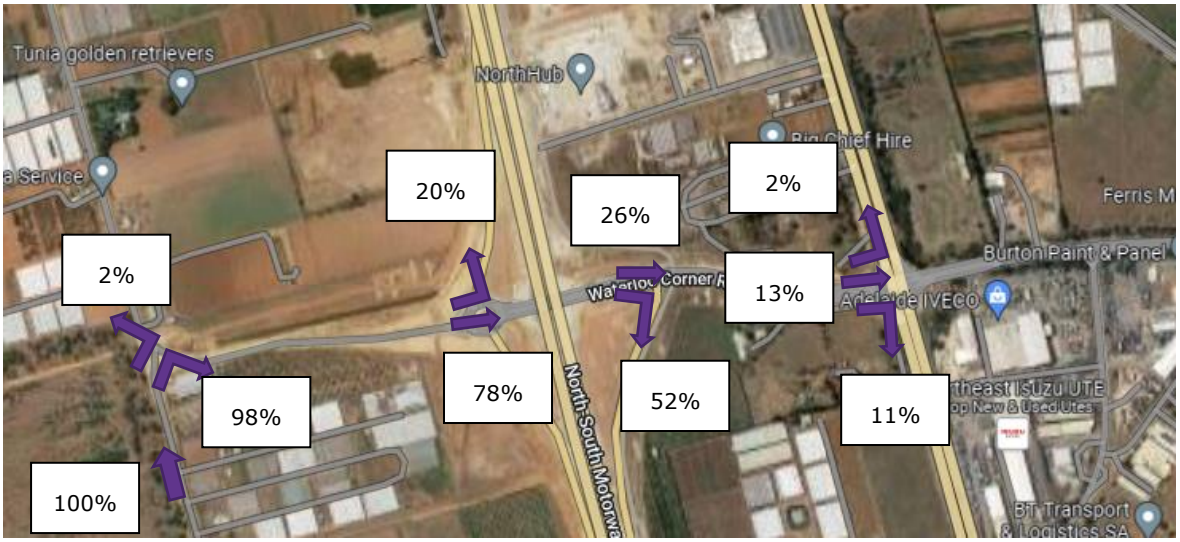


Figure 13: Estimated Distribution of Traffic - Exiting Facility

A figure of 2% was used to determine the number of movements generated from the north (Robinson Road) with the remaining 98% produced from the east (Waterloo Corner Road and North South Motorway). This figure was exclusively applied to light vehicles as the heavy vehicles are anticipated to only be travelling on arterial roads. Thus they must travel on Waterloo Corner Road. Table 5 provides a breakdown of these figures.

Table 5: Daily Movements According to Vehicle – Construction Stage

Vehicle Type	Total Daily Movements	Northern Route (Robinsons Road)	Eastern Route (Waterloo Corner Road)
Light Vehicle	74	2	72
Heavy Vehicle	6	0	6

Table 6 was used to compare the existing daily volumes of the surrounding road links to the Bolivar site. The existing daily traffic volumes on the surrounding roads were acquired from a combination of state government and local council resources. Volumes on arterial roads were obtained from state government sources (Department of Transport and DataSA). Local road volumes for links such as Robinson Road and Waterloo Corner Road were provided by the City of Salisbury. Local roads typically see volumes below 1500 vehicles per day, however Waterloo Corner Road was counted at over 2500 vehicles per day. This was irregular but not uncommon for roads directly linking to the arterial road network.

The Average Annual Daily Traffic (AADT) estimate represents the total two-way daily volume of traffic. This data was sourced from DIT. It was estimated that a majority of staff and delivery movements would be generated from the metropolitan area. A smaller proportion of movements were assigned to the east and north of the site. In all situations, a negligible increase in daily volumes was measured.

The section of Robinson Road directly connected to the site was not compared quantitatively due to the lack of volume data available. However, it was assessed that there would be no impact to the road link.

Table 6: Road Link Daily Volume Increases – Construction Stage 1

Road Link	Existing Traffic Volumes (AADT)	New Generated Volumes – Entering Facility (AADT)	New Generated Volumes – Exiting Facility (AADT)	Total Daily % Volume Increase
Robinson Road (North)	1213	1	1	0.07
Waterloo Corner Road (West Section)	2700	39	39	2.88
North-South Motorway (North Slip Lane)	750	0	16	2.13
North-South Motorway (South Slip Lanes)	3400-3700	21	21	0.59
Waterloo Corner Road (Between Motorway and Port Wakefield Rd)	6300	31	31	0.19
Waterloo Corner Road (East of Port Wakefield Road)	9600	3	3	0.06
Port Wakefield Road (North)	13400	1	1	0.02
Port Wakefield Road (South)	15800	2	2	0.03
North-South Motorway (Northbound)	25200	21	16	0.14
North-South Motorway (Southbound)	25200	0	21	0.08

4.1.2 Peak Traffic

To assess the peak traffic volumes, it was estimated that all light vehicles (employees and light deliveries) would travel at least once during this period. The heavy vehicle movements entering and exiting the facility were conservatively estimated with not all movements occurring during these times. Table 7 and Table 8 detail the movements during the peak periods.

Table 7: Peak AM Traffic (~6:30am-7:30am) – Construction Stage 1

	Entering Facility	Exiting Facility	Total
Movements	40	4	44
Light Vehicle	37	2	39
Heavy Vehicle (HV)	2 to 3	1	3 to 4
Approximate HV%	5	50	7

Table 8: Peak PM Traffic (~3:30pm-4:30pm) – Construction Stage 1

	Entering Facility	Exiting Facility	Total
Movements	2	40	42
Light Vehicle	1	37	38
Heavy Vehicle (HV)	1	2 to 3	3 to 4
Approximate HV%	50	5	7

4.2 Operational – Stage 1

Stage 1 will see 50 percent of the proposed final design begin operation. Stage 1 will utilize approximately 70 000m^2 of the 220 000m^2 site land. It will require an estimated 62 staff, 34 during the day shift and 28 during the night shift.

4.2.1 Daily Traffic

Daily traffic for the BAM site during Stage 1 was generated using the quantity of material being transported and the number of staff expected to be working on site. Calculations were performed to estimate the number of heavy vehicles needed to transport from the Siviour Mine to Bolivar, as well as the number of heavy vehicles to deliver products off site (Table 2 – Table 4).

The calculated movements numbers were compared to the values referred to in the Feasibility Study conducted by Renascor Resources. If the numbers were consistent between both sources, analysis on daily volume increases was initiated. An estimated 178 movements were calculated for Stage 1. Table 9 provides details on the daily movements from Stage 1.

Table 9: Daily Movements According to Vehicle – Stage 1 Operation

Stage 1			
Vehicle Type	**Total Daily Movements**	**Northern Route (Robinsons Road)**	**Eastern Route (Waterloo Corner Road)**
Light Vehicle	136	6	130
Heavy Vehicle	42	0	42

Similar to the construction phase, the surrounding road links to the site are likely to experience an increase in traffic during operation. The same calculated proportions for light vehicle movements were retained for this section of the report, with most movements for light vehicles directed towards the Adelaide metropolitan area.

Heavy vehicle proportions were calculated by assessing the location and destination of the trips between the Siviour Mine, Bolivar, and Port Adelaide. An assessment of the North-South Motorway volume increase was applied similar to the example used in the construction stage. Markups of the intersection peak volumes per turning movement are provided in Section 4.5.

Table 10: Road Link Daily Volume Increases – Stage 1 Operation

Road Link	Existing Traffic Volumes (AADT)	New Generated Volumes – Entering Facility (AADT)	New Generated Volumes – Exiting Facility (AADT)	Total Daily % Volume Increase
Robinson Road (North)	1213	3	3	0.50
Waterloo Corner Road (West Section)	2700	86	86	6.37
North-South Motorway (North Slip Lane)	750	0	18	2.13
North-South Motorway (South Slip Lanes)	3400-3700	48	48	3.10
Waterloo Corner Road (Between Motorway and Port Wakefield Rd)	6300	89	71	2.65
Waterloo Corner Road (East of Port Wakefield Road)	9600	12	12	0.25
Port Wakefield Road (North)	13400	26	2	0.21
Port Wakefield Road (South)	15800	11	11	0.14
North-South Motorway (Northbound)	25200	48	18	0.26
North-South Motorway (Southbound)	25200	0	48	0.19

4.2.2 Peak Traffic

The peak traffic period for Stage 1 operation was determined by estimating that all staff members would travel during this time and a limited amount of heavy vehicle movement would occur. Workers typically would work 12-hour shifts either side of 7am and 7pm. This translated to a peak period between 6:30 and 7:30 for both am and pm times.

Most heavy vehicle deliveries or off-site movements at Bolivar were expected to occur in the daytime shift, with a minimal number of movements occurring during the peak times.

The site would likely experience significant amounts of the light vehicle movement to occur in two intervals either side of 7am/pm as staff arrive and leave their shifts. Tables 11-12 provide information on the predicted peak movements.

Table 11: Peak AM Traffic Movements (~6:30am-7:30am) –Stage 1 Operation

	Entering Facility	Exiting Facility	Total
Movements	39-42	25-26	64-68
Light Vehicle	38-39	24-25	62-64
Heavy Vehicle (HV)	1-4	1-2	2-6
Approximate HV%	5	4	5

Table 12: Peak PM Traffic Movements (~6:30pm-7:30pm) – Stage 1 Operation

	Entering Facility	Exiting Facility	Total
Movements	25-26	39-42	64-68
Light Vehicle	24-25	38-39	62-64
Heavy Vehicle (HV)	1-2	1-4	2-6
Approximate HV%	4	5	5

4.3 Stage 1 Operational and Stage 2 Construction Phase

There will be a period during Stage 1 operation where the Stage 2 construction phase will begin. This will result in further traffic on site during the day shift. No construction is expected to continue during the night shift.

4.3.1 Daily Traffic

Daily traffic for the BAM site during Stage 1 Operational and Stage 2 Construction was calculated by adding the movements of Stage 1 Operational and Construction Stage 1 phase together. It is currently assumed that the number of vehicles required for the construction of Stage 2 facilities will remain the same as what was required during Stage 1 construction. An estimated 258 daily movements were calculated for Stage 1 Operational/Stage 2 Construction. Table 13 provides details on the daily movements from this stage.

Table 13: Daily Movements According to Vehicle – Stage 1 Operational/Stage 2 Construction

Stage 1			
Vehicle Type	**Total Daily Movements**	**Northern Route (Robinsons Road)**	**Eastern Route (Waterloo Corner Road)**
Light Vehicle	210	8	202
Heavy Vehicle	48	0	48

Similar to the construction and operational phases, the surrounding road links to the site are likely to experience an increase in traffic. The same calculated proportions for light vehicle movements were retained for this section of the report, with most movements for light vehicles directed towards the Adelaide metropolitan area.

Heavy vehicle proportions were calculated by assessing the location and destination of the trips between the Siviour Mine, Bolivar, and Port Adelaide. An assessment of the North-South Motorway volume increase was applied similar to the example used in previous stages.

Table 14: Road Link Daily Volume Increases – Stage 1 Operational/Stage 2 Construction

Road Link	Existing Traffic Volumes (AADT)	New Generated Volumes – Entering Facility (AADT)	New Generated Volumes – Exiting Facility (AADT)	Total Daily % Volume Increase
Robinson Road (North)	1213	4	4	0.66
Waterloo Corner Road (West Section)	2700	125	125	9.26
North-South Motorway (North Slip Lane)	750	0	34	4.53
North-South Motorway (South Slip Lanes)	3400-3700	69	69	3.89
Waterloo Corner Road (Between Motorway and Port Wakefield Rd)	6300	120	120	3.81
Waterloo Corner Road (East of Port Wakefield Road)	9600	15	15	0.31
Port Wakefield Road (North)	13400	27	3	0.22
Port Wakefield Road (South)	15800	13	13	0.16
North-South Motorway (Northbound)	25200	69	34	0.41
North-South Motorway (Southbound)	25200	0	69	0.27

4.3.2 Peak Traffic

The peak traffic period for Stage 1 Operational/Stage 2 Construction was determined by estimating that all staff members, heavy vehicles and construction workers would travel during this time and a limited amount of heavy vehicle movement would occur. Workers typically would work 12-hour shifts either side of 7am and 7pm. This translated to a peak period between 6:30 and 7:30 for both am and pm times.

Heavy vehicle deliveries or off-site movements at Bolivar were expected to occur exclusively in the daytime shift, with a minimal number of movements occurring during the peak times.

The site would likely experience significant amounts of the light vehicle movement to occur in two intervals either side of 7am/pm as staff arrive and leave their shifts. Tables 15-16 provide information on the predicted peak movements.

To test for a worst-case scenario, it was assumed that all facility workers and construction workers would arrive and depart during the peak periods. It is very likely that the construction workers would start closer to 6am and finish closer to 4pm, as stated in Section 4.1. This would produce 2 small peaks during the am and pm times. However, if an analysis of the combined number of workers during this stage does not affect the road network (2 larger peaks), then iteratively, the likely scenario of 4 smaller peaks would pass as well.

Stage 1 Operation/Stage 2 Construction was identified as the busiest stage of the project.

Table 15: Peak AM Traffic Movements (~6:30am-7:30am) – Stage 1 Operational/Stage 2 Construction

	Entering Facility	Exiting Facility	Total
Movements	78-82	28-30	106-112
Light Vehicle	75-76	26-27	101-103
Heavy Vehicle (HV)	3-6	2-3	5-9
Approximate HV%	6	7	7

Table 16: Peak PM Traffic Movements (~6:30pm-7:30pm) – Stage 1 Operational/Stage 2 Construction

	Entering Facility	Exiting Facility	Total
Movements	28-30	78-82	106-110
Light Vehicle	26-27	75-76	100-102
Heavy Vehicle (HV)	2-3	3-6	5-9
Approximate HV%	7	6	7

4.4 Operational – Stage 2

Stage 2 will double production within the site, with the facilities in stage 1 duplicated on site. This will result in a further 70 000m^2 of the site being utilized. This new site will double the heavy vehicle movements for Stage 2. The movements of staff will also increase by approximately 35% for Stage 2. Stage 2 operations are currently anticipated to begin between 2027-2030.

4.4.1 Daily Traffic

Daily traffic for the BAM site during Stage 2 operation was generated using the same processes described in Stage 1. The calculated movements numbers were compared to the values referred to in the Feasibility Study conducted by Renascor Resources. If the numbers were consistent between both sources, analysis on daily volume increases was initiated. An estimated 238 daily movements were calculated for Stage 2.

Table 17: Daily Movements According to Vehicle - Stage 2 Operational

Stage 2			
Vehicle Type	**Total Daily Movements**	**Northern Route (Robinsons Road)**	**Eastern Route (Waterloo Corner Road)**
Light Vehicle	154	8	146
Heavy Vehicle	84	0	84

Similar to both previous stages, the surrounding road links to the site were assessed and are likely to experience an increase in traffic.

Small volume increases were noted on all road links; however the increases were still deemed unimpactful to the network. Markups of the intersection peak volumes per turning movement are provided in Section 4.4.

Table 18: Road Link Daily Volume Increases - Stage 2 Operational

Road Link	Existing Traffic Volumes (AADT)	New Generated Volumes – Entering Facility (AADT)	New Generated Volumes – Exiting Facility (AADT)	Total Daily % Volume Increase
Robinson Road (North)	1213	4	4	0.65
Waterloo Corner Road (West Section)	2700	115	115	8.51
North-South Motorway (North Slip Lane)	750	0	24	3.07
North-South Motorway (South Slip Lanes)	3400-3700	68	68	3.83
Waterloo Corner Road (Between Motorway and Port Wakefield Rd)	6300	127	103	3.65
Waterloo Corner Road (East of Port Wakefield Road)	9600	18	18	0.38
Port Wakefield Road (North)	13400	27	3	0.29
Port Wakefield Road (South)	15800	15	15	0.18
North-South Motorway (Northbound)	25200	68	24	0.36
North-South Motorway (Southbound)	25200	0	68	0.27

4.4.2 Peak Traffic

The peak traffic period for Stage 2 operation was determine using the same processes in Stage 1. Worker times remained as 12-hour shifts either side of 7am and 7pm. This translated to a peak period between 6:30 and 7:30 for both am and pm times.

Most heavy vehicle deliveries or off-site movements at Bolivar were expected to occur in the daytime shift, with a minimal number of movements occurring during the peak times.

The site would likely experience significant amounts of the light vehicle movement to occur in two intervals either side of 7am/pm as staff arrive and leave their shifts. Tables 19-20 provide information on the predicted peak movements.

Table 19: Peak AM Traffic Movements (~6:30am-7:30pm) - Stage 2 Operational

	Entering Facility	Exiting Facility	Total
Movements	43-46	29-30	72-76
Light Vehicle	42-43	28-29	70-72
Heavy Vehicle	1-4	1-2	2-6
Approximate HV%	5	4	4

Table 20: Peak PM Traffic Movements (~6:30pm-7:30pm) – Stage 2 Operational

	Entering Facility	Exiting Facility	Total
Movements	29-30	43-46	72-76
Light Vehicle	28-29	42-43	70-72
Heavy Vehicle	1-2	1-4	2-6
Approximate HV%	4	5	4

4.5 Key Intersection Impacts

This section provides details on the individual turning volumes for each of the key intersections. The existing and estimated future volumes are provided for the am and pm peaks. In all situations, the proposed site peak period of 6:30-7:30 am and pm was combined with the existing volumes during those periods.

The volume counts for the Robinson Road-Waterloo Corner Road intersection were unavailable for this assessment. An estimation based on road link volume counts was created to fill this gap.

Figures 13 to 36 provide the existing and future peak traffic volumes for each key intersection. The figures provide further information on the expected increase of peak volume within Stage 1, Stage 1 Operational/Stage 2 Construction and Stage 2 operations. Appendix B provides the intersection turning counts used to create the diagrams in this section. The vehicle turning movement survey created by DIT were also used to target the required peak periods.

Two intersections were identified with the potential for increased peak traffic delay. The volume increases at Robinson Road/Waterloo corner (Robinson south approach right-turn) and Waterloo Corner Road/North-South Motorway (west approach right turn) were both identified as potentially impactful. This was due to them both containing unsignalized sign control with give way/stop signs.

A SIDRA Intersection 9.1 analysis was conducted on both intersections to check for significant increases in delay. In all scenarios, delays increased by less than 3 seconds and remained less than a total of 15 seconds for the movement. A Level of Service of A was produced for all legs of the intersection. This was sampled as an indication the new traffic generated entering and exiting the Bolivar site would not weaken the performance of the nearby intersections.

4.5.1 Robinson Road/Waterloo Corner Road

4.5.1.1 Stage 1 Operational

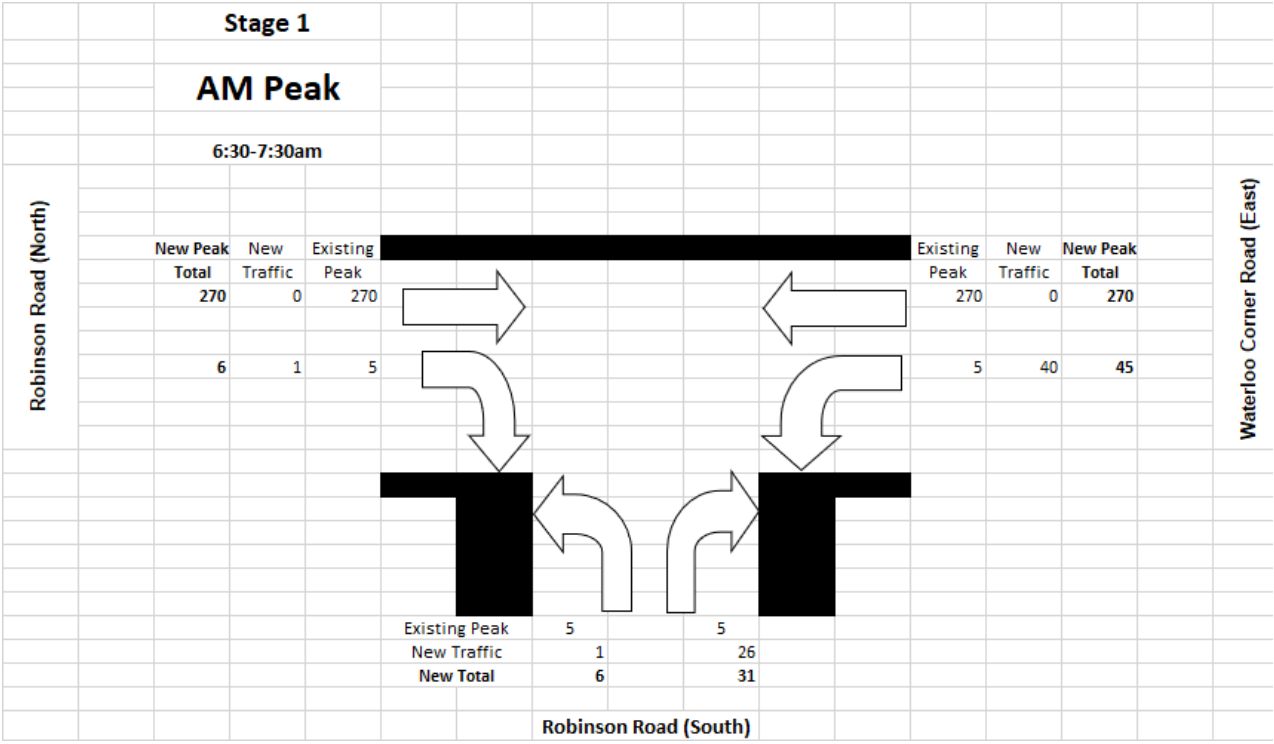


Figure 14: Robinson Rd/Waterloo Cnr Rd AM Peak - Stage 1 Operational

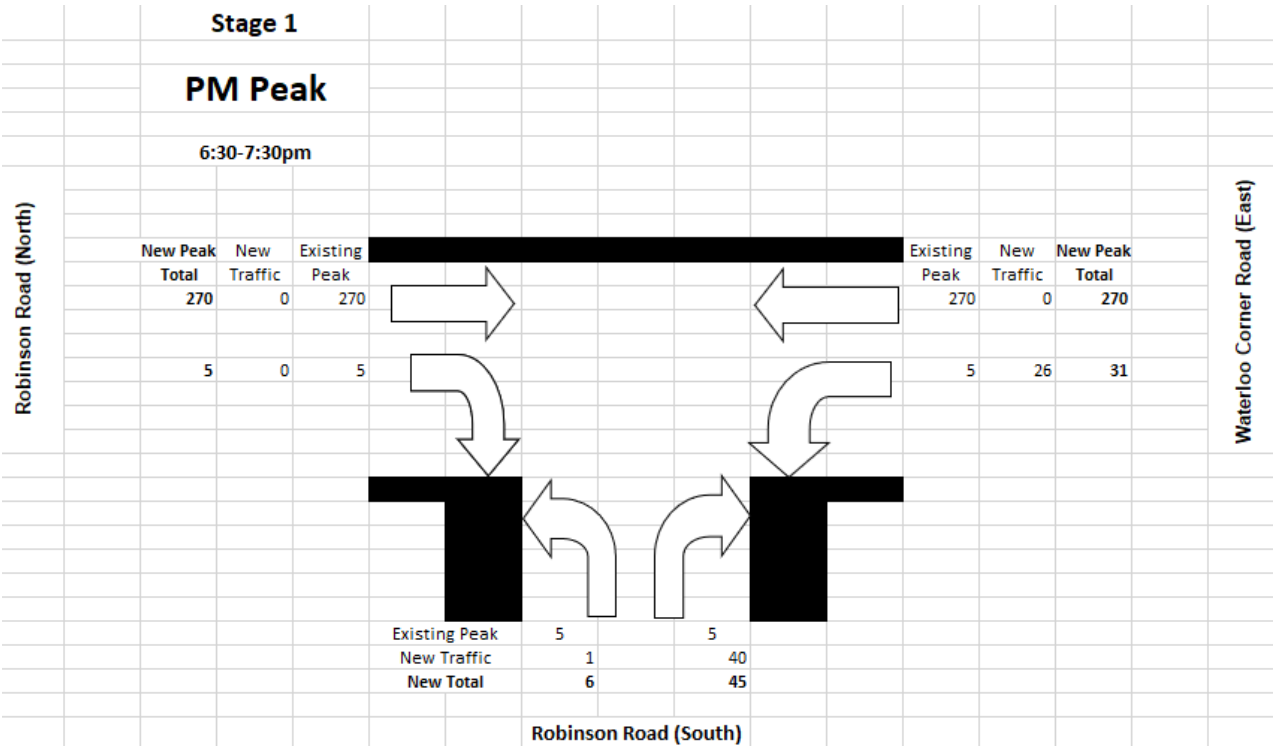


Figure 15: Robinson Rd/Waterloo Cnr Rd PM Peak - Stage 1 Operational

4.5.1.2 Stage 1 Operational/Stage 2 Construction

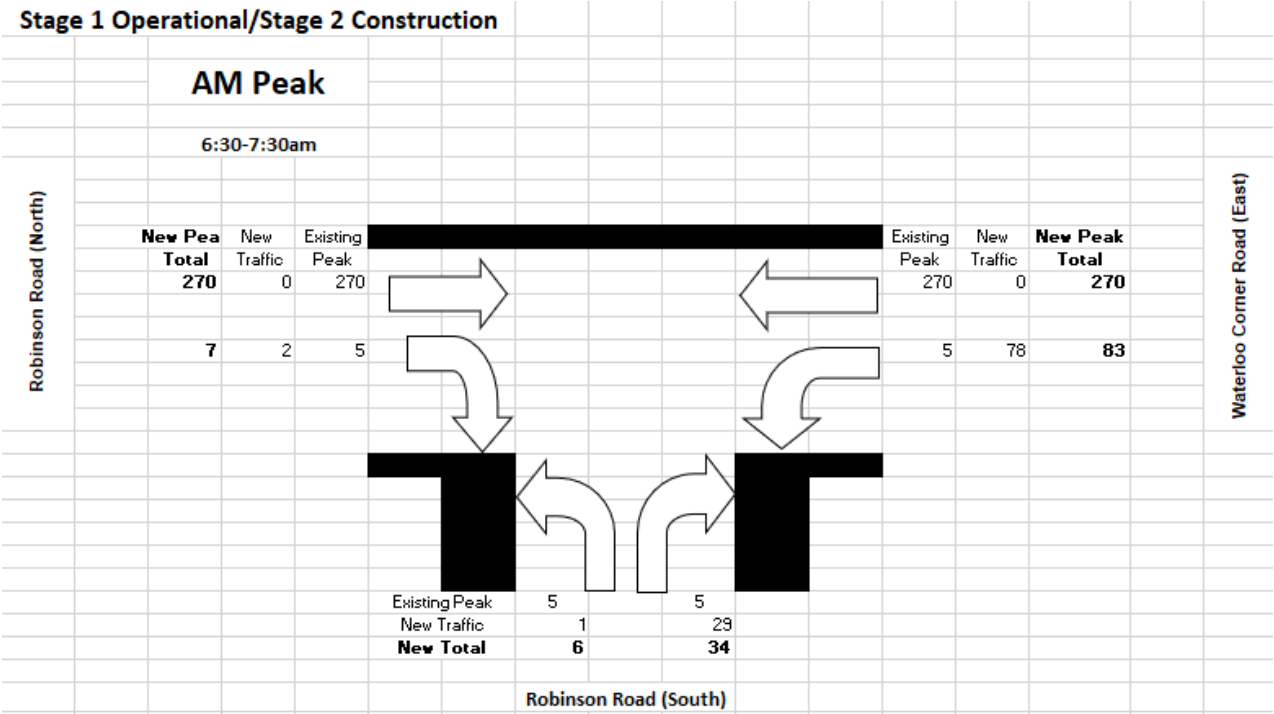


Figure 16: Robinson Rd/Waterloo Cnr Rd AM Peak - Stage 1 Operational/Stage 2 Construction

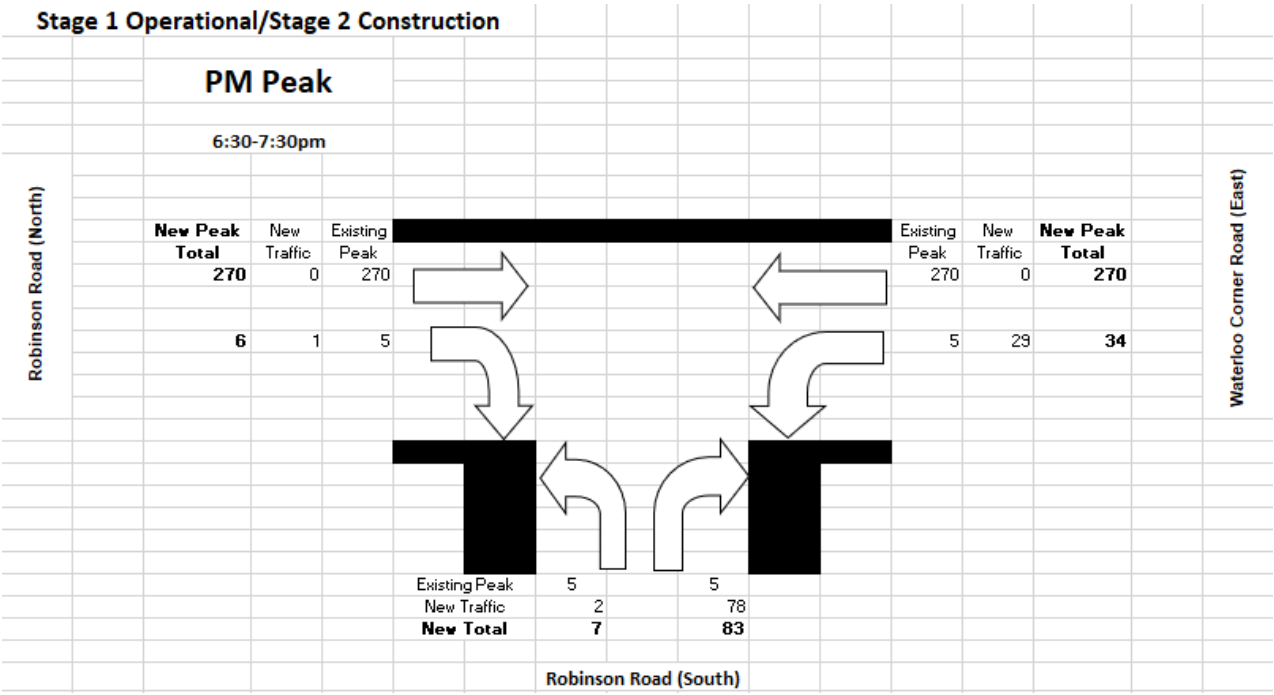


Figure 17: Robinson Rd/Waterloo Cnr Rd PM Peak - Stage 1 Operational/Stage 2 Construction

4.5.1.3 Stage 2 Operational

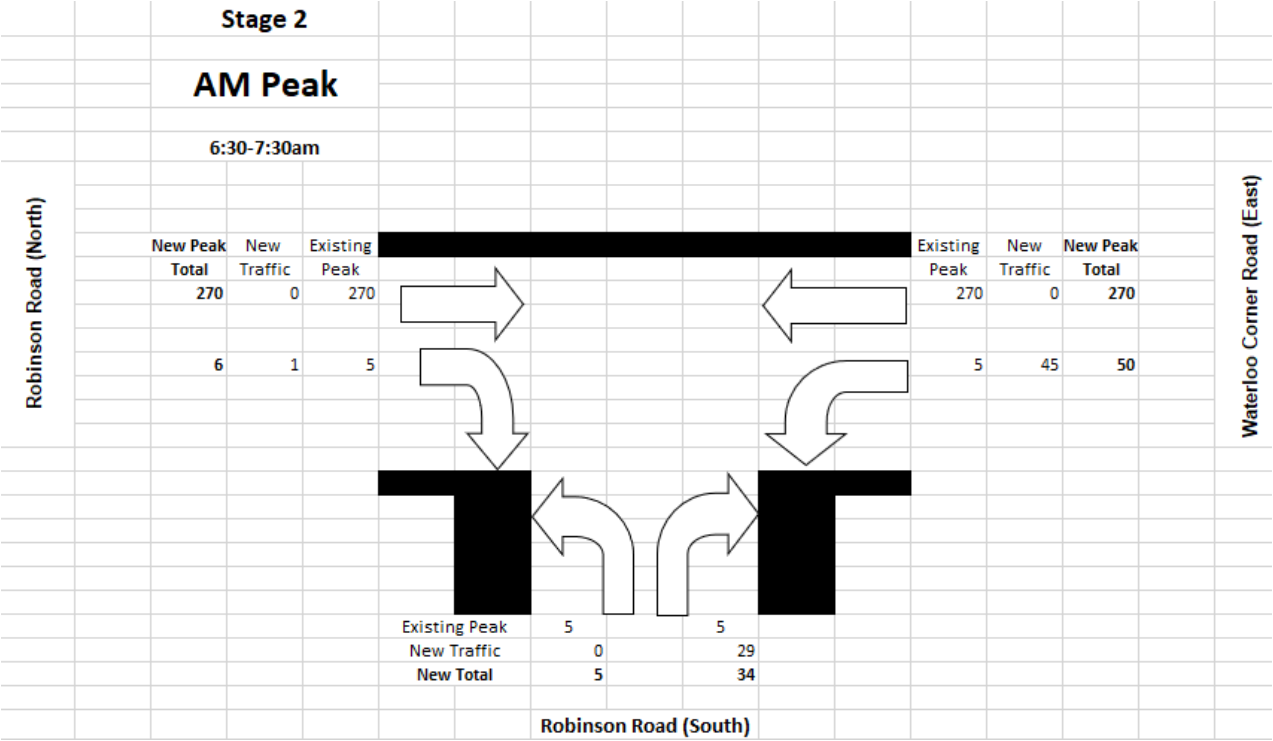


Figure 18: Robinson Rd/Waterloo Cnr Rd AM Peak - Stage 2 Operational

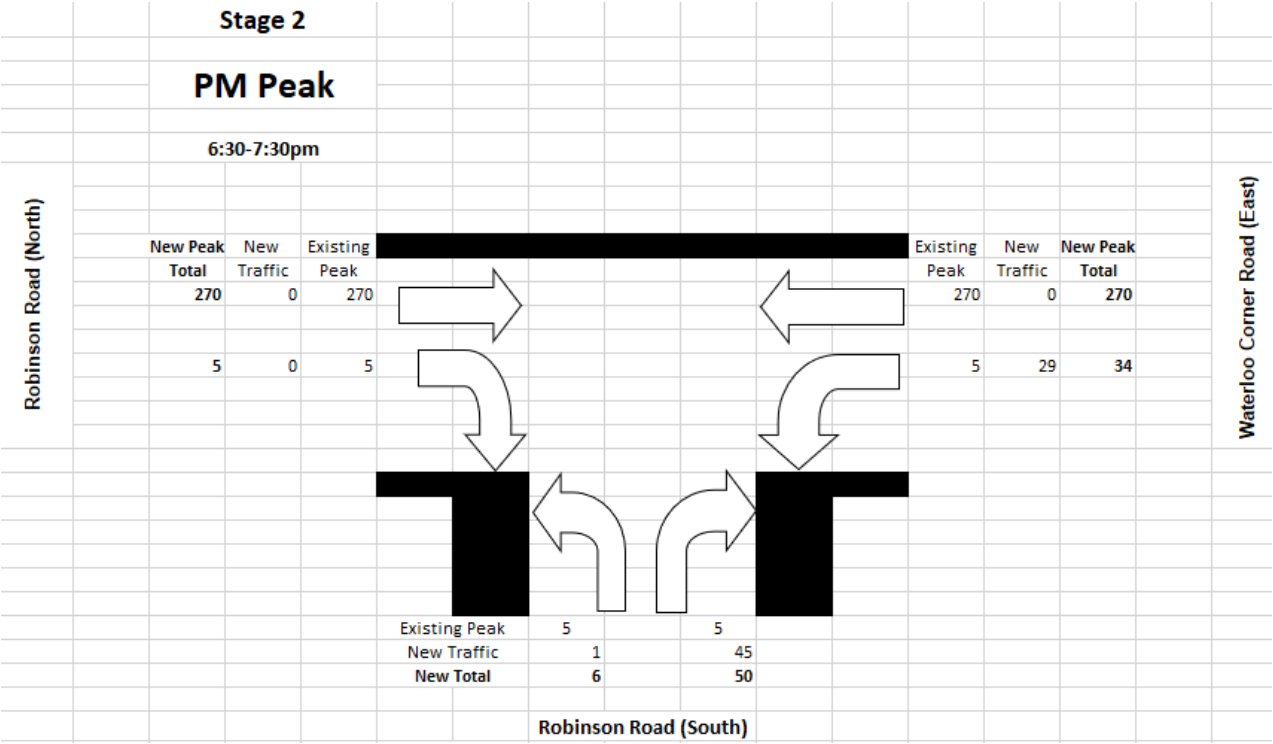


Figure 19: Robinson Rd/Waterloo Cnr Rd PM Peak - Stage 2 Operational

4.5.2 Waterloo Corner Road Roundabout

4.5.2.1 Stage 1 Operational

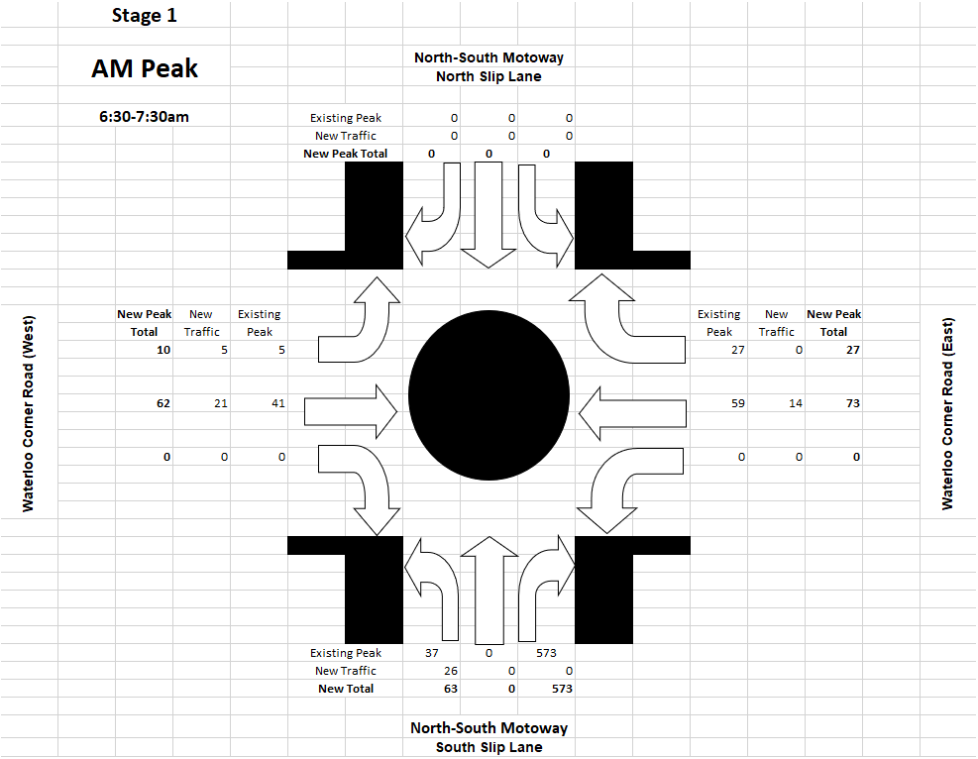


Figure 20: Waterloo Cnr Rd/North-South Motorway Slip Lanes AM Peak – Stage 1 Operational

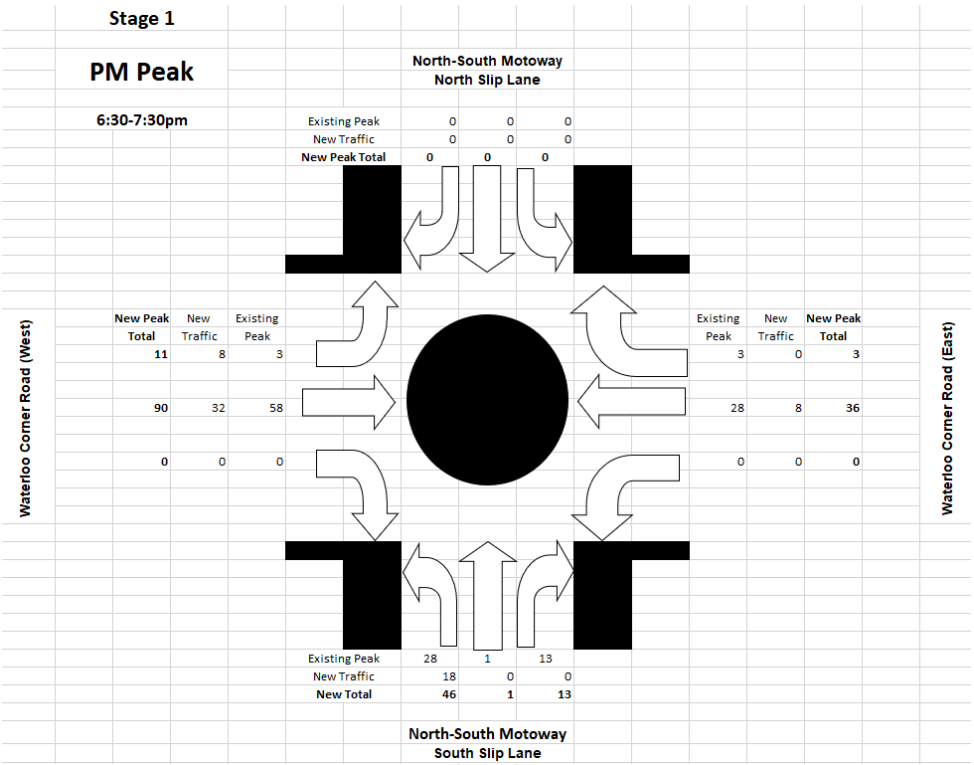


Figure 21: Waterloo Cnr Rd/North-South Motorway Slip Lanes PM Peak – Stage 1 Operational

4.5.2.2 Stage 1 Operational/Stage 2 Construction

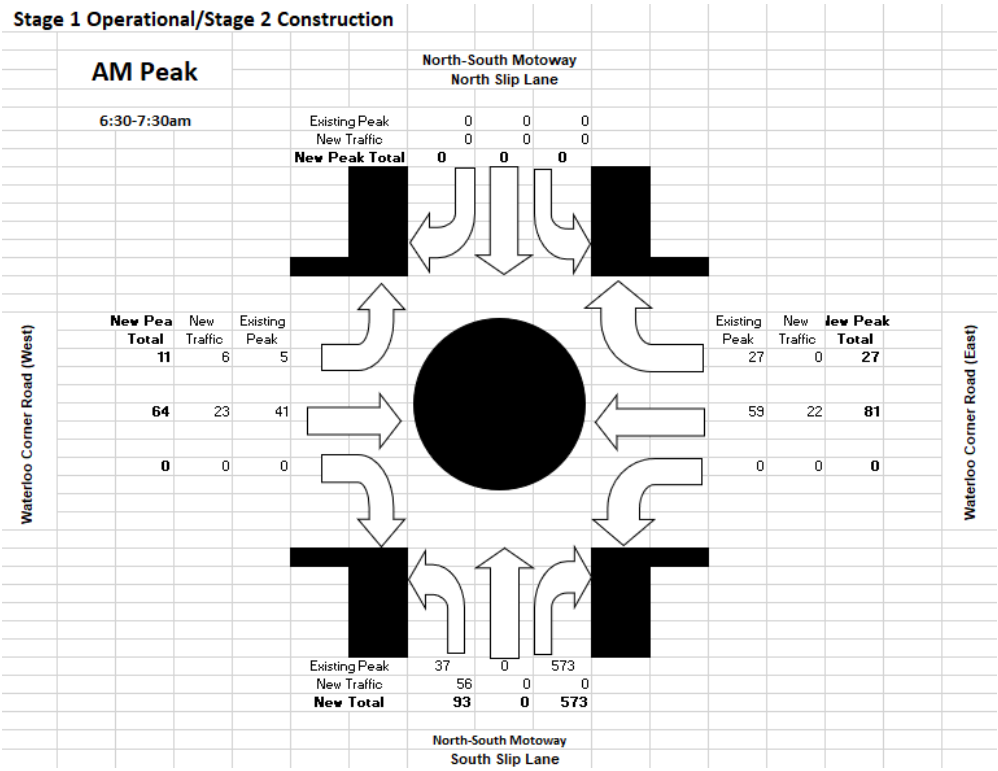


Figure 22: Waterloo Cnr Rd/North-South Motorway Slip Lanes AM Peak – Stage 1 Operational/Stage 2 Construction

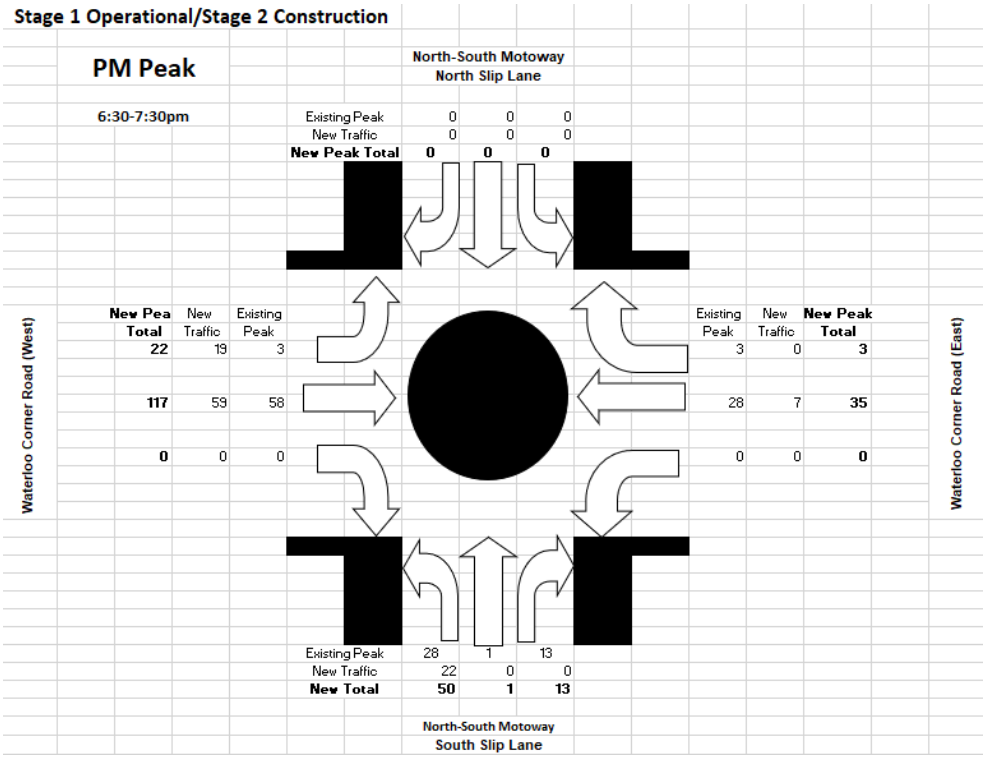


Figure 23: Waterloo Cnr Rd/North-South Motorway Slip Lanes PM Peak – Stage 1 Operational/Stage 2 Construction

4.5.2.3 Stage 2 Operational

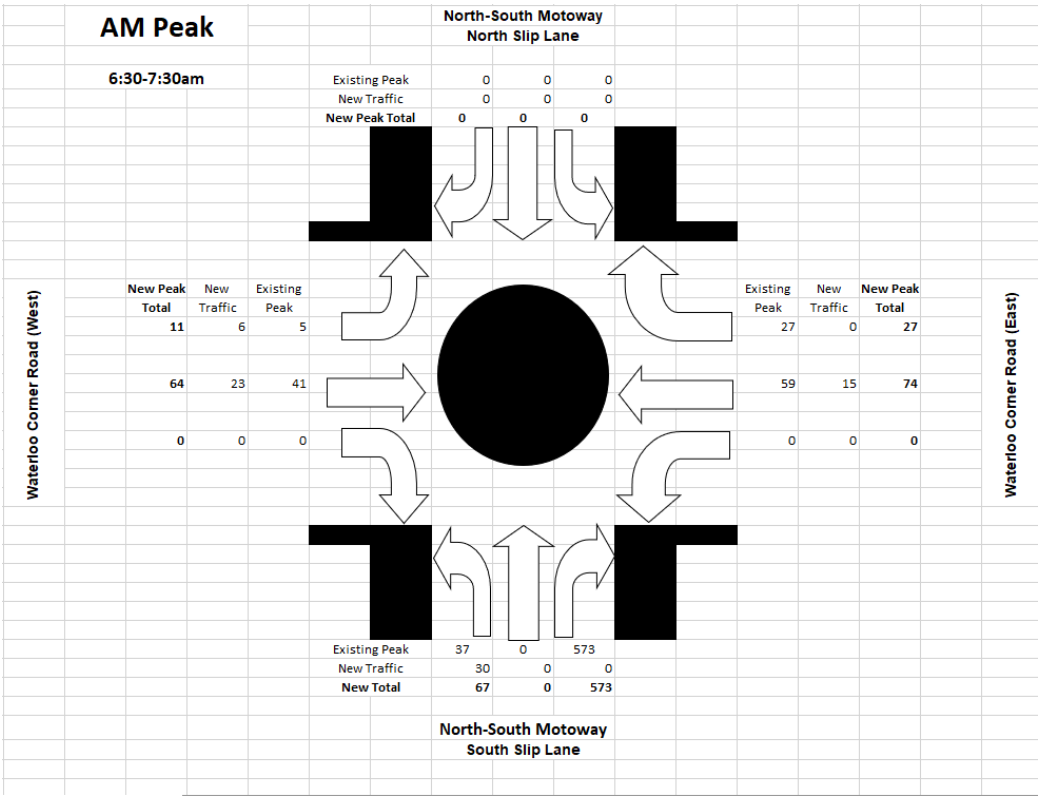


Figure 24: Waterloo Cnr Rd/North-South Motorway Slip Lanes AM Peak – Stage 2 Operational

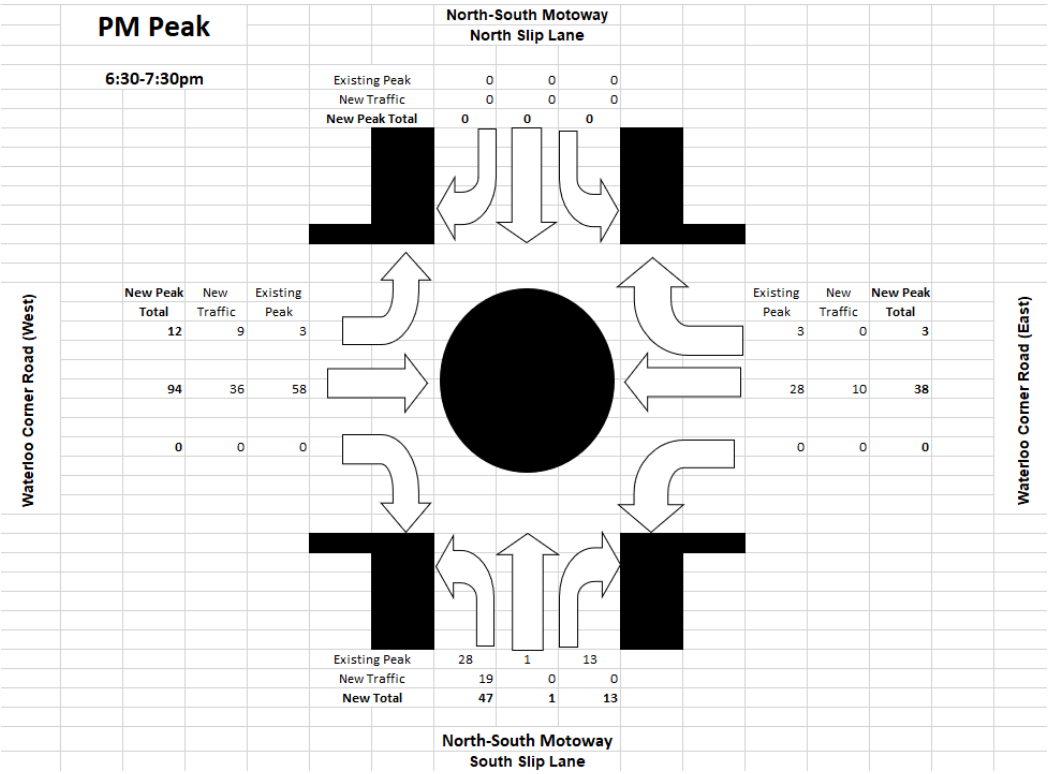


Figure 25: Waterloo Cnr Rd/North-South Motorway Slip Lanes PM Peak – Stage 2 Operational

4.5.3 Waterloo Corner Road/North-South Motorway Slip Lane (South)

4.5.3.1 Stage 1 Operational

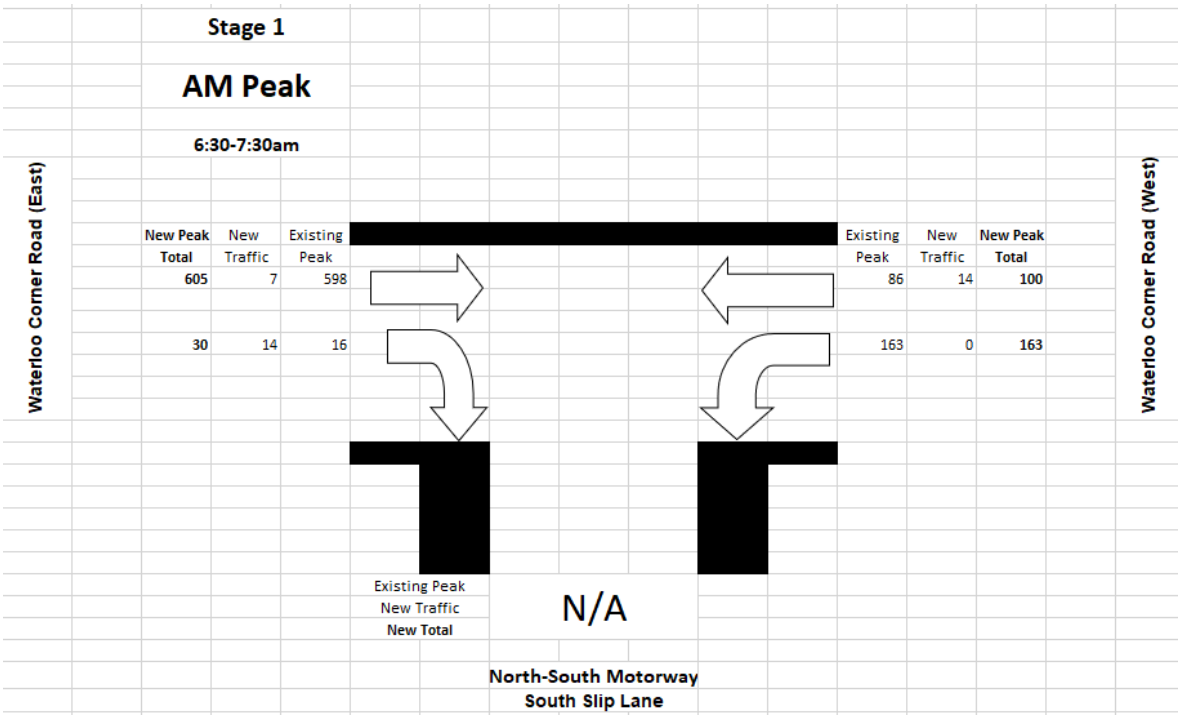


Figure 26: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) AM Peak - Stage 1 Operational

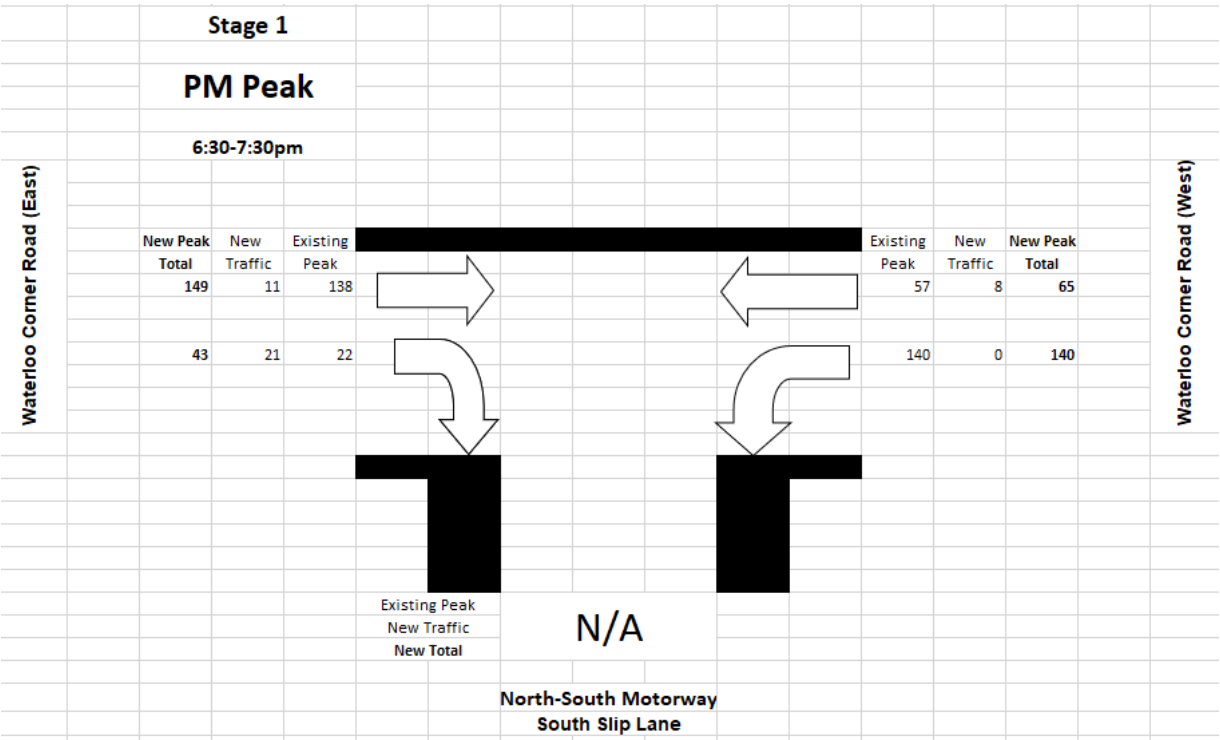


Figure 27: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) PM Peak - Stage 1 Operational

4.5.3.2 Stage 1 Operational/Stage 2 Construction

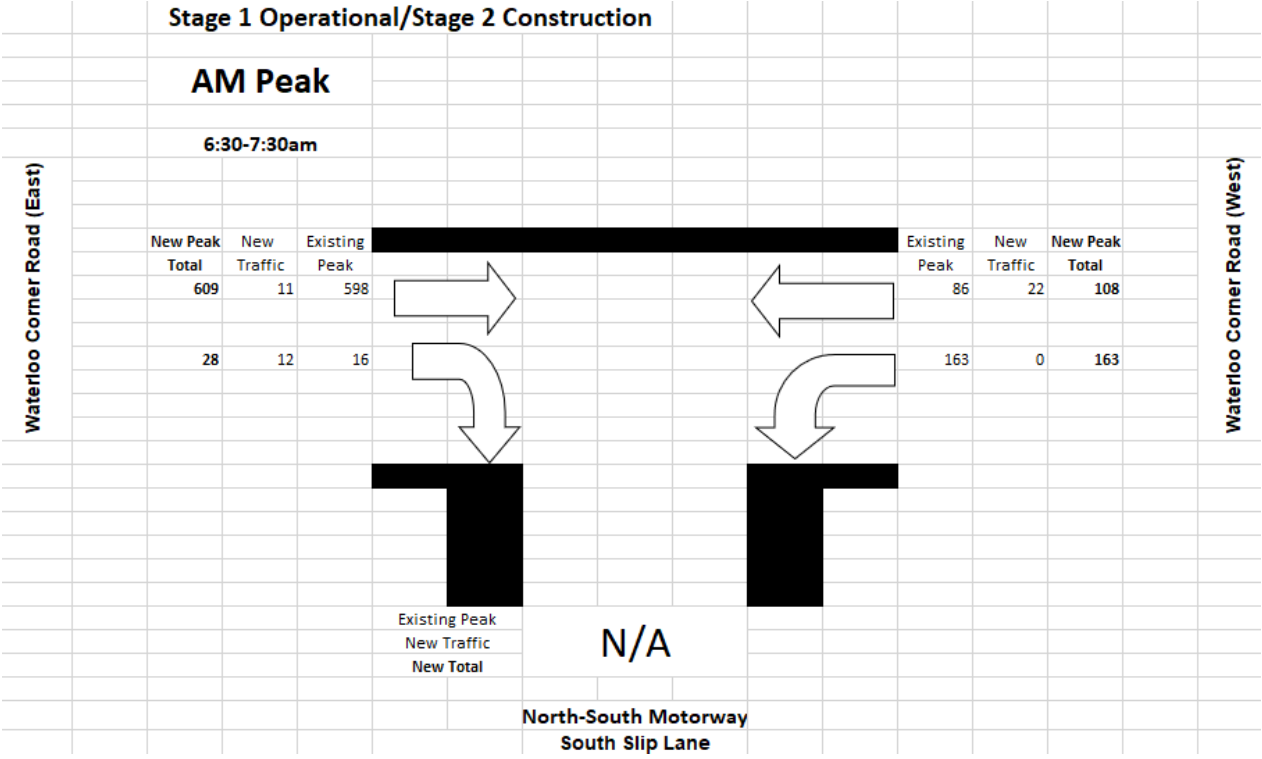


Figure 28: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) AM Peak - Stage 1 Operational/Stage 2 Construction

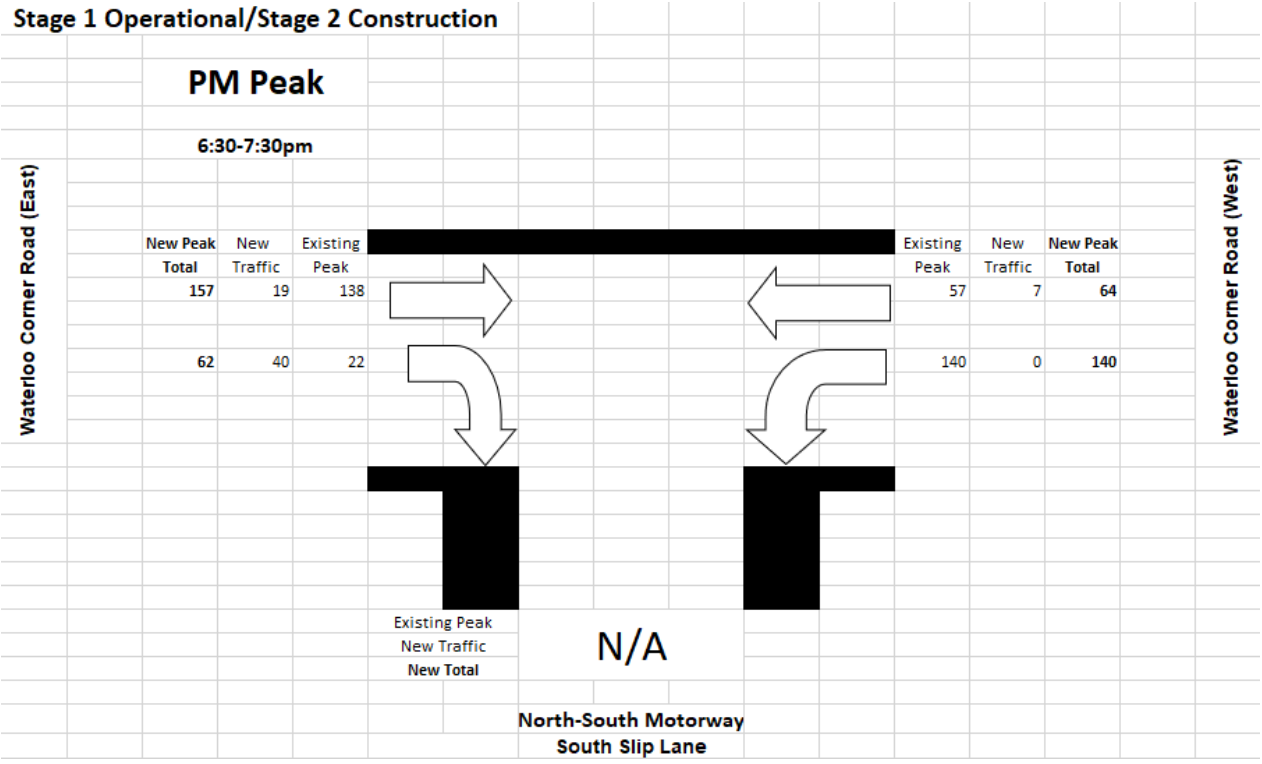


Figure 29: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) PM Peak - Stage 1 Operational/Stage 2 Construction

4.5.3.3 Stage 2 Operational

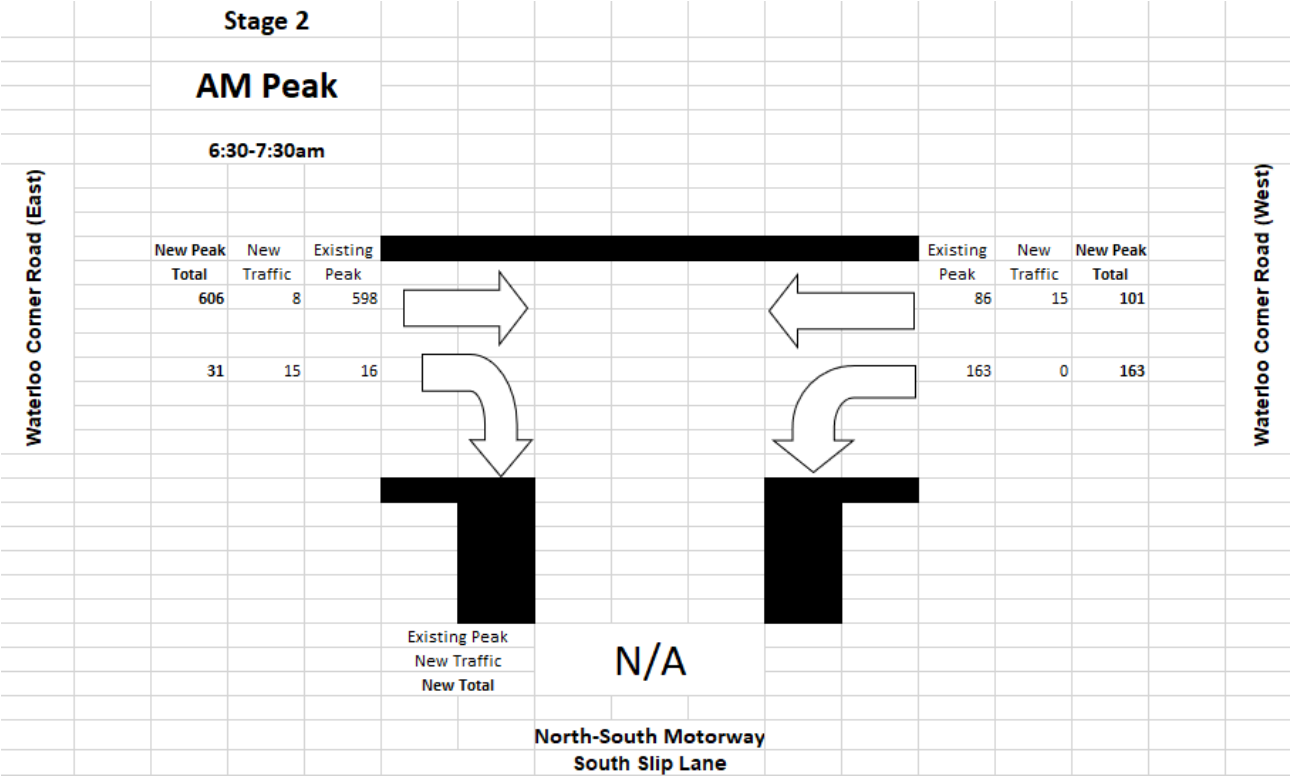


Figure 30: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) AM Peak - Stage 2 Operational

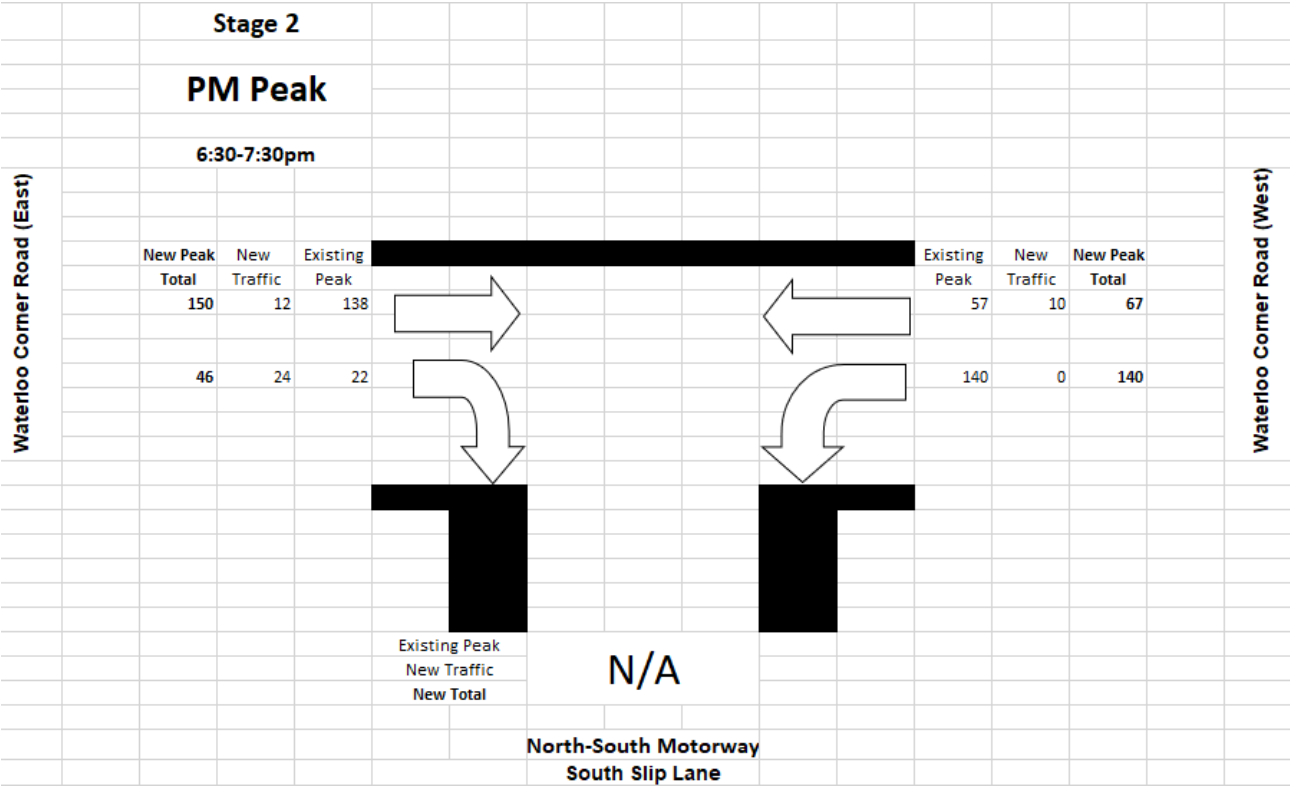


Figure 31: Waterloo Cnr Rd/North-South Motorway Slip Lane (South) PM Peak - Stage 2 Operational

4.5.4 Port Wakefield Road/Waterloo Corner Road

4.5.4.1 Stage 1 Operational

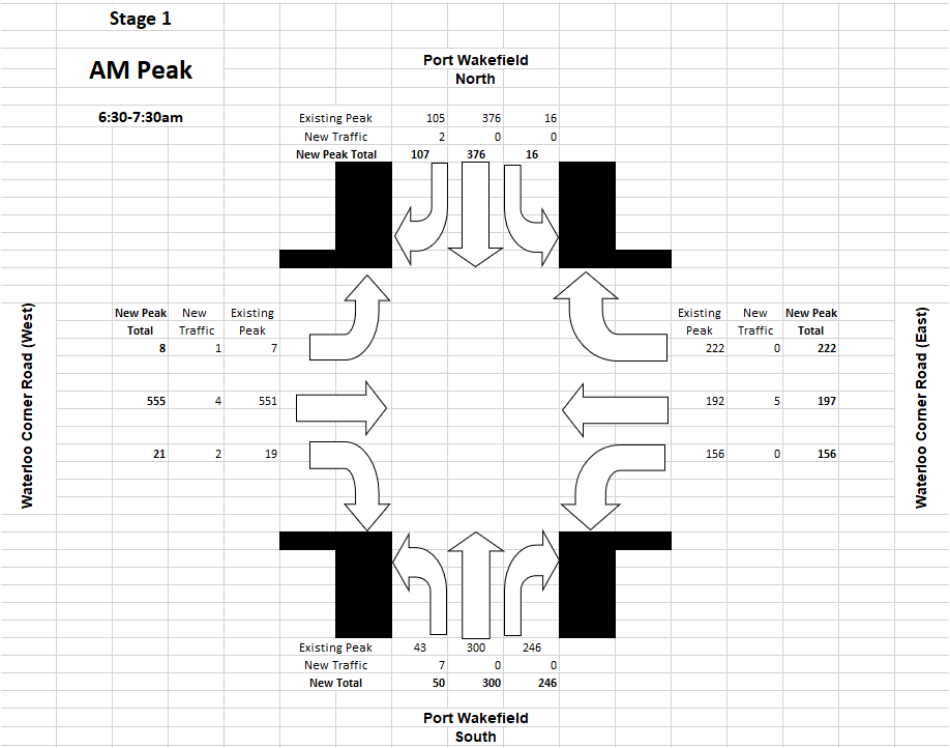


Figure 32: Port Wakefield Road/Waterloo Corner Road AM Peak - Stage 1 Operational

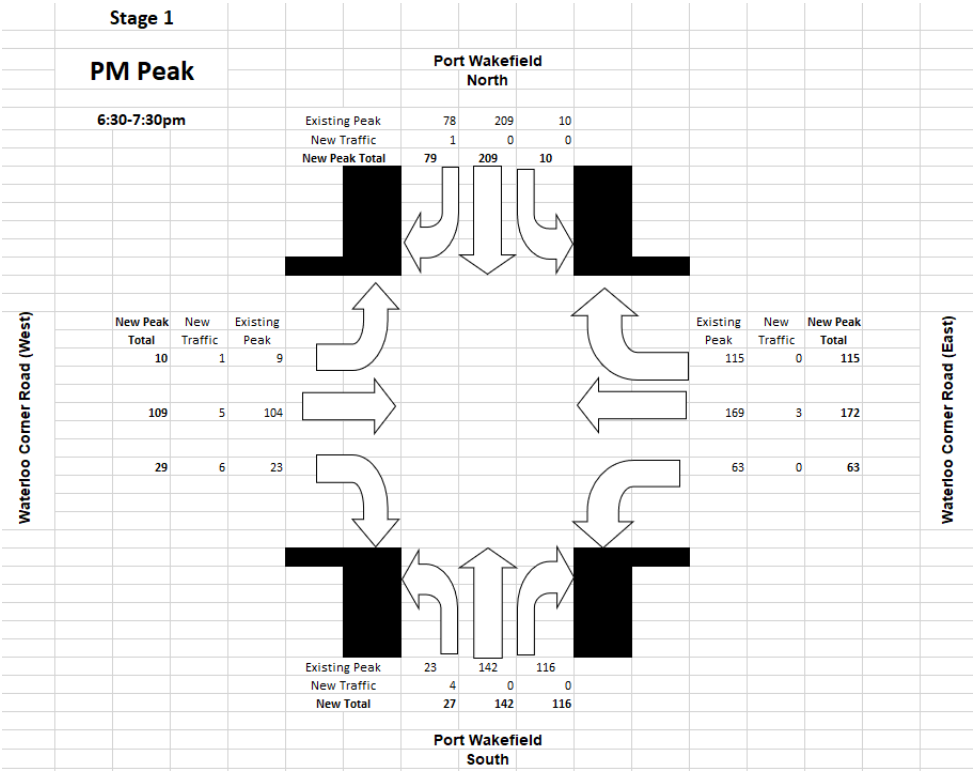


Figure 33: Port Wakefield Road/Waterloo Corner Road PM Peak - Stage 1 Operational

4.5.4.2 Stage 1 Operational/Stage 2 Construction

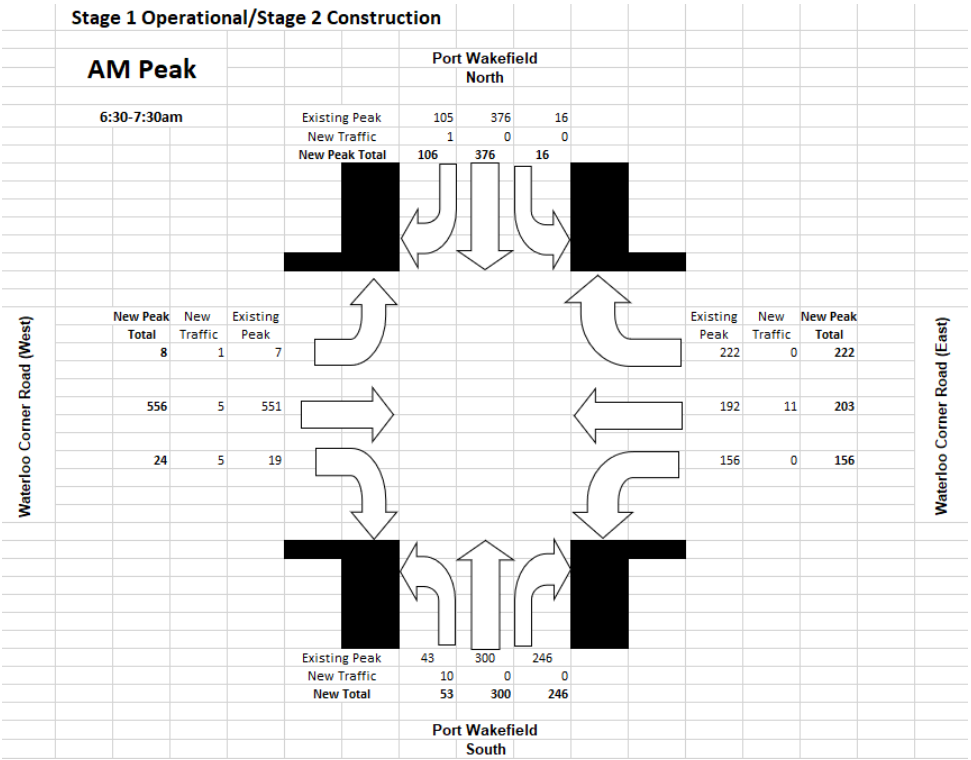


Figure 34: Port Wakefield Road/Waterloo Corner Road AM Peak - Stage 1 Operational/Stage 2 Construction

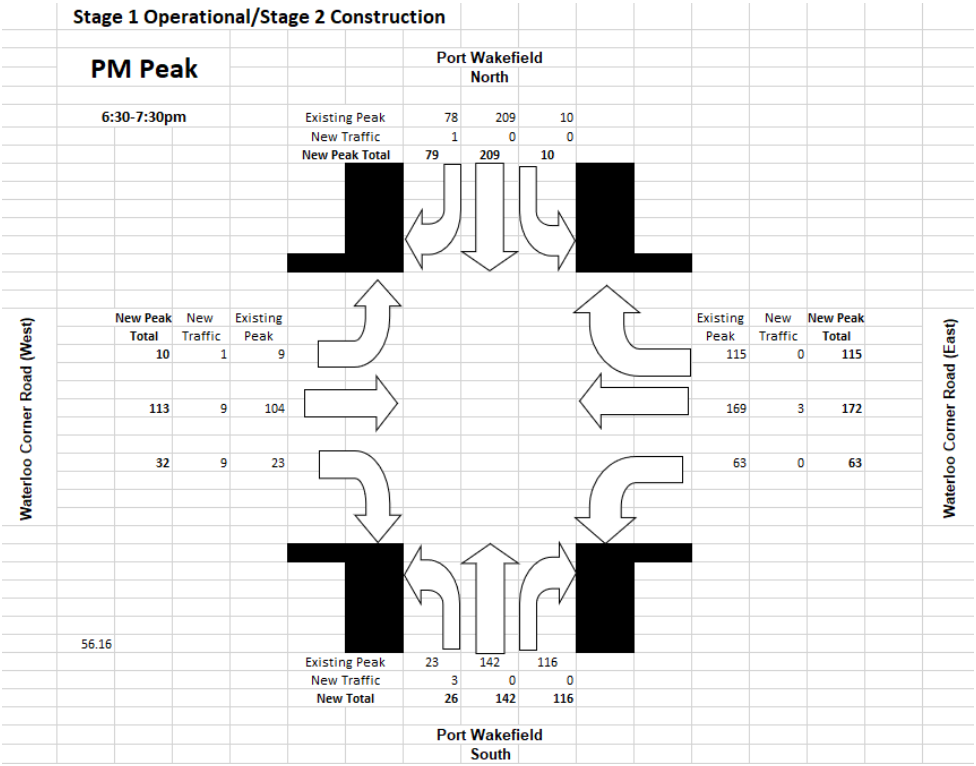


Figure 35: Port Wakefield Road/Waterloo Corner Road PM Peak - Stage 1 Operational/Stage 2 Construction

4.5.4.3 Stage 2 Operational

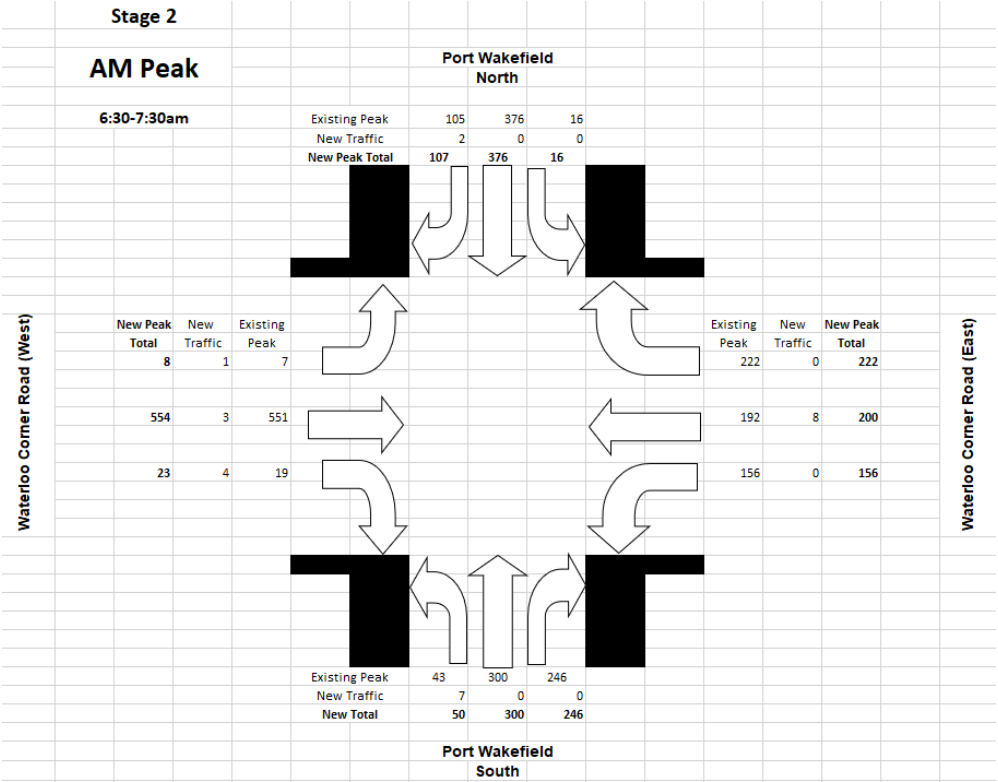


Figure 36: Port Wakefield Road/Waterloo Corner Road AM Peak - Stage 2 Operational

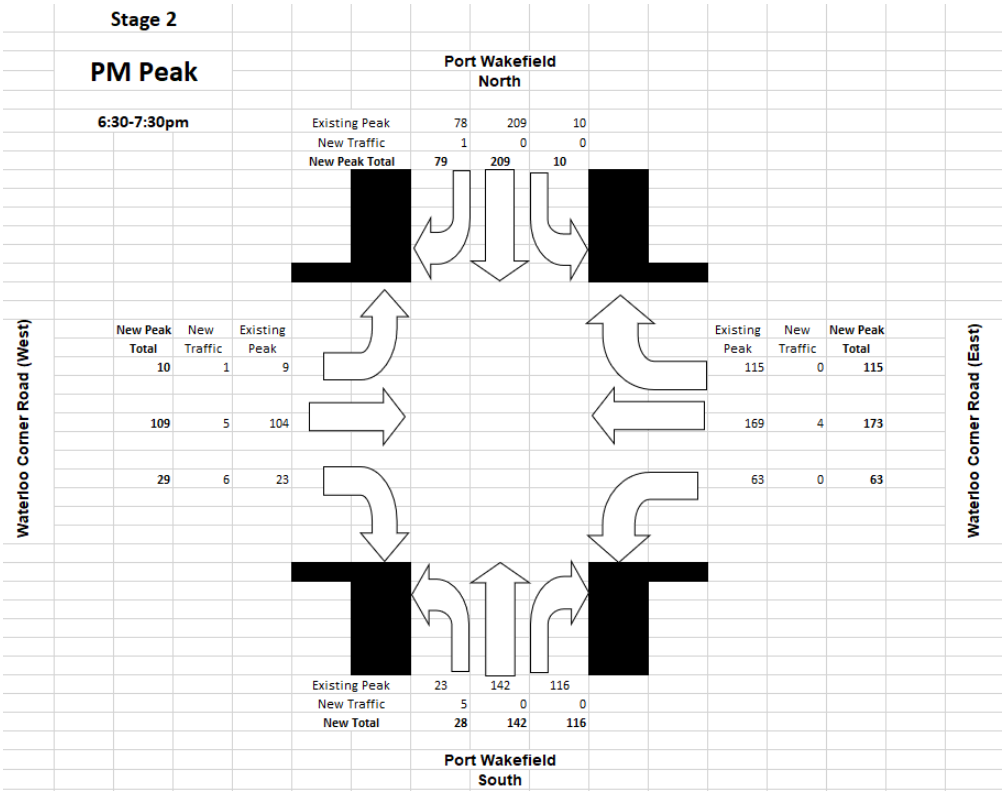


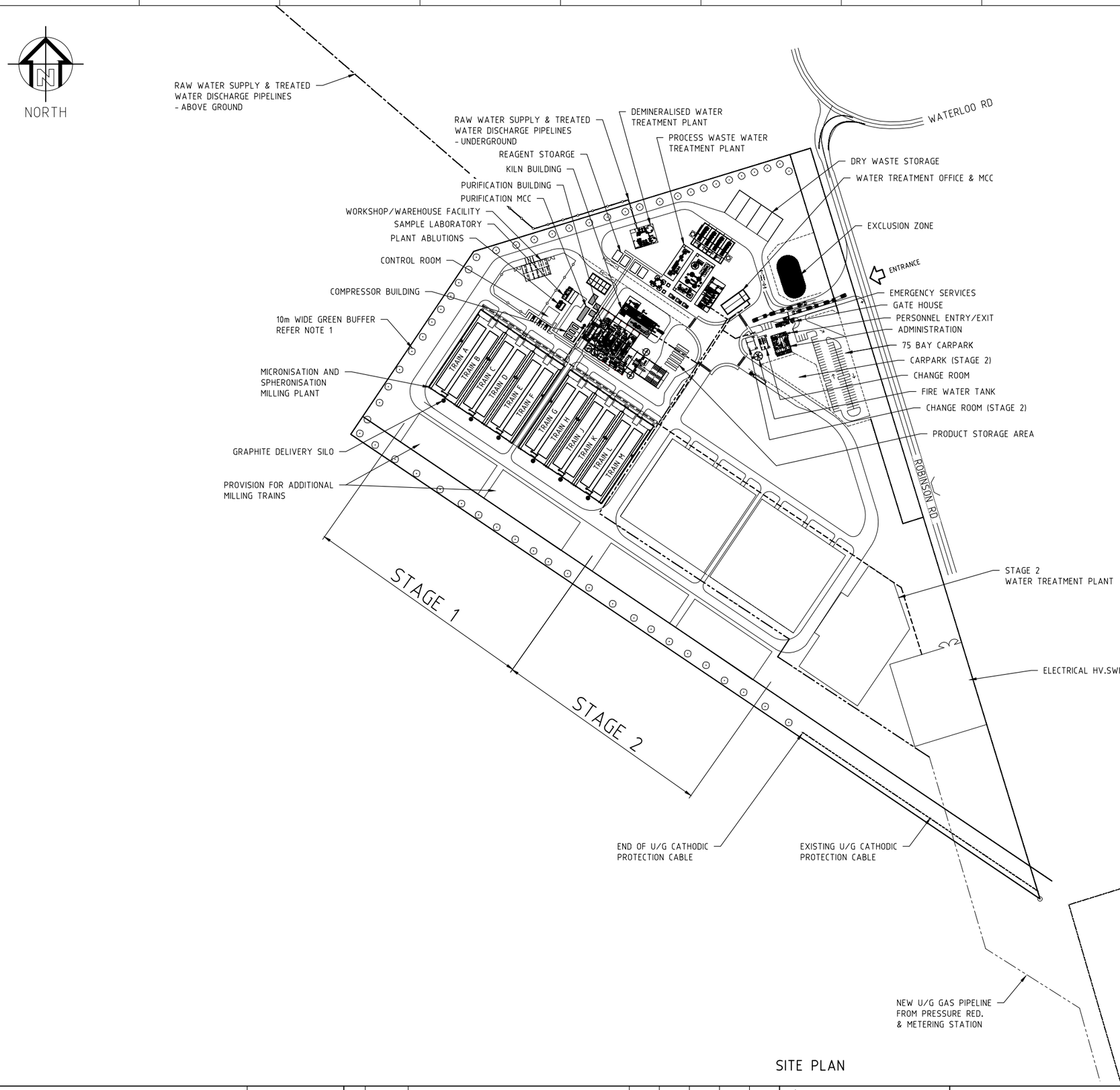
Figure 37: Port Wakefield Road/Waterloo Corner Road PM Peak - Stage 2 Operational

5 Summary and Conclusions

A traffic impact assessment has been undertaken to assess the impact of the proposed Bolivar BAM site for JBS&G, on behalf of Renascor Resources. The findings are as follow:

- As a result of the proposed site, there will be an increase in the numbers of vehicles along the road network surrounding the site
- There will be no impact to the roads north of the facility accessed via Robinson Road
- The section of Robinson Road with direct access to the facility will require upgrade to accommodate additional traffic volumes and the anticipated articulated vehicles
- No heavy vehicle impact is predicted for Lincoln Highway and Port Wakefield-Augusta Highway. These roads are already Gazetted Road train routes suitable for AB-triple road trains (PBS level 3A). The proposed vehicles for operation on the route are nominated PBS Level 3A 36.5m AB-Triple vehicles.
- The sections of Waterloo Corner Road necessary for travel into the facility will not be unduly impacted
- The travel between the Siviour and Bolivar, and Bolivar and Port Adelaide will not impact the North-South Motorway or Port Wakefield Road
- The peak time traffic of the site will not cause significant issues with queuing due to the small number of staff entering and exiting Robinson Road
- There will be minimal impact to the road network during Stage 1 Construction, Stage 1 operational, Stage 1 operational/Stage 2 construction or Stage 2 operational of the project
- The HVRA prepared by Tonkin has determined the need for potential upgrades to the Robinson-Waterloo Intersection
- The HVRA prepared by Tonkin has determined the extent of the road upgrade required to Robinson Road
- The HVRA prepared by Tonkin will determine the extent of the road upgrade required to Port Wakefield Road
- The proposed 120 carparks at the BAM facility are satisfactory for the number of vehicles expected to be parked on site.

Appendix A – BAM Site Plan



SITE PLAN

GENERAL NOTES

1-THIS DEVELOPMENT WILL INCLUDE A GREEN BUFFER ZONE 10m WIDE ON THE NORTH, NORTH-WEST & SOUTH-WEST BOUNDARIES. NATIVE TREES AND VEGETATION WILL CREATE A SCREEN FOR PROCESS PLANT INFRASTRUCTURE.

2-WATER TREATMENT PLANT AS SHOWN IS PROVISIONAL ONLY PENDING STUDY BY SPECIALIST CONSULTANT

LEGEND

- EXISTING U/G GAS PIPELINE
- NEW U/G GAS PIPELINE TO BAM INFRASTRUCTURE
- EXISTING U/G CATHODIC PROTECTION CABLE
- U/G ELECTRICAL CABLES
- RAW WATER SUPPLY & TREATED WATER DISCHARGE - ABOVE GROUND
- RAW WATER SUPPLY & TREATED WATER DISCHARGE - UNDERGROUND

REFERENCE DRAWINGS	DWG No	REV	DATE	REVISIONS	DRN	CHK	DSGN	TECH APP	PROJ APP
		C	24.04.23	ISSUED FOR REVIEW	HB				
		B	29.09.22	ISSUED FOR INFORMATION	HB				
		A	18.07.22	ISSUED FOR REVIEW	HB				

WHEN IN DOUBT-ASK DO NOT SCALE

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ENGINEERING CONSULTANTS AND CONTRACTORS
179 Great Eastern Highway, Belmont Western Australia. 6104 ACN 121 542 738
Phone: (08) 6272 6000
Fax: (08) 6272 6001

DRAWN	HB 28.06.22
CHECKED	
DESIGNED	
TECH APP	
PROJ APP	
CLIENT APP	

RENASCOR RESOURCES LIMITED
BATTERY ANODE MATERIALS (BAM) PROJECT - UPSG
SITE LAYOUT
GENERAL ARRANGEMENT

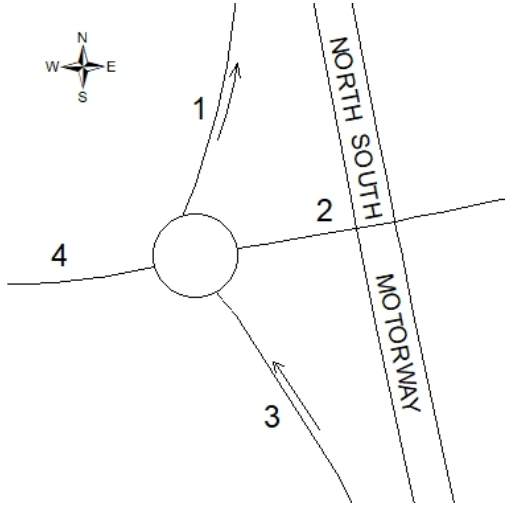
A1	SCALE 1:2000	JOB No 12813	DRG No 12813-L-100	REV C

M:\1-PROJECT STUDIES\12813 - Siviour\Misc\Layout\UPSG\12813L100.dwg - 24/04/2023 - 10:56am - howard.baldock

Appendix B – Intersection Turn Counts (DIT)

Intersection of: INTERCHANGE CONNECTOR / NORTHBOUND ON RAMP / NORTHBOUND OFF RAMP
Locality: WATERLOO CORNER
AMG Reference: TG780538
Date of Count: 29/07/2020 Day: Wednesday
Weather: Dry Control: ROUNDABOUT
Survey Status:

Arm	Road Number - Name
1	53303 - WATERLOO INTERCHANGE NORTHBOUND ON RAMP
2	53306 - WATERLOO CORNER INTERCHANGE CONNECTOR
3	53304 - WATERLOO INTERCHANGE NORTHBOUND OFF RAMP
4	53306 - WATERLOO CORNER INTERCHANGE CONNECTOR



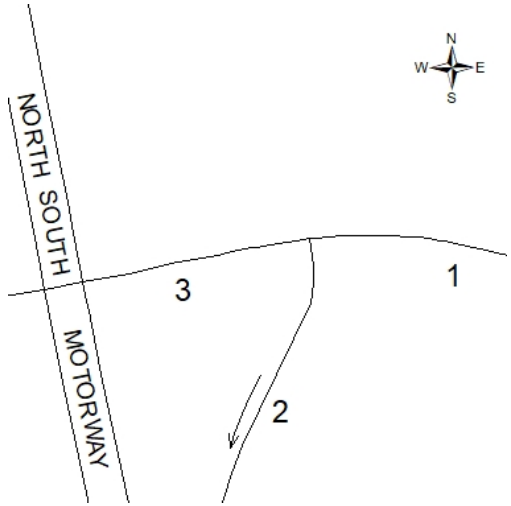
	Arm	1			2			3			4		
	Exit Arm	2 (L)	3	4 (R)	3 (L)	4	1 (R)	4 (L)	1	2 (R)	1 (L)	2	3 (R)
11 hour totals	Cars	**0**	**0**	**0**	**0**	**658**	**368**	**359**	**4**	**2172**	**47**	**821**	**0**
	CV	**0**	**0**	**0**	**0**	**55**	**77**	**36**	**0**	**622**	**7**	**69**	**0**
	Total	**0**	**0**	**0**	**0**	**713**	**445**	**395**	**4**	**2794**	**54**	**890**	**0**
AM Peak hour (07:00)	Cars	**0**	**0**	**0**	**0**	**66**	**22**	**40**	**0**	**479**	**4**	**50**	**0**
	CV	**0**	**0**	**0**	**0**	**3**	**7**	**5**	**0**	**63**	**1**	**4**	**0**
	Total	**0**	**0**	**0**	**0**	**69**	**29**	**45**	**0**	**542**	**5**	**54**	**0**
PM Peak hour (15:00)	Cars	**0**	**0**	**0**	**0**	**54**	**52**	**38**	**0**	**204**	**7**	**90**	**0**
	CV	**0**	**0**	**0**	**0**	**5**	**11**	**2**	**0**	**70**	**0**	**8**	**0**
	Total	**0**	**0**	**0**	**0**	**59**	**63**	**40**	**0**	**274**	**7**	**98**	**0**

		1	2	3	4
One-way Flows	11 Hour Totals	**(IN) 0 (OUT) 503**	**(IN) 1158 (OUT) 3684**	**(IN) 3193 (OUT) 0**	**(IN) 944 (OUT) 1108**
	AM Peak Hour	**0 11:45 45**	**07:45 111 06:30 614**	**06:30 610 0**	**07:45 93 07:45 133**
	PM Peak Hour	**0 16:45 72**	**16:00 138 14:30 372**	**15:00 314 0**	**13:45 129 16:00 122**
Two-way Flows	AM Peak Hour	**10:30 45**	**06:30 700**	**06:30 610**	**07:45 226**
	PM Peak Hour	**16:45 72**	**15:00 494**	**15:00 314**	**13:45 221**
All Vehicles	11 Hour Totals	**503 16.7% CV**	**4842 17.0% CV**	**3193 20.6% CV**	**2052 8.1% CV**
	Estimated AADT	**650 SF(1.00) ZF(1.31)**	**6300 SF(1.00) ZF(1.31)**	**4200 SF(1.00) ZF(1.31)**	**2700 SF(1.00) ZF(1.31)**

AADT - Annual Average Daily Traffic SF - Seasonal Factor ZF - Zone Factor CV - Commercial Vehicles

Intersection of: INTERCHANGE CONNECTOR / SOUTHBOUND ON RAMP
Locality: WATERLOO CORNER
AMG Reference: TG783539
Date of Count: 29/07/2020 Day: Wednesday
Weather: Dry Control:
Survey Status:

Arm	Road Number - Name
1	53306 - WATERLOO CORNER INTERCHANGE CONNECTOR
2	53305 - WATERLOO INTERCHANGE SOUTHBOUND ON RAMP
3	53306 - WATERLOO CORNER INTERCHANGE CONNECTOR



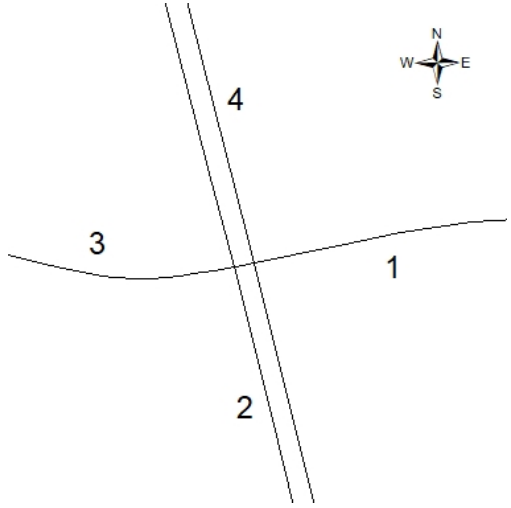
	Arm	1		2		3	
	Exit Arm	2 (L)	3	3 (L)	1 (R)	1	2 (R)
11 hour totals	Cars	**2196**	**1026**	**0**	**0**	**2723**	**270**
	CV	**563**	**132**	**0**	**0**	**660**	**31**
	Total	**2759**	**1158**	**0**	**0**	**3383**	**301**
AM Peak hour (07:00)	Cars	**136**	**88**	**0**	**0**	**510**	**19**
	CV	**60**	**10**	**0**	**0**	**66**	**1**
	Total	**196**	**98**	**0**	**0**	**576**	**20**
PM Peak hour (16:00)	Cars	**479**	**130**	**0**	**0**	**244**	**40**
	CV	**24**	**8**	**0**	**0**	**45**	**1**
	Total	**503**	**138**	**0**	**0**	**289**	**41**

		1	2	3
One-way Flows	11 Hour Totals	**(IN) 3917 (OUT) 3383**	**(IN) 0 (OUT) 3060**	**(IN) 3684 (OUT) 1158**
	AM Peak Hour	**07:15 305 06:30 598**	**0 07:15 226**	**06:30 614 07:45 111**
	PM Peak Hour	**16:00 641 15:00 345**	**0 16:15 545**	**14:30 372 16:00 138**
Two-way Flows	AM Peak Hour	**07:00 870**	**07:15 226**	**06:30 700**
	PM Peak Hour	**16:00 930**	**16:15 545**	**15:00 494**
All Vehicles	11 Hour Totals	**7300 18.6% CV**	**3060 19.4% CV**	**4842 17.0% CV**
	Estimated AADT	**9600 SF(1.00) ZF(1.31)**	**4000 SF(1.00) ZF(1.31)**	**6300 SF(1.00) ZF(1.31)**

AADT - Annual Average Daily Traffic SF - Seasonal Factor ZF - Zone Factor CV - Commercial Vehicles

Intersection of: PORT WAKEFIELD RD / WATERLOO CORNER RD
Locality: WATERLOO CORNER
AMG Reference: TG786538
Date of Count: 29/07/2020 Day: Wednesday
Weather: Dry Control: SIGNALS
Survey Status:

Arm	Road Number - Name
1	5063 - WATERLOO CORNER ROAD
2	3500 - PORT WAKEFIELD ROAD
3	53306 - WATERLOO CORNER INTERCHANGE CONNECTOR
4	3500 - PORT WAKEFIELD ROAD



	Arm	1			2			3			4		
	Exit Arm	2 (L)	3	4 (R)	3 (L)	4	1 (R)	4 (L)	1	2 (R)	1 (L)	2	3 (R)
11 hour totals	Cars	**1731**	**2624**	**1067**	**392**	**2462**	**1787**	**72**	**2377**	**331**	**1397**	**3567**	**151**
	CV	**424**	**594**	**148**	**71**	**265**	**559**	**17**	**574**	**35**	**192**	**436**	**45**
	Total	**2155**	**3218**	**1215**	**463**	**2727**	**2346**	**89**	**2951**	**366**	**1589**	**4003**	**196**
AM Peak hour (06:45)	Cars	**160**	**164**	**171**	**37**	**271**	**218**	**8**	**464**	**14**	**109**	**318**	**7**
	CV	**38**	**51**	**18**	**7**	**20**	**60**	**0**	**60**	**5**	**13**	**52**	**15**
	Total	**198**	**215**	**189**	**44**	**291**	**278**	**8**	**524**	**19**	**122**	**370**	**22**
PM Peak hour (16:00)	Cars	**238**	**531**	**113**	**46**	**293**	**209**	**6**	**206**	**41**	**188**	**429**	**18**
	CV	**22**	**30**	**13**	**3**	**23**	**25**	**5**	**34**	**2**	**20**	**29**	**4**
	Total	**260**	**561**	**126**	**49**	**316**	**234**	**11**	**240**	**43**	**208**	**458**	**22**

		1	2	3	4
One-way Flows	11 Hour Totals	**(IN) 6588 (OUT) 6886**	**(IN) 5536 (OUT) 6524**	**(IN) 3406 (OUT) 3877**	**(IN) 5788 (OUT) 4031**
	AM Peak Hour	**06:45 602 07:00 934**	**06:45 613 07:30 666**	**06:30 577 07:15 296**	**07:30 651 06:45 488**
	PM Peak Hour	**15:30 949 15:45 738**	**15:45 625 16:00 761**	**14:30 356 16:00 632**	**16:00 688 16:15 480**
Two-way Flows	AM Peak Hour	**06:45 1526**	**07:00 1217**	**07:00 847**	**07:30 1055**
	PM Peak Hour	**15:30 1685**	**15:45 1382**	**15:30 932**	**16:15 1151**
All Vehicles	11 Hour Totals	**13474 18.5% CV**	**12060 14.8% CV**	**7283 18.3% CV**	**9819 11.2% CV**
	Estimated AADT	**17700 SF(1.00) ZF(1.31)**	**15800 SF(1.00) ZF(1.31)**	**9500 SF(1.00) ZF(1.31)**	**12900 SF(1.00) ZF(1.31)**

AADT - Annual Average Daily Traffic SF - Seasonal Factor ZF - Zone Factor CV - Commercial Vehicles

Appendix 13 B) Memorandum - Traffic Impact Assessment

Building exceptional outcomes together

Memorandum

To	Renascor Resources		
From	Tonkin	**Date**	3 May 2024
Job Number	221294		
Subject	Intersection Treatments for SA Water Access		

Introduction

The Renascor Resources Battery Anode Material (BAM) Project consists of a mine and concentrator near Arno Bay and a downstream Purified Spherical Graphite (PSG) production facility proposed to be located on Robinson Road, Waterloo Corner.

Graphite concentrates from the Arno Bay mine operation, are proposed to be transported to the PSG production facility, using the following vehicle combinations via Waterloo Corner Road and Port Wakefield Road.

- 26m B-Doubles,
- 36.5m AB-Triple or
- 40.7m AB Triple,

Tonkin has previously been engaged by Renascor Resources to undertake a traffic impact assessment and a heavy vehicle route assessment. Findings within the heavy vehicle route assessment (ref. 221294R001D) recommended that either a basic left turn treatment or an auxiliary left turn treatment (i.e. an intersection upgrade) be considered. Due to a lack of turning movement data at the intersection at the time of reporting for the Traffic Impact Assessment (ref. 221875R01D) and the heavy vehicle route assessment, the need for an intersection upgrade could not be confirmed.

Renascor Resources have therefore engaged Tonkin to undertake the following scope of work:

1. Collect traffic data and undertake an assessment to determine whether existing traffic volumes at the intersection warrant an upgrade of the intersection (i.e. Base Case) based on Figure 3.25 of Austroads Guide to Traffic Management Part 6 and Figure 4A-A 4 in the TMR Road Planning and Design Manual – Edition 2: Volume 3.
2. whether future traffic volumes at the intersection, including traffic generated by the Renascor Resources PSG facility, will warrant an intersection upgrade (i.e. Future Case), based on Figure 3.25 of Austroads Guide to Traffic Management Part 6 and Figure 4A-A 4 in the TMR Road Planning and Design Manual – Edition 2: Volume 3.
3. to determine the types of vehicles that are currently accessing Robinson Road based on a vehicle classification tube count.

Traffic Counts

Tonkin engaged Austraffic to undertake turning movement counts at the Robinson Road / Waterloo Corner Road intersection and midblock tube counts on Robinson Road. The turning movement

counts at the intersection were undertaken on 15th November 2023 between 7am-7pm. The mid block tube counts were undertaken over a 7 day period between 15 November 2023 and 21 November 2023.

Turning Movement Counts

Intersection warrant assessments are based on peak hourly volumes and the turning movement counts show that the morning peak (i.e. the AM Peak) occurred between 7:45-8:45am while the evening peak (i.e. the PM Peak) occurred between 15:30-16:30. Illustrations for the two peak hourly volume periods are shown in the figures below.

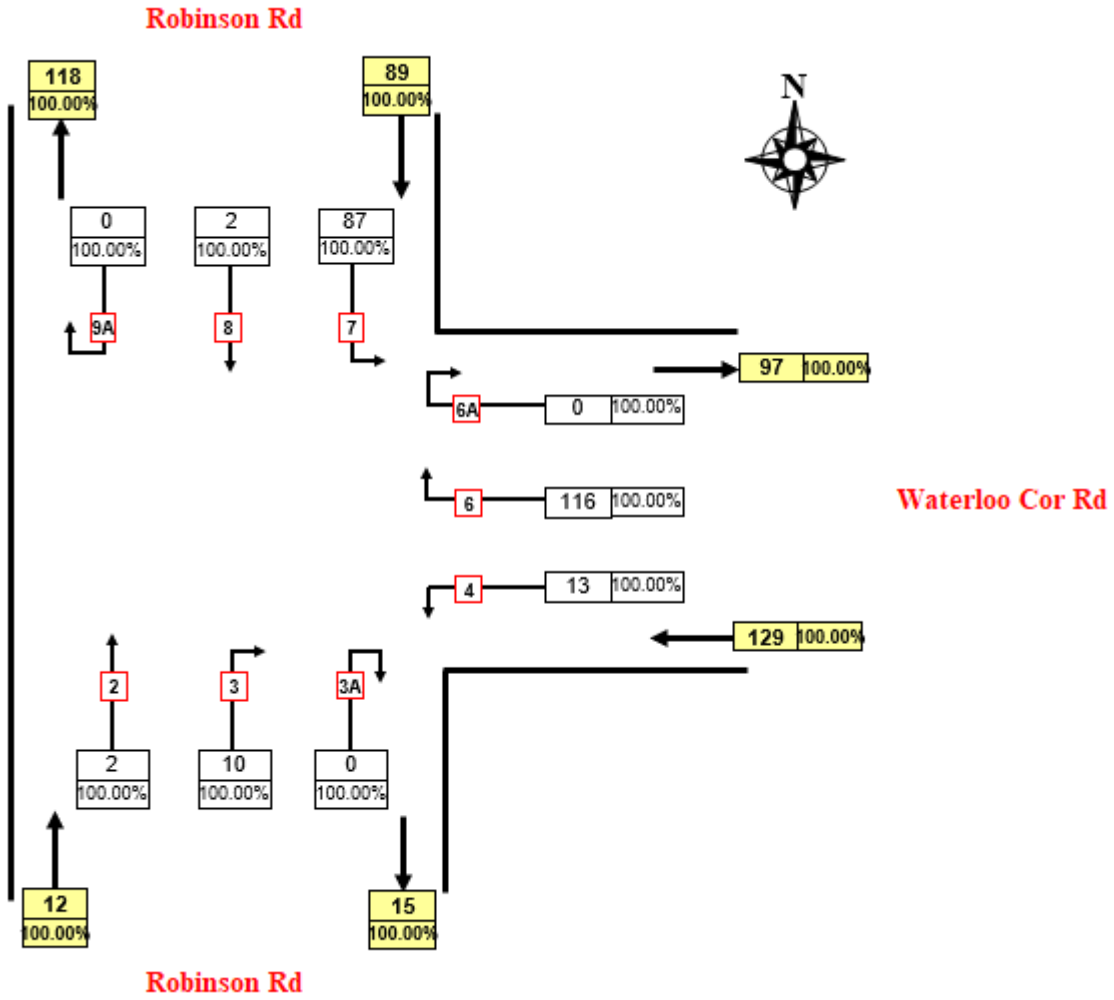


Figure 1: AM Peak 07:45-08:45

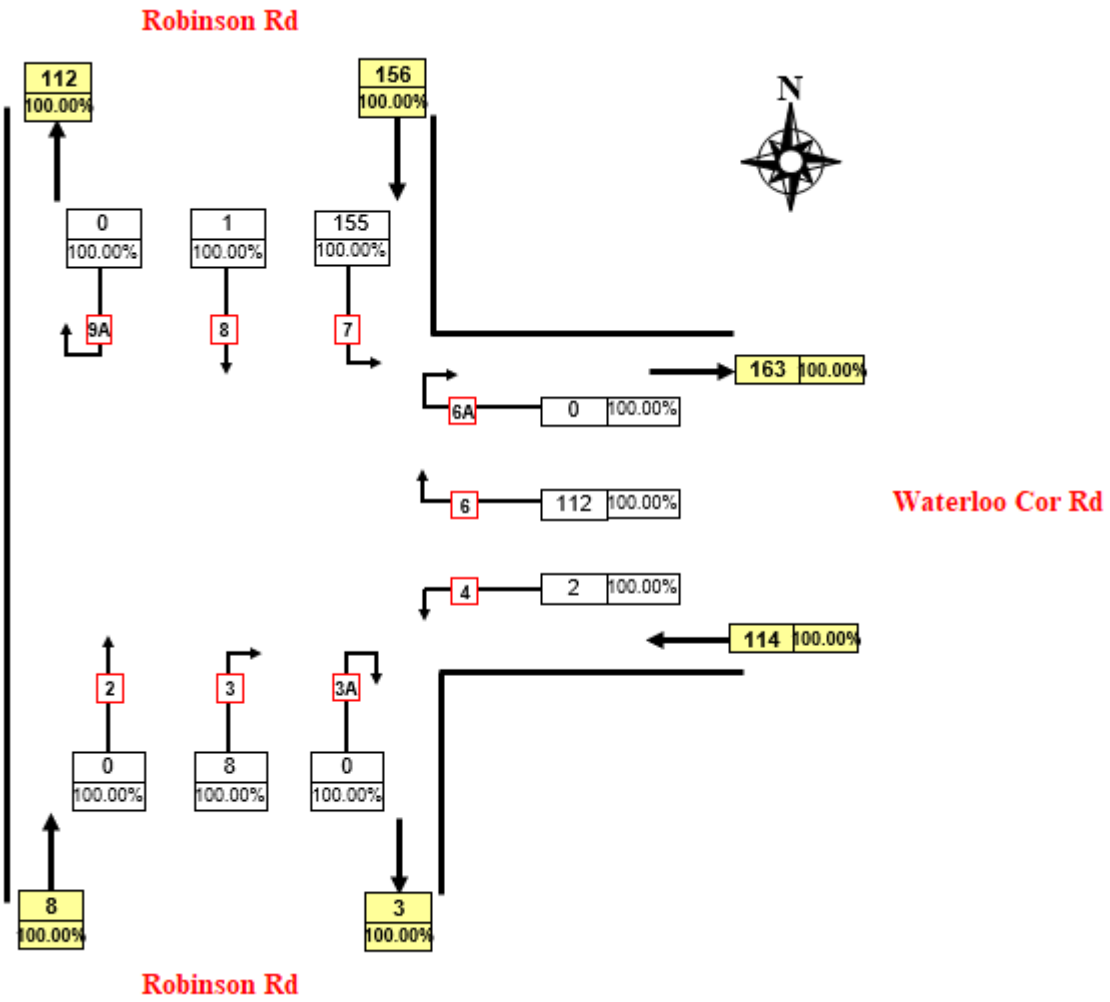
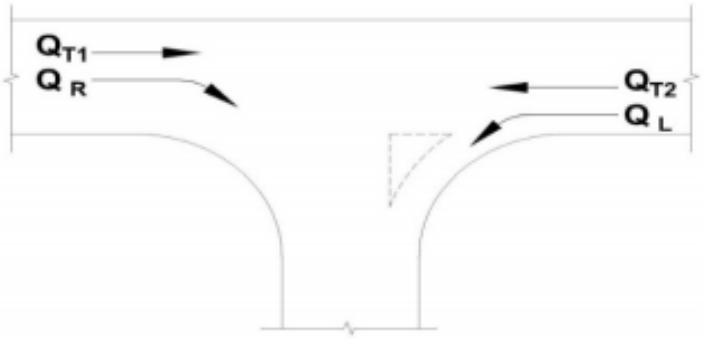


Figure 2: PM Peak 15:30-16:30

Based on Austroads Guide to Traffic Management Part 6 and the TMR Road Planning and Design Manual, an intersection warrant assessment was undertaken for the base case using the turning movement counts undertaken on 15 November 2023. A future case was also assessed based on Peak hourly traffic movements generated by the Renascor facility during "Stage 2 Operation".

Figure 3 was used to determine the major road traffic volumes (i.e QM(Left) and QM(Right)) which are used as inputs into determining the required intersection treatment.



Turn type	Splitter island	Q_m (veh/h)
Right	No	$= Q_{T1} + Q_{T2} + Q_L$
Right	Yes	$= Q_{T1} + Q_{T2}$
Left	No/yes	$= Q_{T2}$

Source: Arndt and Troutbeck (2006).

Figure 3: Calculation of the major road traffic volume parameter Qm

Base Case

As mentioned previously, the base case uses the turning movement counts undertaken on 15 November 2023 to determine whether existing traffic volumes warrant an intersection upgrade.

Table 1: Base Case Peak Hourly Traffic Volumes and Major Road Traffic Volumes for AM Peak

	QT1	QT2	Q(Left)	QM(Left)	Q(Right)	QM(Right)
AM Peak	87	116	13	116	2	216

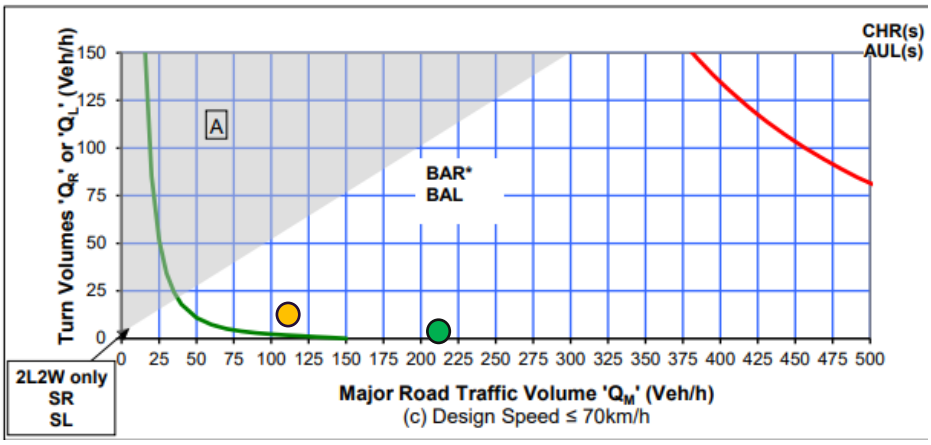


Figure 4: AM Peak Warrant Assessment

Table 2: Base Case Peak Hourly Traffic Volumes and Major Road Traffic Volumes for PM Peak

	QT1	QT2	Q(Left)	QM(Left)	Q(Right)	QM(Right)
PM Peak	155	112	2	112	1	269

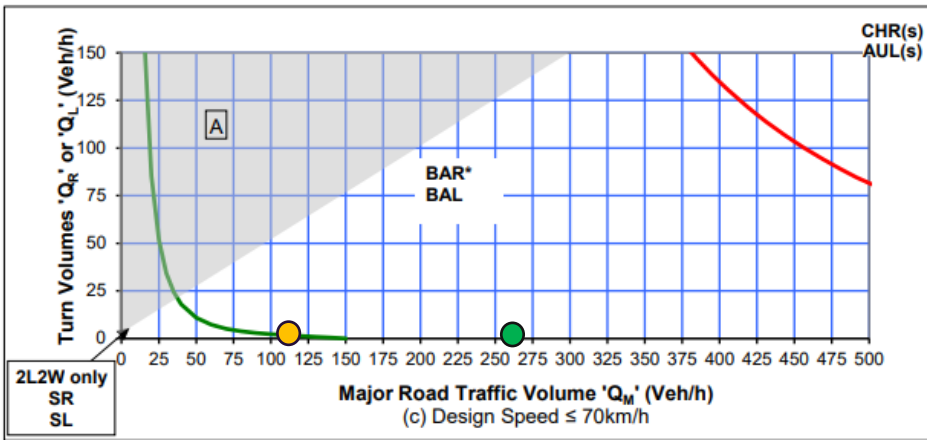


Figure 5: PM Peak Warrant Assessment (Base Case)

For both the AM and PM Peak scenarios, the assessments above show that the treatment required for the base case is a BAR/BAL (i.e. a basic right turn treatment and a basic left turn treatment). The existing intersection appears to provide a BAR with a 4 m wide sealed shoulder on the inside of the curve adjacent to a 4.4 m wide through lane, in order to allow motorists to pass vehicles waiting to turn right into Robinson Road. The requirement of a BAL for left turns appears to be met based on turn paths for a 26 m B-Double vehicle, 36.5 m AB-Triple and a 40.7 m AB-Triple undertaken on aerial backdrop (refer Appendix A), although it also appears that the wheels are tracking off the existing edge of bitumen near the existing stobie pole for the 36.5 m AB Triple and the 40.7 m AB- Triple turn paths. As per the recommendation in the route assessment report (221294R001D), trial turning assessments should be undertaken on site.

Figure 6: Width measurements at the Waterloo Corner Road/Robinson Road intersection using Metromap aerial imagery

Future Case

The future case adds peak hourly trip generation values based on vehicles entering and leaving the Renascor facility on top of the base intersection turning count volumes, to assess what intersection treatment is warranted based on Renascor's activities.

Table 3: Future Case Peak Hourly Traffic Volumes and Major Road Traffic Volumes

	QT1	QT2	Q(Left)	QM(Left)	Q(Right)	QM(Right)
AM Peak	87	116	59	116	2	216
PM Peak	155	112	32	112	1	269

Based on the traffic impact assessment prepared by Tonkin in August 2023 (ref. 221875R01D), Renascor's AM and PM Peak movements are expected to occur between 6:30 and 7:30 for both am and pm times. The AM peak hourly volume entering the Renascor facility is estimated to range from 43-46 vehicles per hour while the PM Peak hourly volume entering the facility is 29-30 vehicle per hour for "Operational – Stage 2". It is assumed that in both the AM and PM Peaks all vehicles will perform a left turn into Robinson Road from Waterloo Corner Road.

Based on the figure presented below, the warrant for a BAL left turn treatment remains, as indicated by the orange circles. Since the circle for the AM Peak is in the shaded grey area, the TMR Road Planning and Design Manual suggests considering road realignment. However, since growth in the through lanes has not been considered, it is likely that the major road will continue to be Waterloo Corner Road to Robinson Road North, and that no realignment is required.

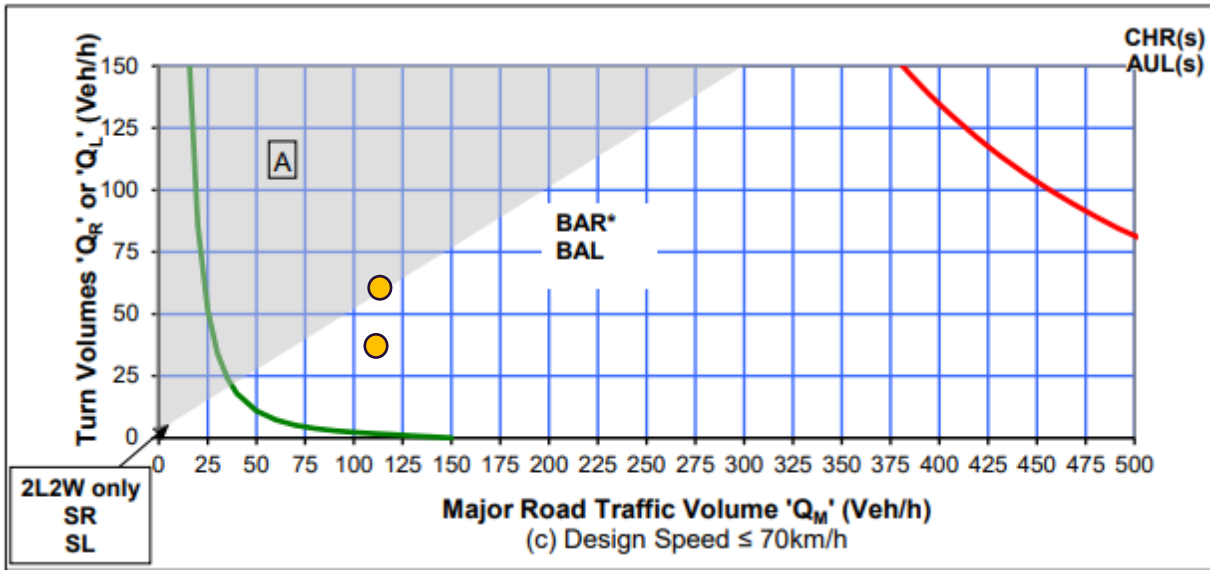


Figure 7: AM and PM Peak Warrant Assessment (Future Case)

It should also be noted that Renascor's peak periods occur outside of the AM Peak (07:45-08:45) and PM Peak (15:30-16:30) period determined from the base traffic counts undertaken by Austraffic.

Mid-block Tube Counts

7 day tube counts were undertaken on Robinson Road, from 15 November 2023 to 21 November 2023. The traffic count data shows that the AADT (two-way) on Robinson Road is 124 vehicles per day, with a heavy vehicle content of approximately 9%. The traffic counters are also able to classify vehicles based on the number of axles passing over the tubes in accordance with the Austroads94 vehicle classification scheme (refer figure below).

Level 1	Level 2		Level 3	Austroads 1994 Classification	
Length (indicative)	Axles and axle groups		Vehicle type	Class	Parameters
Type	Axle	Groups	Description		
Short up to 5.5 m	LIGHT VEHICLES				
	2	1 or 2	Short sedan, wagon, 4WD, utility, light van, bicycle, motorcycle, etc.	1	d1 ≤ 3.2 m and axles = 2
	3, 4 or 5	3	Short – towing trailer, caravan, boat, etc.	2	Groups = 3 d1 ≥ 2.1 m, d1 ≤ 3.2 m d2 ≥ 2.1 m and axles = 3, 4 or 5
Medium 5.5 m to 14.5 m	HEAVY VEHICLES				
	2	2	Two-axle truck or bus	3	d1 > 3.2 m and axles = 2
	3	3	Three-axle truck or bus	4	Axles = 3 and groups = 2
	> 3	2	Four-axle truck	5	Axles > 3 and groups = 2
Long 11.5 m to 19.0 m	3	3	Three-axle articulated or rigid vehicle and trailer	6	d1 > 3.2 m, axles = 3 and groups = 3
	4	> 2	Four-axle articulated or rigid vehicle and trailer	7	d2 < 2.1 m or d1 < 2.1 m or d1 > 3.2 m Axles = 4 and groups > 2
	5	> 2	Five-axle articulated or rigid vehicle and trailer	8	d2 < 2.1 m or d1 < 2.1 m or d1 > 3.2 m Axles = 5 and groups > 2
	6 >6	>2 3	Six-axle (or more) articulated or rigid vehicle and trailer	9	Axles = 6 and groups > 2 or axles > 6 and groups = 3
Medium combination 17.5 m to 36.5 m	> 6	4	B-double or heavy truck trailer	10	Groups = 4 and axles > 6
	> 6	5 or 6	Double road train or heavy truck and trailers	11	Groups = 5 or 6 and axles > 6
Long combination over 33.0 m	> 6	> 6	Triple road train or heavy truck and three trailers	12	Groups > 6 and axles > 6

Figure 8: Austroads 94 Classification Scheme

The results of the classification counts are presented in the figure below.

AUTOMATIC VEHICLE CLASSIFICATION AND SPEED SURVEY
SUMMARY OF RESULTS - Two ways

Client:	Tonkin
Road	Robinson Road
Survey Location:	south of corner outside 87
Suburb	Waterloo Corner
Survey Period:	Wed 15 Nov 23 to Tue 21 Nov 23
Speed Limit:	80
ATS Reference:	
GCCC Reference:	73Z

TRAFFIC VOLUME / CLASSIFICATION DATA

DAY	DAILY TRAFFIC BY AUSTROAD CLASSES														Motor cycle	Bicycle
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total		
Wednesday, November 15, 2023	144	6	24	2	2	0	2	2	5	2	2	0	2	193	5	1
Thursday, November 16, 2023	122	2	11	3	0	0	0	0	5	0	0	0	0	143	0	2
Friday, November 17, 2023	119	12	25	0	2	1	6	2	5	0	0	0	0	172	0	0
Saturday, November 18, 2023	113	8	16	0	0	4	0	0	4	0	0	0	0	145	0	0
Sunday, November 19, 2023	94	31	9	0	0	5	0	0	4	0	0	0	0	143	1	0
Monday, November 20, 2023	108	8	11	6	5	1	0	0	11	0	0	0	1	151	3	3
Tuesday, November 21, 2023	136	3	17	3	1	0	0	1	7	0	0	0	1	169	1	1
Average Daily Volume	119	10	16	2	1	2	1	1	6	0	0	0	1	159	1	1
% of Vehicles by Class	75.1%	6.3%	10.2%	1.3%	0.9%	1.0%	0.7%	0.4%	3.7%	0.2%	0.2%	0.0%	0.4%	100.0%	0.9%	0.6%

Figure 9: Midblock traffic classification count summary

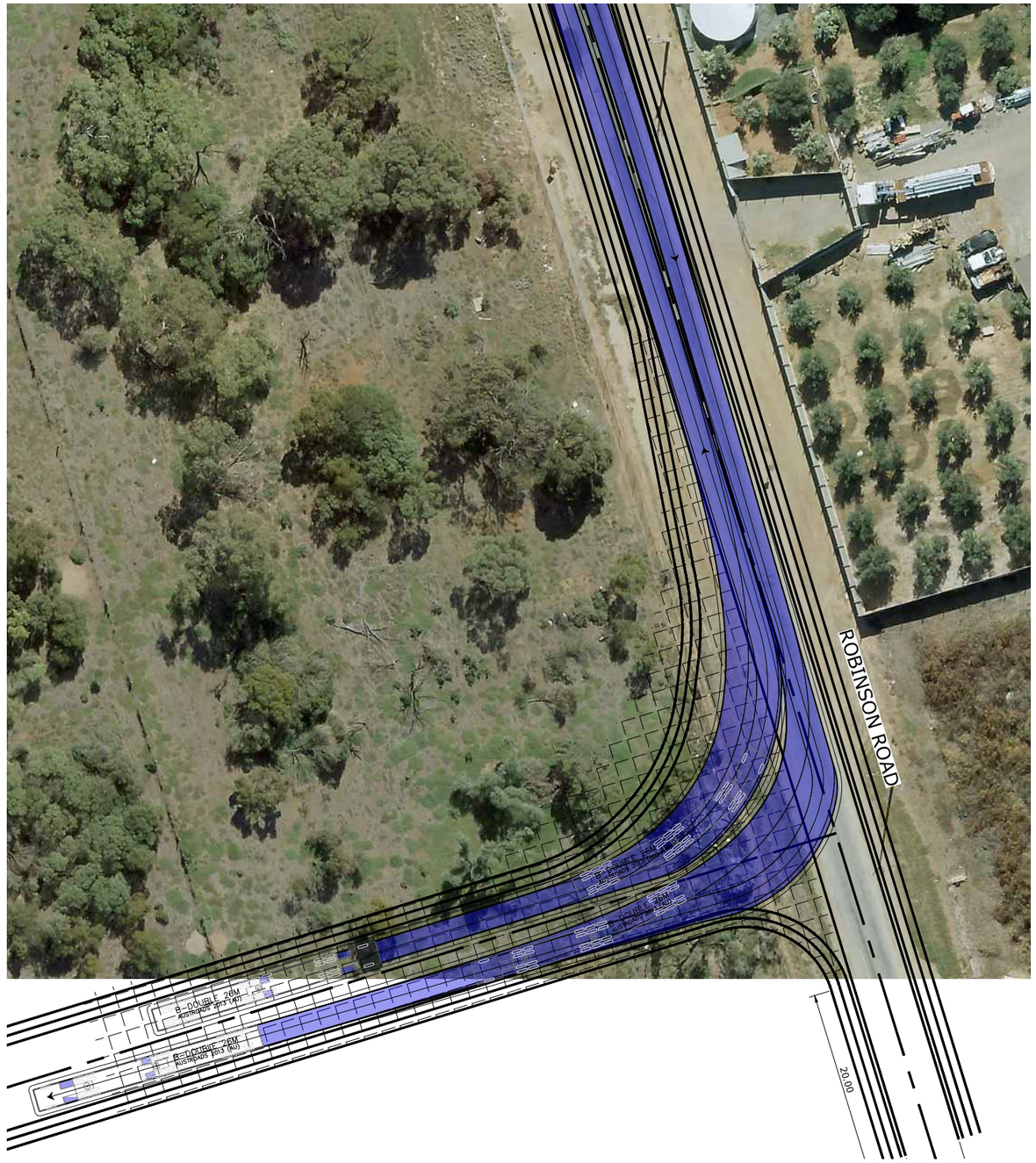
RAVNET 2023 indicates that Robinson Road is currently not a gazetted heavy vehicle route, however the classification counts show that there is a small percentage of Class 10 (i.e. B-Double) and Class 11 (i.e. Double Road Trains) vehicles accessing the road.

Conclusion

Having undertaken an assessment of the base and future cases at the Waterloo Corner Road / Robinson Road intersection, the findings indicate that a basic right turn treatment and a basic left turn treatment (i.e. BAR/BAL) are warranted in both cases. The current intersection geometry consists of a basic right turn treatment and an urban basic left turn treatment, and therefore intersection upgrades are not required if 26 m B-Doubles, 36.5 m AB Triples and 40.7 m AB triples are proposed to be used as haulage vehicles. As per the recommendations in the route assessment report, we recommend trial turn paths be undertaken for both the 36.5 m AB Triple and the 40.7 m AB Triple.

The mid block tube counts on Robinson Road show that despite not being gazetted as a heavy vehicle route, there is a small percentage of Class 10 and Class 11 vehicles accessing the road already.

Appendix A – Turn Paths



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WATERLOO CORNER RD AND ROBINSON RD
HEAVY VEHICLE ROUTE ASSESSMENT
TURN PATHS - 26m B-DOUBLE - SHEET 1

FILENAME: 221294 AUTOTURN_2.DWG
PROJECT NUMBER 221294
DRAWING NUMBER SK-100
REVISION C

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HEAVY VEHICLE ROUTE ASSESSMENT
TURN PATHS - 26m B-DOUBLE - SHEET 2

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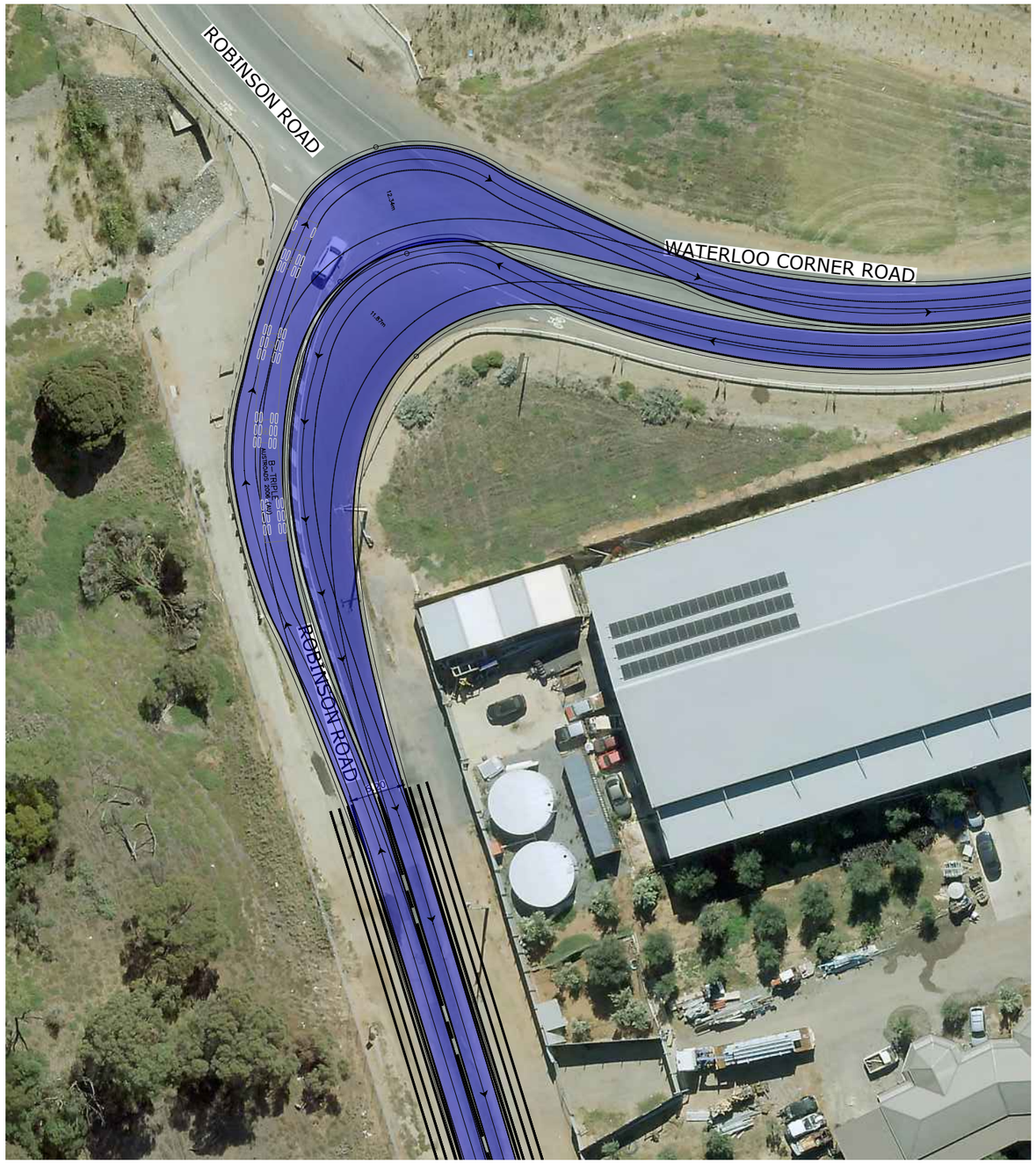

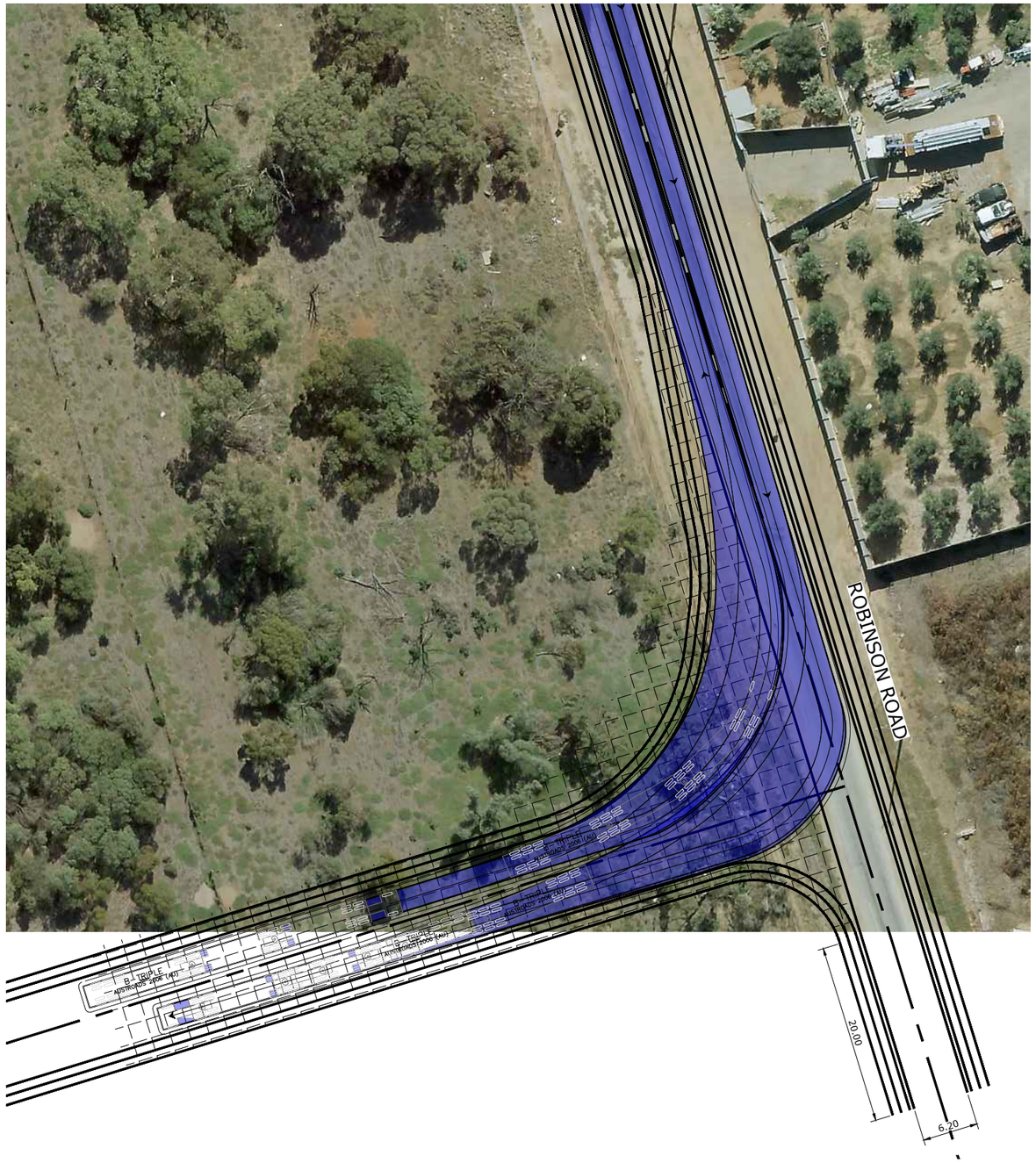

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HEAVY VEHICLE ROUTE ASSESSMENT
TURN PATHS - 36.5m B-TRIPLE - SHEET 1

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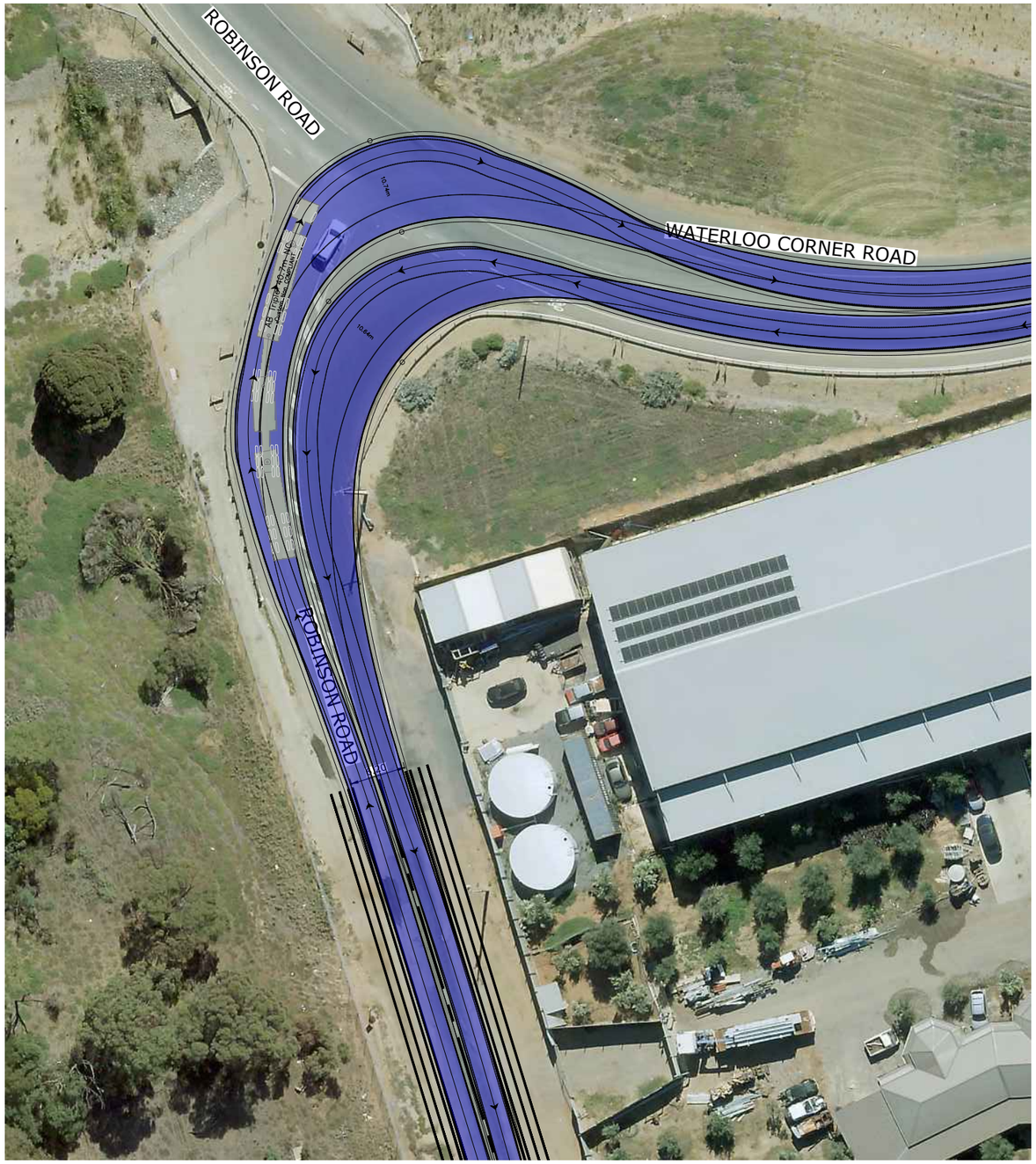

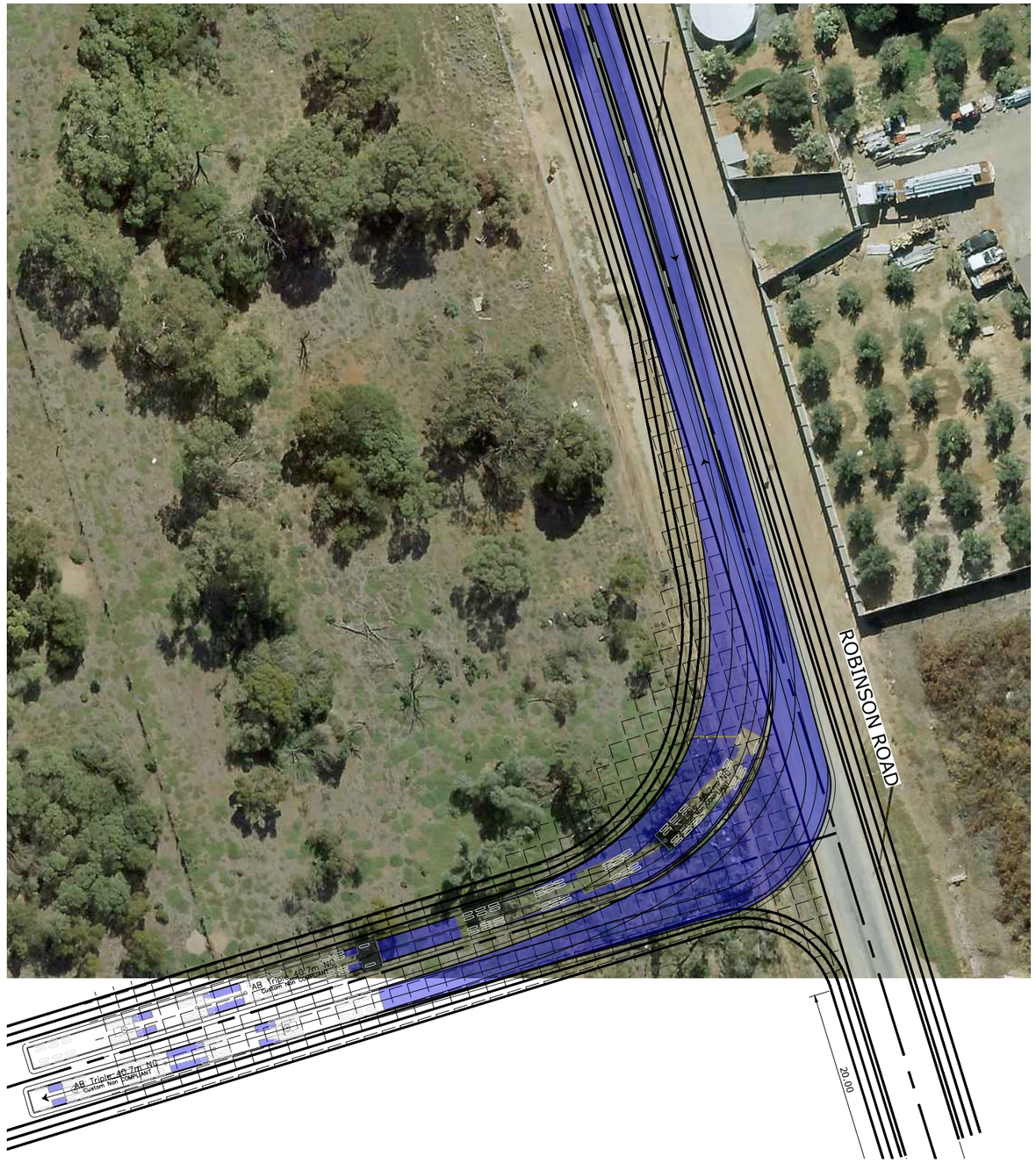

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Appendix 14 Heavy Vehicle Route Assessment

Port Wakefield Road Heavy Vehicle Route Assessment

North South Motorway on ramp/Northern Expressway interchange to Waterloo Corner Road

Renascor Resources Limited

28 April 2023
Ref: 221294R002B

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Building exceptional outcomes together

Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
A	Draft	DS	RB	DS	3/04/2023
B	Final	DS	RB	DS	27/04/2023

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Contents

Project: Port Wakefield Road | North South Motorway on ramp/Northern Expressway interchange to Waterloo Corner Road
Client: Renascor Resources Limited
Ref: 221294R002B

1 Introduction 4

2 Methodology 4

2.1 General 4

2.2 Prioritisation of Risks 5

3 Proposed Route 5

4 Existing Traffic Data 8

5 Crash Statistics 8

6 Vehicle Turning Movements 12

7 Geometric Constraints 12

8 Route Assessment 14

9 Route Assessment Concluding Statement 17

Tables

Table 1: Traffic data 8

Table 2: Crash Statistics (2017-2021 Port Wakefield Road) 8

Table 3: Crash Statistics (2017-2021 Waterloo Corner Road) 9

Table 4: NHVR Network Classification Guidelines geometric constraints 12

Table 5: Summary of recommendations to reduce the risk associated with the high-risk items 17

Figures

Figure 1: Proposed Route 6

Figure 2: Proposed Route (RAVNET, 2023) 7

Figure 3: Crash Statistics Summary (2017-2021) 11

Figure 4: Single carriageway rural road widths (Austroads Guide to Road Design Part 3) 13

Appendices

Appendix A – Turning Movement Assessments

Appendix B – Turning Movement Assessments (Comparison)

1 Introduction

The Renascor Resources Battery Anode Material (BAM) Project consists of a mine and concentrator near Arno Bay and a downstream Purified Spherical Graphite (PSG) production facility proposed to be located on Robinson Road, Waterloo Corner.

Graphite concentrates from the Arno Bay mine operation, are proposed to be transported to the PSG production facility, using the following vehicle combinations via Waterloo Corner Road and Port Wakefield Road.

- 26 m B-Double (PBS Level 2A)
- 36.5 m AB Triple (PBS Level 3A)
- 40.7m AB Triple (PBS Level 3B)

Renascor Resources have requested Tonkin to undertake a heavy vehicle route assessment along a section of Port Wakefield Road from the North South Motorway on ramp / Northern Expressway interchange to the Waterloo Corner Road intersection, which includes assessing right turns into Waterloo Corner Road. This section of Port Wakefield Road is not gazetted as a PBS Level 3B route, however Waterloo Corner Road is a gazetted PBS Level 3B route between the interchange and Port Wakefield Road. The focus of this route assessment is the assessment of the 40.7 m AB Triple combination, particularly at the Port Wakefield Road / Waterloo Corner Road intersection.

2 Methodology

2.1 General

This heavy vehicle route assessment was undertaken in accordance with the following reference documentation;

- DIT Route Assessment Guidelines (October 2008)
- NHVR Network Classification Guidelines (July 2007)
- Austroads Guide to Road Design Part 3: Geometric design (2021)

The assessment process included undertaking a day-time drive through of the proposed route on 22 March 2023 by Deshitha Senanayake (Senior Engineer, DIT Accredited Heavy Vehicle Route Assessor). The weather conditions were fine at the time of the inspection, and the pavement was dry.

The assessment process included preparing turning movement sketches on aerial backdrop for the 40.7m AB Triple at the intersection of Waterloo Corner Road and Port Wakefield Road. Turn paths for the 26 m B-Double and the 36.5 m AB Triple were not prepared since Port Wakefield Road is currently gazetted as a PBS Level 3A route and Waterloo Corner Road is gazetted as a PB Level 3B route between the interchange and Port Wakefield Road.

Pavement investigations are not included as part of the scope for this assessment, with only the road geometry being assessed based on available information.

2.2 Prioritisation of Risks

The assessment and management process outlined within the DIT Route Assessment Guidelines has been adopted to assess and prioritise risks along the proposed route.

Risk management measures have been prioritised from P1 to P4, as defined below:

Priority	Risk Rating	Definition
P1 (Priority 2)	Very high risk	Required to be treated prior to operation of RAVs on the route.
P2 (Priority 2)	High risk	Required to be treated prior to operation of RAVs on the route.
P3 (Priority 3)	Moderate risk	Road Authority should treat hazards conditional upon the level of risk acceptance
P4 (Priority 4)	Low risk	Risk Acceptable

3 Proposed Route

The proposed route is shown in Figure 1. It is understood that access on Port Wakefield Road will be limited to the southbound direction only. To head north bound, the proposed vehicle will access the North-South Motorway via the interchange roundabout on Waterloo Corner Road, which is gazetted as a PBS Level 3B route.

Observations on site showed an A-Double perform a right turn from Port Wakefield Road (North) into Waterloo Corner Road (West).

Figure 1: Proposed Route

RAVNET (2023) indicates that south of the North South Motorway / Northern Connector interchange, Port Wakefield Road is not gazetted as a PBS Level 3B route.

Between the North South motorway interchange and Port Wakefield Road, Waterloo Corner Road is gazetted as a PBS Level 3B route.

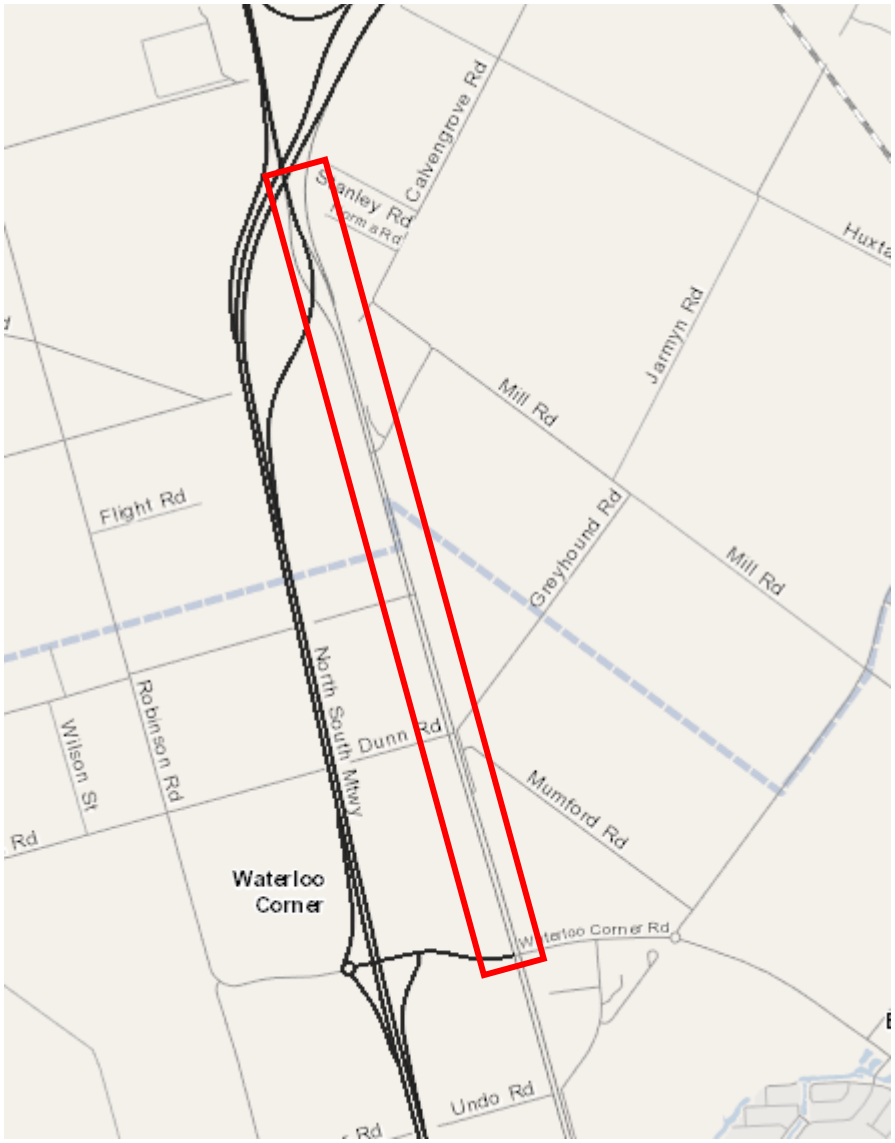

Figure 2: Proposed Route (RAVNET, 2023)

4 Existing Traffic Data

Traffic data for Port Wakefield Road and Waterloo Corner Road is summarised in the table below.

Table 1: Traffic data

Road	Count Year	Count Location	Annual Average Daily Traffic Volume (two-way AADT, vpd)	Commercial Vehicle %
Port Wakefield Road	2020	Unknown	13,400	14.5%
Waterloo Corner Road	2020	Unknown	9,600	19%

5 Post Development Traffic

Tonkin were engaged by Renascor to undertake a traffic impact assessment of the Purified Spherical Graphite facility in Bolivar. The assessment looked at the existing traffic conditions, traffic demands as a result of the development, and traffic impacts during the two-stage construction/operation of the Bolivar facility. Further details can be found in traffic impact assessment (ref. 221875).

6 Crash Statistics

Based on crash data supplied by DIT, there have been 11 crashes on Port Wakefield Road and 22 crashes on Waterloo Corner Road in the last 5-year period (i.e. 2017 – 2021). Crash statistics are summarised in the tables below.

Table 2: Crash Statistics (2017-2021 Port Wakefield Road)

	Fatalities	Serious Injuries	Minor Injuries	Total Casualties
PT WAKEFIELD ROAD	**0**	**1**	**10**	**11**
Hit Fixed Object	**0**	**1**	**0**	**1**
D.U.I.	0	1	0	1
Inattention	0	0	0	0
Reverse Without Due Care	0	0	0	0
Rear End	**0**	**0**	**7**	**7**
D.U.I.	0	0	2	2

Follow Too Closely	0	0	2	2
Inattention	0	0	3	3
Right Angle	**0**	**0**	**1**	**1**
Disobey - Stop Sign	0	0	1	1
Roll Over	**0**	**0**	**0**	**0**
Inattention	0	0	0	0
Side Swipe	**0**	**0**	**2**	**2**
Change Lanes to Endanger	0	0	2	2

Table 3: Crash Statistics (2017-2021 Waterloo Corner Road)

	Fatalities	Serious Injuries	Minor Injuries	Total Casualties
WATERLOO CNR INTERCHANGE CONNECT	**1**	**4**	**17**	**22**
Hit Fixed Object	**0**	**1**	**1**	**2**
Inattention	0	1	1	2
Other	**0**	**0**	**0**	**0**
Inattention	0	0	0	0
Vehicle Fault	0	0	0	0
Rear End	**0**	**0**	**8**	**8**
Follow Too Closely	0	0	0	0
Inattention	0	0	8	8
Right Angle	**1**	**2**	**4**	**7**
Disobey - Traffic Lights	1	2	4	7
Fail to Give Way	0	0	0	0
Right Turn	**0**	**1**	**3**	**4**
Disobey - Traffic Lights	0	1	2	3

Fail to Stand	0	0	1	1
Side Swipe	**0**	**0**	**1**	**1**
Change Lanes to Endanger	0	0	0	0
DIED, SICK OR ASLEEP AT WHEEL	0	0	0	0
Inattention	0	0	0	0
Incorrect Turn	0	0	1	1
Grand Total	**1**	**5**	**27**	**33**

All Fatal and Serious Injury crashes occurred at the Waterloo Corner Road / Port Wakefield Road signalised intersection, with the crash types being right angle, right turn or hit fixed object.

Figure 3 provides a summary of the crash statistics including the key road and the cross road where the crash occurred.

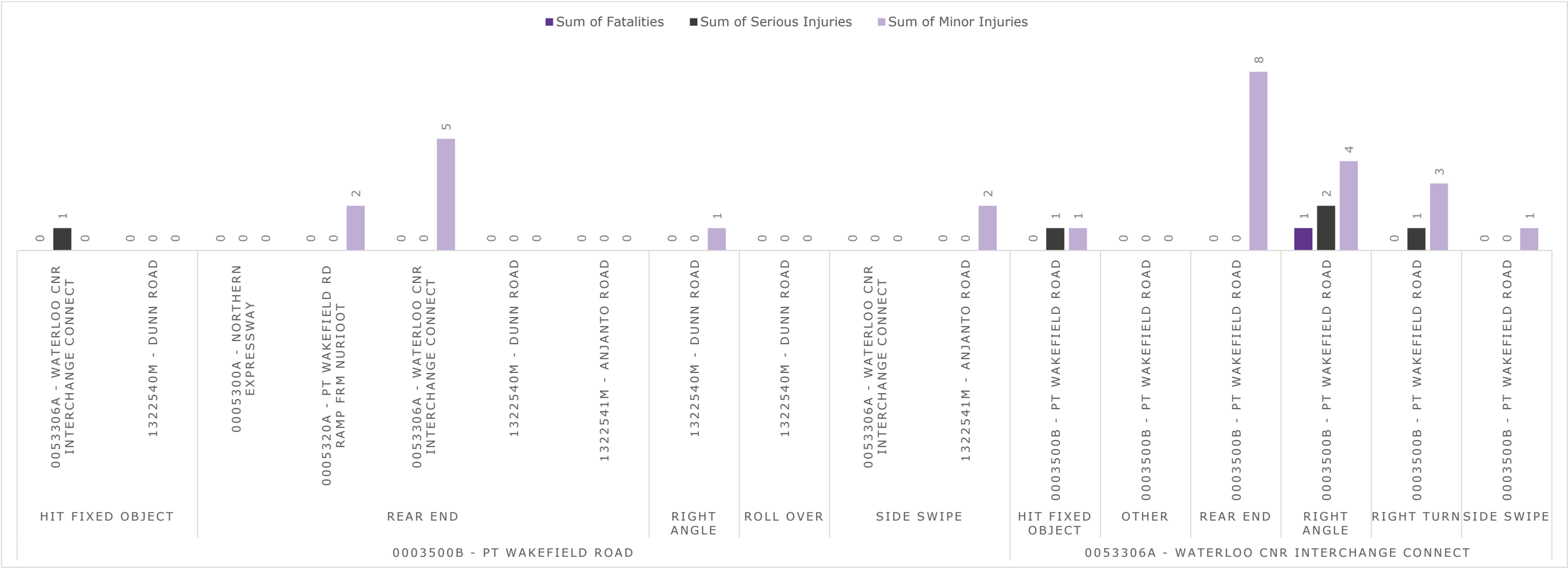

Figure 3: Crash Statistics Summary (2017-2021)

7 Vehicle Turning Movements

A 40.7m AB Triple vehicle combination was modelled in Autoturn based on dimensions provided by Renascor. The modelled parameters are presented in Appendix B along with a comparison with the turning movements of a 39.99 m AB Triple; the comparison shows that there is little difference between the two turn paths for a 12.5 m radius. A turning movement sketch was prepared for the 40.7m AB Triple vehicle for the right turn from Port Wakefield Road into Waterloo Corner Road, and is presented in Appendix A.

8 Geometric Constraints

Assessment of the suitability of the proposed route for PBS Level 3B access has been undertaken based upon a drive through of Port Wakefield Road, preparation of turn path sketches on aerial photography, and assessment against the geometric constraints outlined in the NHVR publication "The Performance Based Standards Scheme – Network Classification Guidelines" (2007) and the Austroads Guide to Road Design Part 3: Geometric Design, as detailed below.

The PBS Network Classification Guidelines provide several geometric constraints for Level 3 vehicles based on the road's AADT. Key constraints are:

Table 4: NHVR Network Classification Guidelines geometric constraints

Constraints	Reference	L3 Road Class
Minimum Lane Widths for Urban and Township Roads	Table 2	3.6 m wide lanes (80-100 km/h)
Minimum Widths for Sealed Rural Roads	Table 3	3.5m wide traffic lanes and 1.3m wide shoulder for L3 vehicles on roads with an AADT > 3000 vehicles per day.
Curve Widening	Table 5	Curve widening required where curve radius is less than 700m.
Bridge Widths	Table 6	7.2m minimum width on rural roads where AADT is less than 500 vehicles per day.
Signalised Intersections	Table 12	Clearance time and stacking distances at signalised intersections at flat grades Intersection width –30 m Min. green plus intergreen (s) - 20.5 s (Access Class B)
Approach Visibility	Table 15	210m Stopping sight distance (0% grade, 90 km/h)

Austroads Guide to Road Design Part 3 - Table 4.5 has also been referenced to assess the route. Austroads minimum requirements are presented in Figure 4 below.

Table 4.5: Single carriageway rural road widths (m)

Element	Design AADT				
	1–150	150–500	500–1000	1000–3000	> 3000
Traffic lanes(1)	3.7 (1 x 3.7)	6.2 (2 x 3.1)	6.2–7.0 (2 x 3.1/3.5)	7.0 (2 x 3.5)	7.0 (2 x 3.5)
Total shoulder	2.5	1.5	1.5	2.0	2.5
Minimum shoulder seal (2),(3),(4),(5),(6)	0	0.5	0.5	1.0	1.5
Total carriageway	8.7	9.2	9.2–10.0	11.0	12.0

1 *Traffic lane widths include centrelines but are exclusive of edge-lines.*
2 *Where significant numbers of cyclists use the roadway, consideration should be given to fully sealing the shoulders. Suggest use of a maximum size 10 mm seal within a 20 km radius of towns.*
3 *Wider shoulder seals may be appropriate depending on requirements for maintenance costs, soil and climatic conditions or to accommodate the tracked width requirements for Large Combination Vehicles.*
4 *Short lengths of wider shoulder seal or lay-bys to be provided at suitable locations to provide for discretionary stops.*
5 *Full width shoulder seals may be appropriate adjacent to safety barriers and on the high side of superelevation.*
6 *A minimum 7.0 m seal should be provided on designated heavy vehicle routes (or where the AADT contains more than 15% heavy vehicles).*

Figure 4: Single carriageway rural road widths (Austroads Guide to Road Design Part 3)

9 Route Assessment

Item	Assessment Findings	Risk Assessment	Recommendations
Road Width			
1.	Port Wakefield Road is a divided, four-lane dual carriageway arterial road with a posted speed limit of 90 km/h. The lane widths are 2x3.5 m wide (typical), with a minimum 2.0 m wide sealed shoulder. The widths generally comply with minimum requirements in Austroads Guide to Road Design for a dual carriageway road, and the NHVR Network Classification Guidelines.	**Comment**	
Road Geometry			
2.	There is a single horizontal curve in the section of road being assessed. The horizontal curve radius is approximately 650 m based on aerial measurements. Lane widths are 3.5 m wide. The network classification guidelines stipulate lane widening of 0.2 m beyond a minimum lane width of 3.5 m. While the existing lane width is not wide enough, there is a sealed pavement in the gore area in between the outside lane on Port Wakefield Road and the on ramp onto Port Wakefield Road from the Northern Expressway. The width of the gore area at the apex of the curve is 1.70 m and therefore there is sufficient sealed width for the vehicle to track through the curve.	**Possibility** Conceivable but Very Unlikely **Exposure** Infrequent **Consequence** Important **Priority** P4 – Low Risk	
Sight Lines			
3.	The alignment on approach to the signalised intersection at Waterloo Corner Road is straight, and the grade appears flat. There are	**Comment**	

Item	Assessment Findings	Risk Assessment	Recommendations
	advance warning signs prior to the intersection to warn motorists of the signalised intersection. Sightlines to the traffic signals are considered appropriate.		
Turning Movement Assessments			
4.	A turning movement assessment was undertaken at the Port Wakefield Road / Waterloo Corner Road intersection for the right turn manoeuvre. This is presented in Appendix A. The intersection can cater for right turn manoeuvres of the 40.7 m AB triple vehicle combination.	**Comment**	
Intersection Geometry			
5.	The channelised right turn lane on Port Wakefield Road, at the Waterloo Corner Road intersection, has a deceleration + taper length of 148 m. The current gazettal status of Port Wakefield Road allows PBS Level 3A vehicles, which have a maximum length of 36.5 m, to use the road. The length of the proposed vehicle is 40.7 m. The maximum length of PBS Level 3B vehicles is 42 m. The increased length of vehicles in the right turn lane may impact on storage capacity and the length available for deceleration, resulting in traffic impacts on Port Wakefield Road. The concern is the potential for rear end and side swipe crashes.	**Possibility** Conceivable but Very Unlikely **Exposure** Infrequent **Consequence** Serious **Priority** P4 - Low Risk	Review traffic impacts at the channelised right turn lane on Port Wakefield Road.
Signal Clearance Times			
6.	Based on discussions with DIT and observations made on site, the right turn green time is 5 seconds, with 6 seconds of yellow time. Noting that the clearance distance of the right turn is around 45 m, there is concern	**Possibility** Possible **Exposure** Infrequent	Review/modify clearance times at the intersection to ensure the vehicle has sufficient time to clear the intersection and conflict points.

Item	Assessment Findings	Risk Assessment	Recommendations
	that the current clearance time is not sufficient, thereby presenting an increased intersection crash risk.	**Consequence** Very Serious **Priority** P2 – High Risk	

10 Route Assessment Concluding Statement

Renascor has engaged Tonkin to undertake a heavy vehicle route assessment of Port Wakefield Road from the North South Motorway/ Northern Expressway interchange to the Waterloo Corner Road intersection.

The assessment has identified one high risk issue associated with clearance times for the right turn at the Waterloo Corner Road / Port Wakefield Road intersection. A summary of recommendations to reduce the risk associated with the use of Port Wakefield Road is provided in Table 5.

Table 5: Summary of recommendations to reduce the risk associated with the high-risk items

Item	Recommendation	Revised Risk Ranking
Item 6 – Signal Clearance Rimes	Review/modify clearance times at the intersection to ensure the vehicle has sufficient time to clear the intersection and conflict points when performing a right turn from Port Wakefield Road (North) to Waterloo Corner Road (West)	Low

Following the implementation of the recommendations for the high risk item (Table 5) the section of Port Wakefield Road assessed (i.e. the southbound lane between the North South Motorway on ramp at the Northern Expressway interchange and Waterloo Corner Road) could be used as a PBS Level 3B route provided a low level of risk is acknowledged and managed.

Appendix A – Turning Movement Assessments

THIS DRAWING IS TO BE VIEWED IN COLOUR AS SOME FEATURES / SYMBOLS ARE DIFFERENTIATED BY COLOUR. DRAWING NOT TO BE RELIED ON IF PRINTED IN GREYSCALE.

0 2.5 5 10 15
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RENASCOR RESOURCES LIMITED

WATERLOO CORNER RD AND ROBINSON RD
HEAVY VEHICLE ROUTE ASSESSMENT
TURN PATH - 40.7m AB-TRIPLE SKETCH-02

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
SK01.DWG	221294	DS111	A

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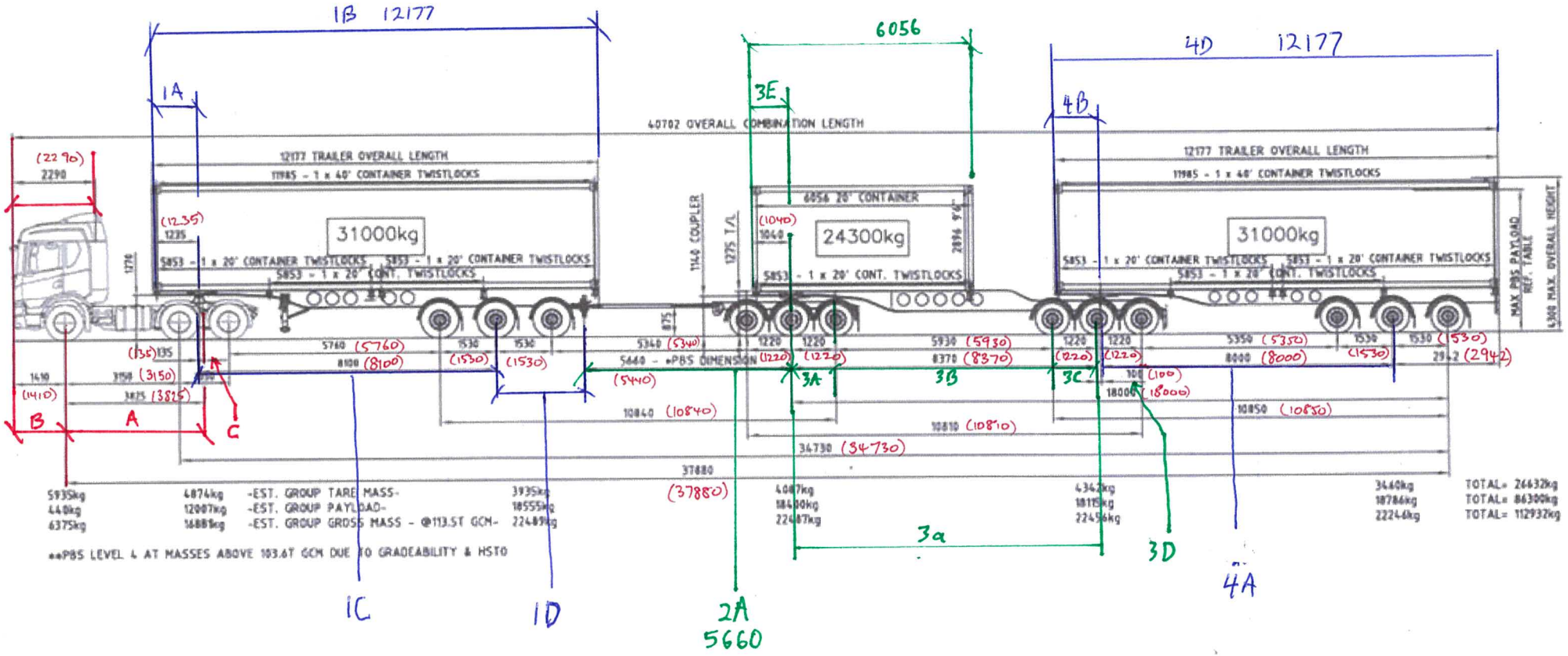
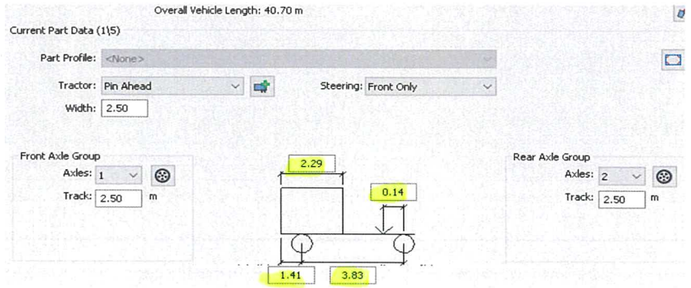
Appendix B – Turning Movement Assessments (Comparison)

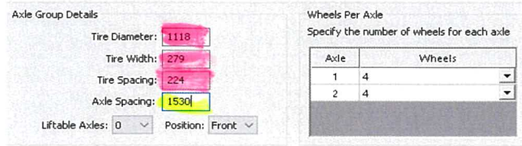
FINAL DETAIL DESIGN MAY VARY FROM THE LAYOUT SHOWN; FINAL DESIGN SHOWN ON ENGINEERING LAYOUT



CAB

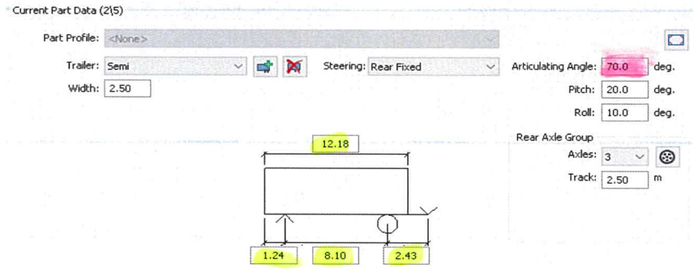
A	3.875
B	1.41
C	0.135
D	2.29



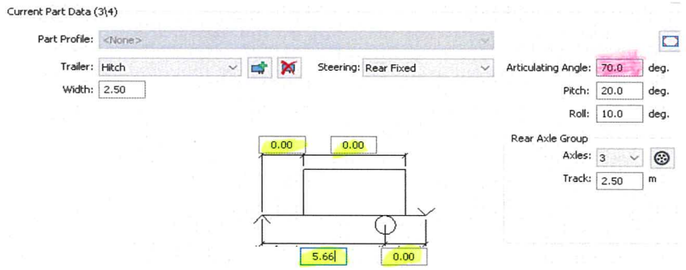


Trailer 1

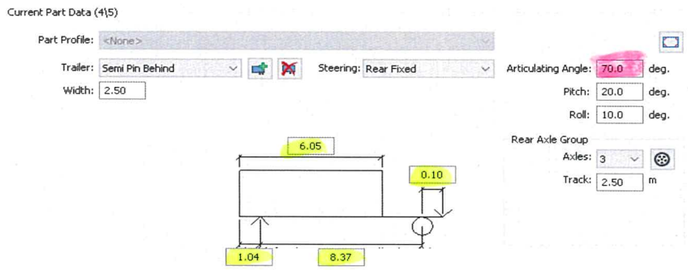
C	0.135				
1A	1.235				
1B	12.177				
1C	8.1				
1D	2.43				
1a	C+1A	0.135	1.235		1.37
1b	1C-C	8.1	0.135		7.965
1D	10.84	1.53		5.66	1.22 2.43



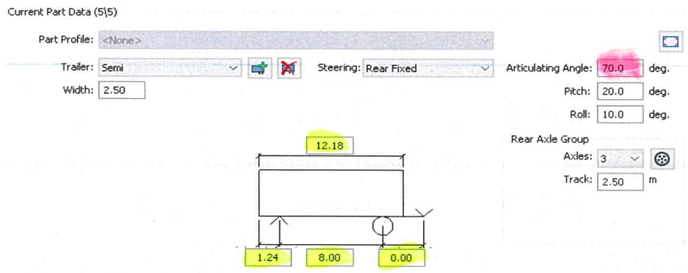
Trailer 2	2A	5.66
Hitch	2B	0
	2C	0
	2D	0

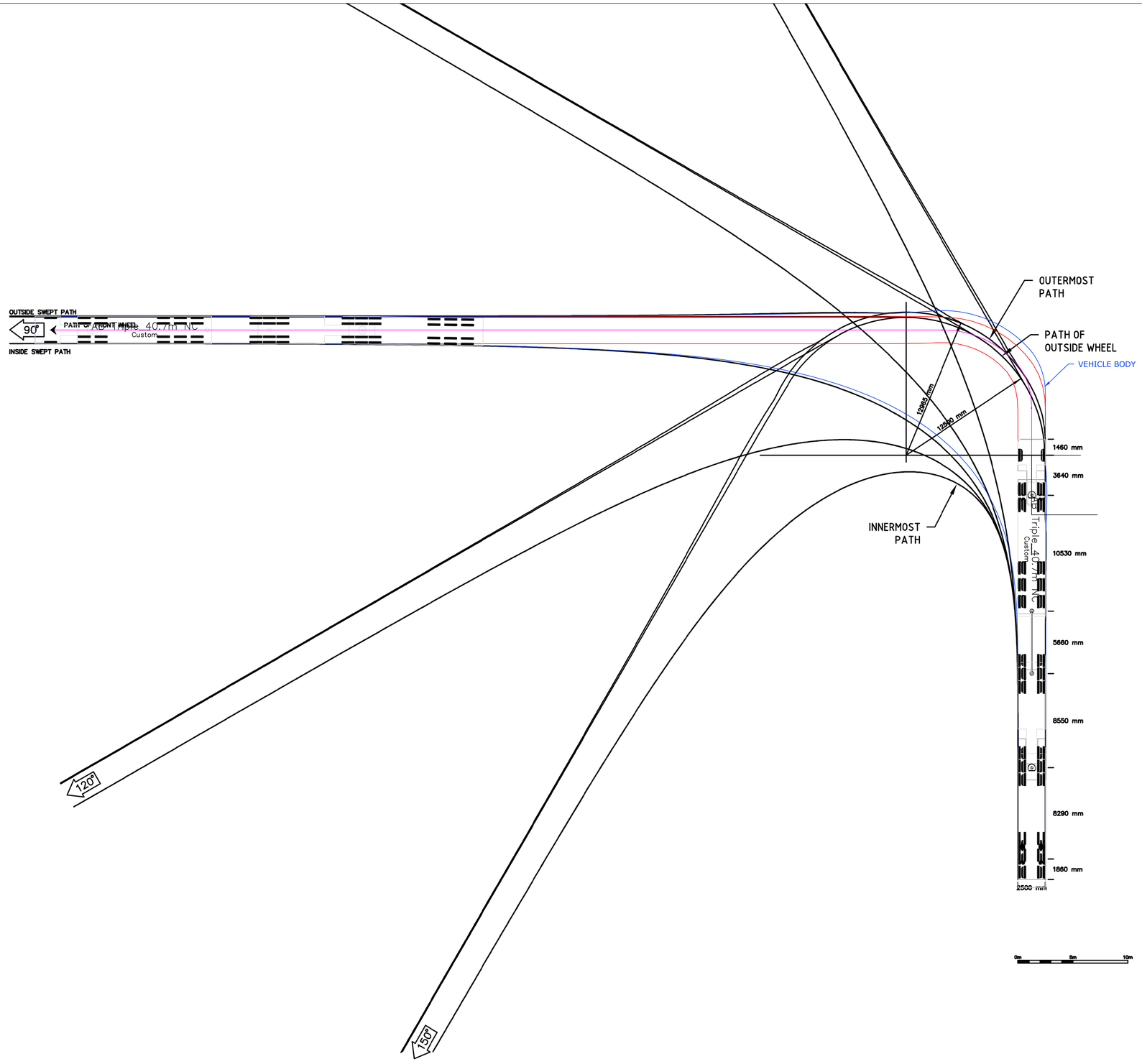


Trailer 3	3A	1.22
Hitch	3B	5.93
	3C	1.22
	3D	0.1
	3E	1.04
	3F	6.054
3a	3A+3B+3C	1.22 5.93 1.22 8.37



			1.135
Trailer 4	4A	8	
	4B	1.235	
	4C	0	
	4D	12.177	
	4E		
	4F		
	4B	12.177 5	8 2.942 1.235





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AUTO TURN - AB TRIPLE 40.7m
90 Deg TURN
STANDARD AT Radius

FILENAME: AB TRIPLE 40.7M - 90DEG.DWG
PROJECT NUMBER 221294
DRAWING NUMBER FIG 1
REVISION

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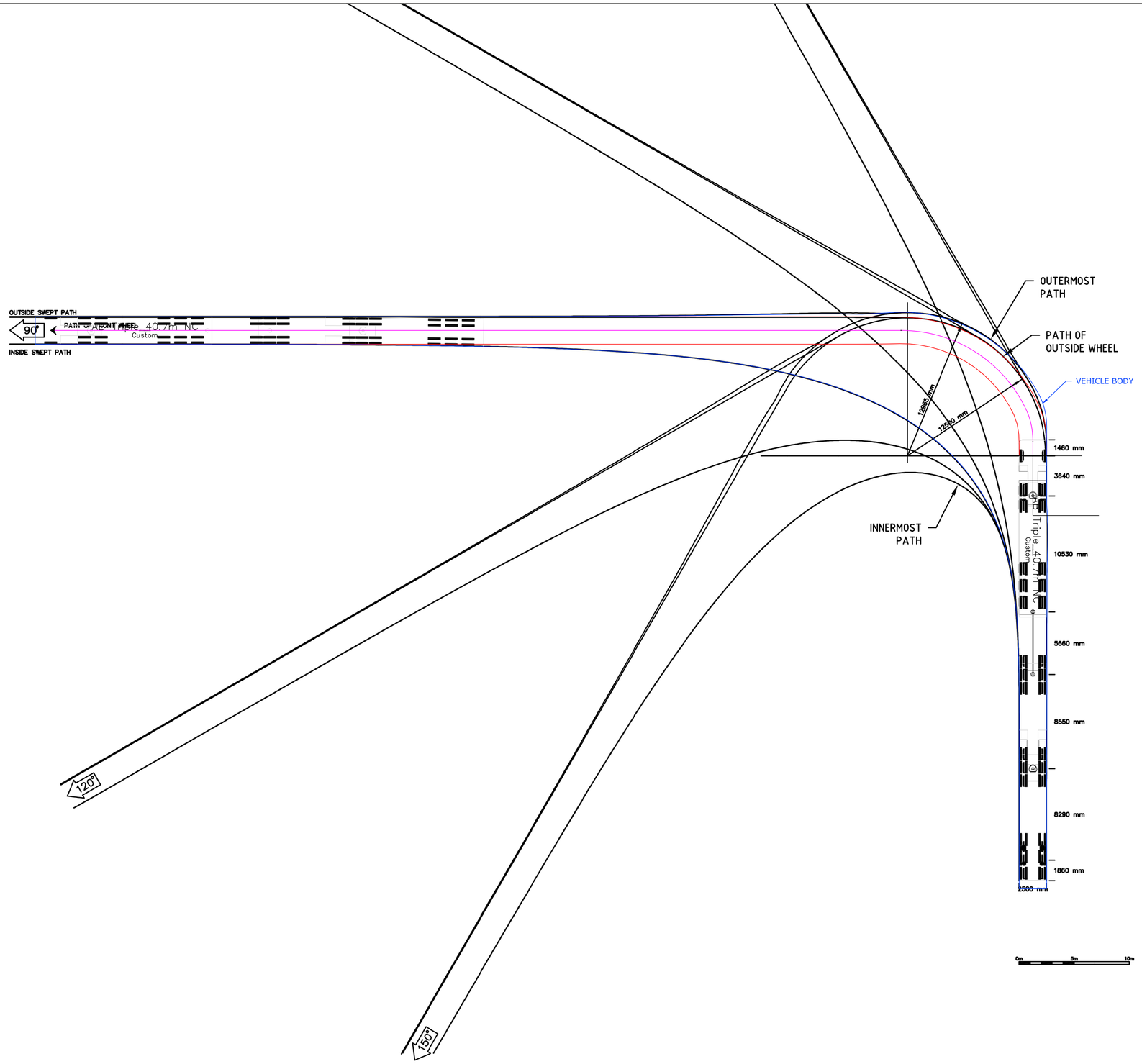

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AUTO TURN - AB TRIPLE 40.7m
90 Deg TURN
12.5m CL Radius

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PROJECT NUMBER 221294
DRAWING NUMBER FIG 2
REVISION

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Appendix 15 Visual Amenity Impact Assessment

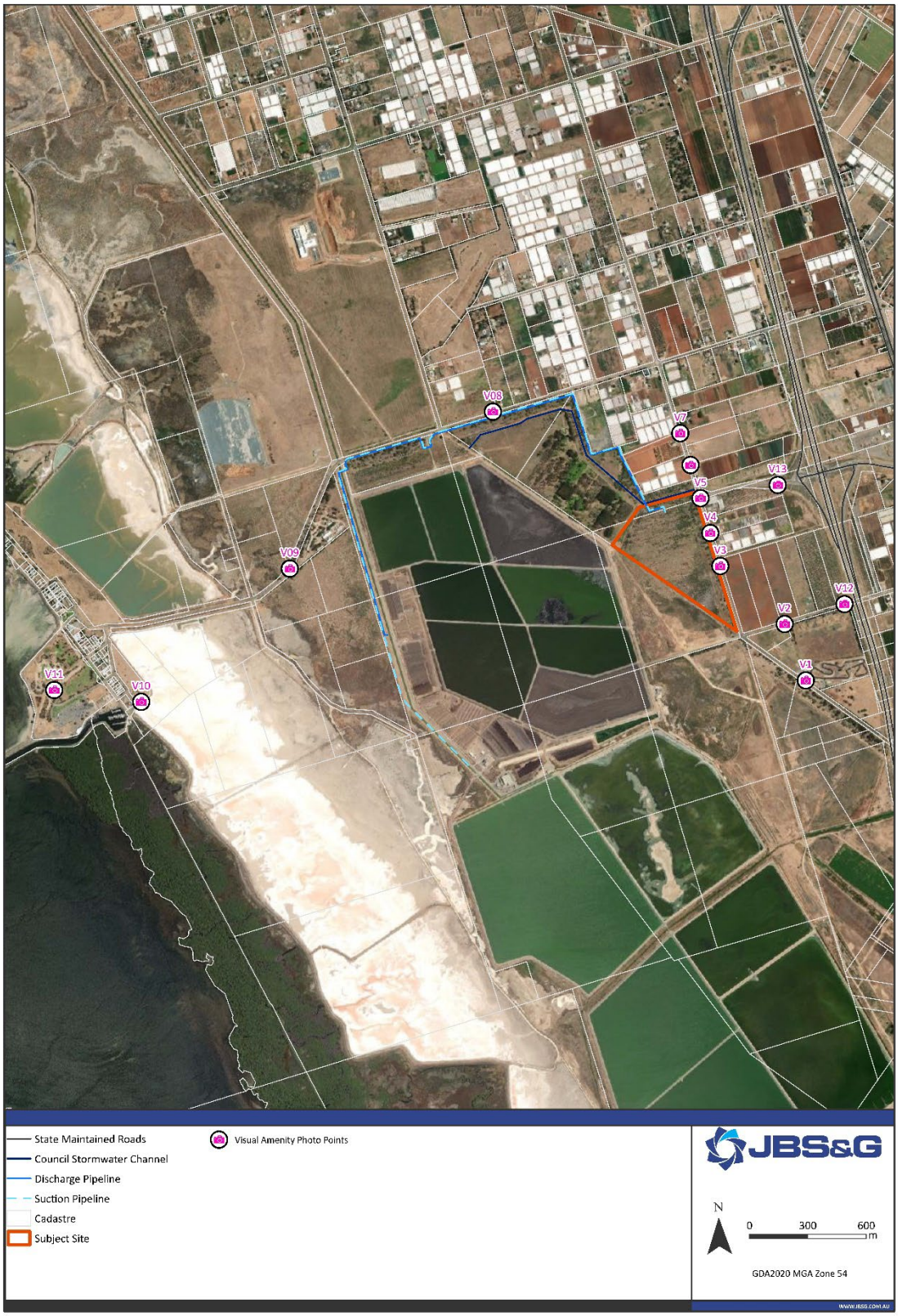


Figure 1: Location of the visual amenity photo points

Figure 2: Visual Point V01 Southern Go Kart Club existing visual character

Figure 3: Visual Point V01 Southern Go Kart Club Project render

Figure 4: Visual Point V02 Undo Road existing visual character

Figure 5: Visual Point V02 Undo Road Project render

Figure 6: Visual Point V03 Robinson Road south existing visual character

Figure 7: Visual Point V03 Robinson Road south Project render

Figure 8: Visual Point V04 Robinson Road existing visual character

Figure 9: Visual Point V04 Robinson Road Project render

Figure 10: Visual Point V05 Robinson Road existing visual character

Figure 11: Visual Point V05 Robinson Road Project render

Figure 12: Visual Point V06 Robinson Road north existing visual character

Figure 13: Visual Point V06 Robinson Road north Project render

Figure 14: Visual Point V07 Robinson Road north existing visual character

Figure 15: Visual Point V07 Robinson Road north Project render

Figure 16: Visual Point V08 St Kilda Road north existing visual character

Figure 17: Visual Point V08 St Kilda Road north Project render

Figure 18: Visual Point V09 St Kilda Tramway Museum existing visual character

Figure 19: Visual Point V09 St Kilda Tramway Museum Project render

Figure 20: Visual Point V10 St Kilda marina and mangroves existing visual character

Figure 21: Visual Point V10 St Kilda marina and mangroves Project render

Figure 22: Visual Point V11 St Kilda Adventure Playground existing visual character

Figure 23: Visual Point V11 St Kilda Adventure Playground Project render

Figure 24: Visual Point V12 North South Motorway existing visual character

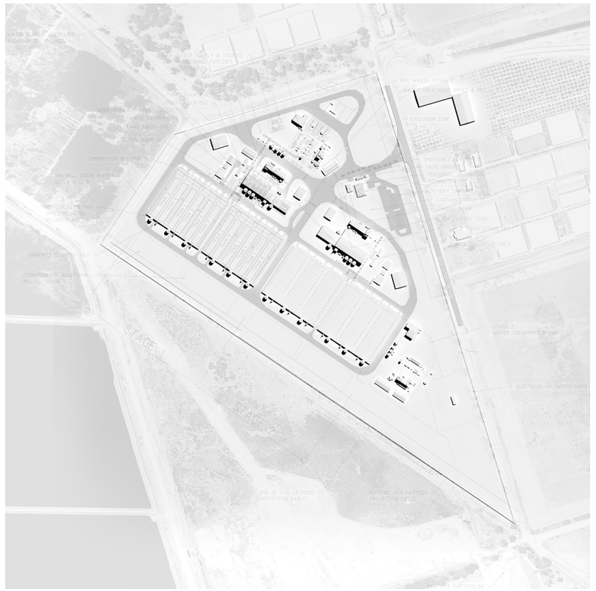
Figure 25: Visual Point V12 North South Motorway Project render

Figure 26: Visual Point V13 St Kilda Road, east of site, existing visual character

Figure 27: Visual Point V13 St Kilda Road, east of site, Project render

Summer Solstice 2023

09:00



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Winter Solstice 2023

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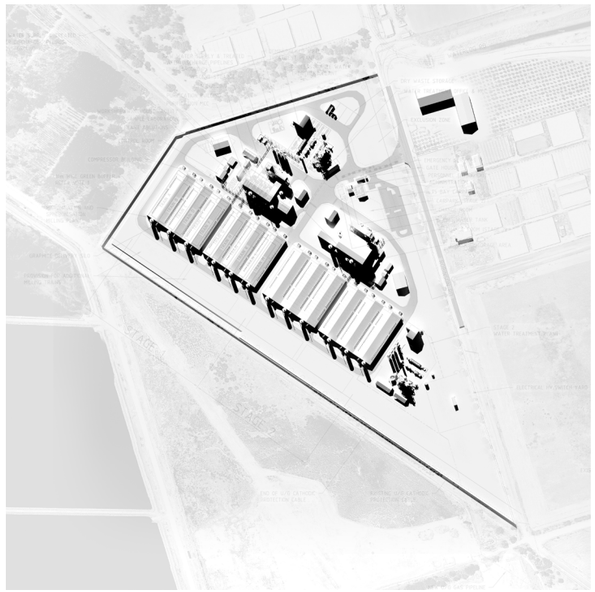

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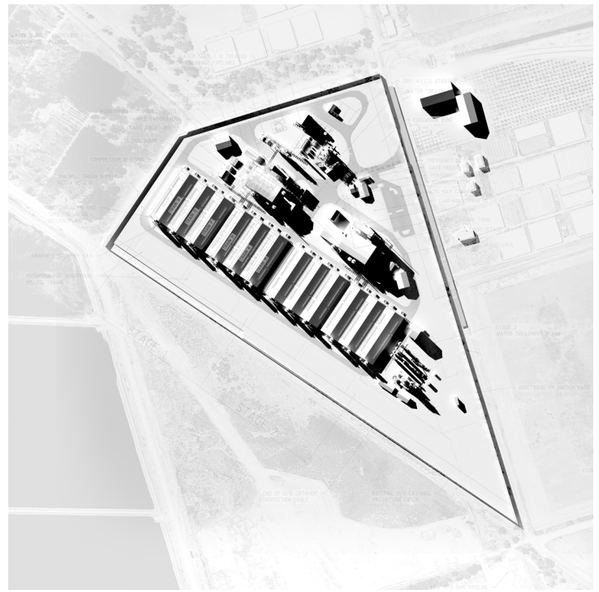

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Figure 26: Shadow Diagrams

Appendix 16 Economic Evaluation of the Renascor Resources Mine and Processing Project

ERC
Economic & Financial Analysis

Economic Evaluation of the Renascor Resources PSG Processing Project

Summary Report

Barry Burgan, ERC Pty Ltd

17 August 2023

Economic Evaluation of the Renascor Resources PSG Processing Project – Summary Report

Barry Burgan, ERC Pty Ltd *

17 August 2023

Table of Contents

Context of the Evaluation 1

PSG Facility Development and Operation 2

Other economic impact considerations 3

Benefit Cost Outcomes Perspective 3

List of Tables

Table 1: Modelling Results –Economic Contribution of Renascor Resources Graphite Project – PSG Facility 2

List of Figures

Figure 1: : Employment Outcomes - PSG facility 3

* Barry Burgan has undertaken this study on behalf of Economic Research Consultants. This study, while embodying the best efforts of the investigator, is but an expression of the issues considered most relevant, and neither the individual nor associated organizations can be held responsible for any consequences that ensue from the use of the information herein.

Context of the Evaluation

This report represents an evaluation of the economic contribution of a proposal by Renascor resources to develop a processing plant (purified spherical graphite (PSG)) will to the Northern Adelaide region, and the state as a whole. The PSG plant will be supplied mined graphite from a proposed mine in the Eyre Peninsula.

The Project is to be developed in 2 stages, with the second stage effectively doubling the capacity of the first stage. The mine has an expected 40-year life if both stages are completed.

The location of the processing facility is intended to be 20km north of Adelaide CBD in Bolivar with land leased from SA Water on their Wastewater Treatment Facility. The location of the mine is12km from Arno Bay (Eyre Peninsula, located ~100km central between Port Lincoln and Whyalla).

Purified Spherical Graphite is an important product in supporting modern technological operations, used as battery anode material for lithium batteries made for the electric vehicle market. Secondary markets for graphite fines could be (refractory, carburizer, sporting equipment, lubricants, pencils etc.).

This report summarises the modelling outcomes of the economic benefits of the PSG Processing plant. The project has a long term economic benefit in terms of employment and income creation for individuals and businesses in the state of South Australia, and in particular for the region of Northern Adelaide. The modelling indicates that in the face of short term economic uncertainty and possible slowdown (with increasing unemployment), the project constitutes a positive investment that enhances the medium to long term future of the state. In addition the importance of the product in batteries, especially to support the EV market, means the projects contribute strongly to the state's plans for development with respect to having a "world leading position on decarbonisation"[1] and further provide the prospect of outcomes beyond the direct economic outcomes of this project – with an industry network that can support spin-offs and additional investment.

Given the focus of the projects in Northern Adelaide – it is noted that over the last decade that region has experienced limited employment growth, and indeed in wealth generating activities with manufacturing employment outcomes decreasing Therefore the project contributes positive outcomes in diversifying the underlying export oriented economic activity in the areas.

To undertake the economic modelling Renascor Pty Ltd have provided details of their expenditure for the project operations, and of the work force required for the project. The expenditure has been allocated to the respective industries in which it occurs, and then has been modelled in a whole of economy model[2] which traces the induced effect of the expenditure to provide an estimate of the total economic contribution of the Project[3].

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1 https://www.energymining.sa.gov.au/home/news/latest/economic-statement-to-map-out-south-australias-future

2 The economic model used for this evaluation is a 35 industry sector framework based on the 2019/20 national input output tables prepared by the ABS, with South Australian, Northern Adelaide and Eyre Peninsula tables prepared using the location quotient method and data from State Accounts, and State Labour Force and the 2021 census – updated to 2023 based on inflation. An input output model is a simple and unconstrained general equilibrium model – and given the long term nature of the investment produces similar results as would more complicated models as in the long term the constraints are generally limited.

3 The key indicators of economic impact reported are:

- Gross State/Regional Product (GSP/GRP) – which is a measure of the net contribution of an activity to the state economy as defined within the national accounting framework - and is the value added created in the economy – the sum of household income with gross operating surplus or other value added.
- Compensation of Employees – the gross wages generated for the household sector (employees).
- Employment - the number of full-time equivalent (FTE) jobs.

The report also considers these outcomes within a broader benefit cost context – and it is noted that these economic benefits as modelled are the dominant aspect of a benefit cost review of the projects.

PSG Facility Development and Operation

Table 1 provides a summary perspective of the estimated or modelled impact of the processing (PSG) facility development and operations on the state and regional economies over the initial 2 years of construction and 40 years of operation, while Figure 1 depicts the employment outcomes year by year (for the first 10 years of operation) for the processing activity. In summary it is estimated that:

- The project will generate a total positive **impact on Gross State Product of an estimated $2.6 billion** over the extended period (in present value terms and excluding the Gross Operating Surplus of the activity).
- This impact includes **$1.4 billion of estimated wages and salaries paid to SA resident households,** and an estimate of 1,**286 full time equivalent jobs supported** every year throughout the economy (232 in an ongoing basis in operations, and 480 in suppliers to the activity, with the balance in flow through effects).
- 61% of the impact will occur in the Northern Adelaide region, with the remainder occurring elsewhere in South Australia (especially the broader metropolitan area, with some benefits the Eyre Peninsula through ore transportation activity).

TABLE 1: MODELLING RESULTS –ECONOMIC CONTRIBUTION OF RENASCOR RESOURCES GRAPHITE PROJECT – PSG FACILITY

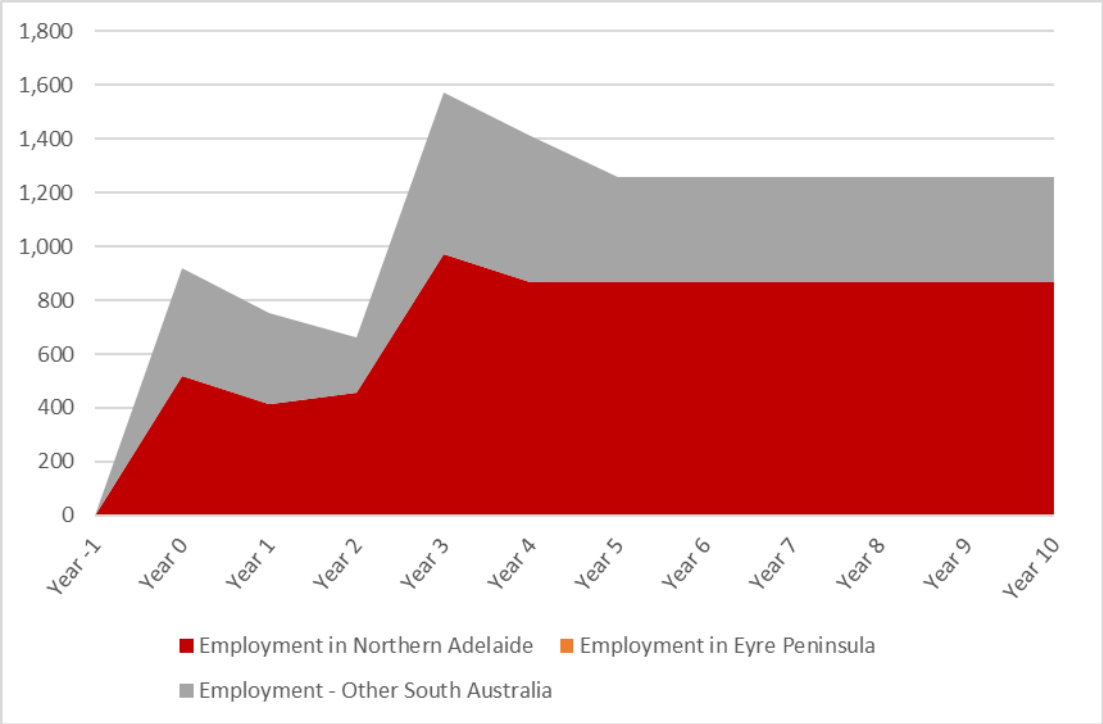
	Stage 1			Stage 2			Combined Stages		
	State	Northern Adelaide	Other SA	State	Northern Adelaide	Other SA	State	Northern Adelaide	Other SA
Project Outcomes									
Gross State/Regional Product ($m)	$1,500.1	$922.8	$577.3	$1,136.2	$694.8	$441.3	$2,636.2	$1,617.6	$1,018.6
Compensation of Employees ($m)	$811.4	$517.8	$293.6	$613.3	$388.3	$225.0	$1,424.7	$906.1	$518.6
Average annual employment (FTEs) created	697	458	239	589	385	204	1,286	843	443

Source: Modelled results– 42 Year Present Value. Note that stage 2 results are in present value terms as per the commencement of the project – although the activity does not start until Year 3/4 for construction and year 5 for operations.

Estimates of economic impact are modelled Figure 4: Total Project Employment Outcomes – by Employment category in terms of:

- **Direct (employment, incomes and value added) impacts** - which is the estimated direct construction jobs related to the investment (employment by contractors in the non-residential construction, heavy engineering construction and construction services industries), and the employment by Renascor in terms of operations.
- **First Round impact** – impacts in direct suppliers to the investment and operations phases, including for example fabricated metals, machinery and equipment, electricity, professional services etc.
- **Induced or flow-on impacts** (impacts caused by the supply chain effects) – which are a combination of production (or business to business supply chain) and consumption induced impacts , and
- Total impacts (the sum of direct, first round and induced).

FIGURE 1: : EMPLOYMENT OUTCOMES - PSG FACILITY



Other economic impact considerations

Not included in the above is the benefit to the state in terms of taxation outcomes and other payments – it is estimated that activities will deliver $7 million of annual direct additional payments for stage 1 only. This is generated through royalties , payroll tox, general taxes and other payments. With the inclusion of stage 2 the annual additional payments increase to over $13 million. The present value of taxation and other payment outcomes amount to $158 million over the 42 year period of stage 1 and stage 2.

Benefit Cost Outcomes Perspective

From a benefit cost assessment context, it is noted that the major benefits of the project relates to the impacts on economic activity as estimated above – in short, the project delivers to the state an incomes generated net benefit of $2.6 billion per year over the 42 years of the assessment (present value discounted at 6% real). Given the current economic uncertainties with expectations of an economic slow down or recession in the short term, and the impact of climate change and market shifts in agriculture in coming years this can be considered the core component of a cost benefit evaluation.

The project description indicates there is limited cost impacts of the project, with the major possibilities being:

- Some offsetting impact in terms of traffic congestion and road use of the transport of the ore from mine to processing plant and of the PSG product from the plant to the port for export – with an average of 3-4 road trains per day (in each direction) for the mine to processing plant transport re stage 1, increasing to 7 when stage 2 is implemented. Relative to current traffic on the roads used (regional and roads to port) this is relatively marginal additional contribution to road volumes.

- Visual amenity affect – the processing plant is located in an industrial area and as such does not change the perspective significantly.
- Environmental risks – the processing activity will involve some water discharge and the normal outcomes of some dust and emission. The application of strict environmental approval requirements, and experience in such projects will minimise this impact of these risks.

Other potential benefits which have not been quantified include:

- Benefits in terms of state pride in terms of the state contributing to climate change management in a global perspective by inputting into the broader availability of batteries in EVs etc.
- There are possibilities of further developments that could occur based on approval of this project (additional value added, additional projects using the infrastructure) but such projects are not at a sufficient status to include in the modelling or assessment.

Appendix 17 Waste Management and Minimisation Strategy

Waste Management and Minimisation Strategy

Table of Contents

1 Introduction 2

2 Legislative Requirements 3

3 Project Description 5

3.1 Key Project activities 5

4 Waste Management Hierarchy 6

4.1 Avoidance and Minimisation of Waste 6

4.2 Reuse and recycling 6

4.3 Treatment and Disposal 7

5 Potential Waste Sources and Management 8

6 Implementation 11

6.1 Roles and Responsibilities 11

6.2 Awareness and training 11

6.3 Monitoring 11

6.3.1 Reporting and compliance 12

6.3.2 Review 12

1 Introduction

This Waste Management and Minimisation Strategy (WM&M Strategy) has been prepared to accompany Renascor's Environment Impact Statement (EIS) for the Battery Anode Material (BAM) Facility in the Bolivar area of Adelaide's northern suburbs as part of the Siviour Battery Anode Material Project (Siviour BAM Project).

The purpose of the WM&M Strategy is to describe the principles and procedures for the management of the waste generated by the BAM Facility and outline measures to manage and mitigate waste generation and resource consumption during construction and operation. This includes addressing sources of waste from construction and operation of the BAM Facility and the measures to be implemented to manage, reuse, recycle and safely dispose of the identified waste.

The WM&M Strategy will be updated prior to construction and supporting plans and procedures developed where required.

2 Legislative Requirements

The *Environment Protection Act 1993* (EP Act) sets out the general environmental duty to take all reasonable and practical steps to prevent or minimise environmental harm. This requirement includes the management of waste. The EP Act prescribes the waste management hierarchy (refer Figure 2-1).

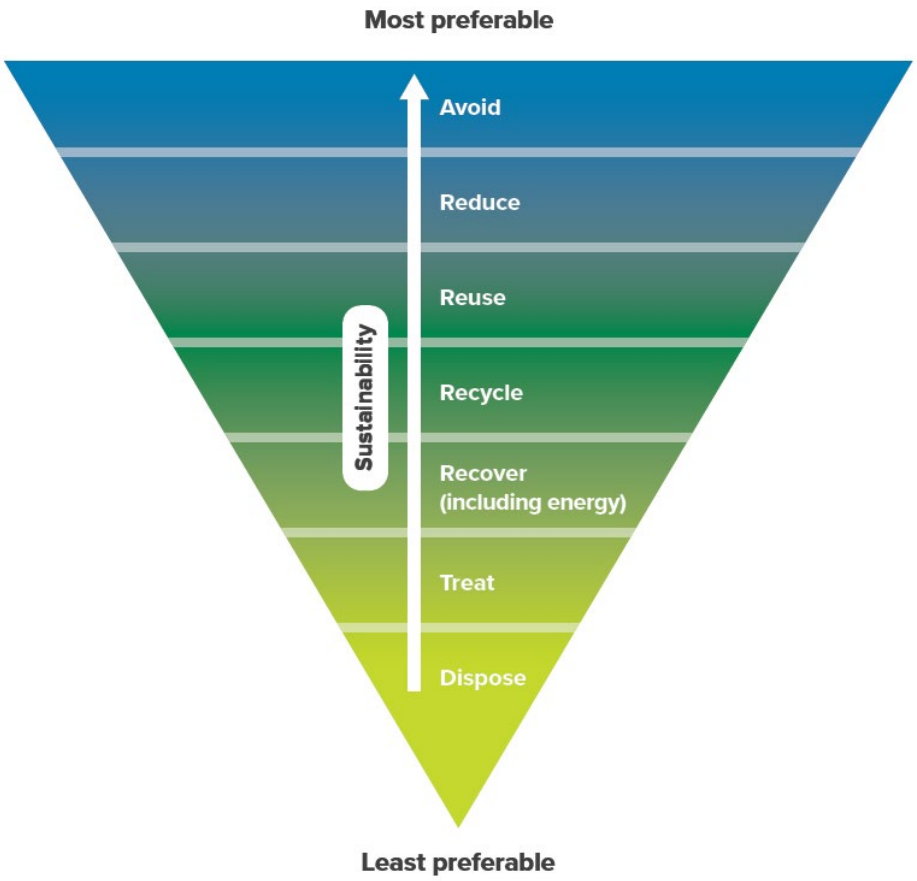


Figure 2-1 Waste management hierarchy

The EP Act also provides for listed wastes which have specific management and disposal requirements due to their potentially contaminating nature.

The *Environment Protection (Waste to Resources) Policy 2010* (Waste to Resources EPP) prescribes general waste management obligations. The primary objective of the Waste to Resources EPP is to achieve sustainable waste management by applying the waste management hierarchy consistently with the principles of ecologically sustainable development. To meet the Waste to Resources EPP waste management objective, waste management should:

- Promote best practice and accountable waste management,
- Include effective recording, monitoring and reporting systems for the treatment, transportation and disposal of waste and other matter,
- Promote environmental responsibility and involvement in waste avoidance, waste minimisation and waste management within the community.

The *Environment Protection (Water Quality) Policy 2015* (Water Quality EPP) aims to achieve the sustainable management of waters, by protecting or enhancing water quality while allowing economic and social development.

The current SA Waste Strategy 2020-2025 supports maximising the reuse, recycling and recovery of materials. Its mission is to support the development of a circular economy within South Australia by focusing on five priority areas including; transitioning to a circular economy, market development for secondary products, infrastructure capability and capacity, reducing food waste and reducing plastics and packaging.

Other relevant legislation, standards and guidelines for waste management include:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013) (NEPM)
- The *South Australian Public Health (Wastewater) Regulations 2013* (SA)
- *Work Health and Safety Regulations 2012* (SA)
- EPA SA Guidelines (EPA 080/016): Bunding and spill management
- Australian Standard AS 1940 The storage and handling of flammable combustible liquids.

3 Project Description

The proposed Project involves the construction and operation of a Battery Anode Material (BAM) Facility in the Bolivar area of Adelaide's northern suburbs as part of the Siviour Battery Anode Material Project (Siviour BAM Project). The BAM Facility includes:

- Graphite milling machinery comprising mechanical micronisation / spheronisation circuits, associated feed hoppers, dust mitigation, collection and conveyance structures, including collection of by-products
- Caustic roast kiln including reagent mixing, cooling equipment, lump-breaking and re-pulping equipment
- Leach tanks (caustic and acid), filtration structures and repulp tanks
- Chemical storage equipment for solid and liquid reagents including appropriate bunding / hardstand areas
- Product bagging plant equipment
- Mechanical, hydraulic and pneumatic conveyance, feed structures and hoppers for moving graphite, reagents and wastes around the plant
- Truck loading and unloading facilities, access and egress
- Product storage silos
- Water treatments (reverse osmosis, demineralisation, process water treatment plant)
- Solid waste product isolation, drying and containment.
- Process monitoring equipment
- Kiln and associated equipment
- Supporting buildings including administration, security ablutions, laboratory and maintenance.

3.1 Key Project activities

The key construction activities include:

- Vegetation clearance and earthworks for BAM Facility, access and laydown areas.
- Temporary stockpiling of topsoil and subsoil
- Transport of materials and equipment to construction locations
- Pouring of concrete footings
- Installation and commissioning of equipment
- Installation of permanent security fencing and gates
- Rehabilitation of temporary areas of disturbance (including clean up of waste materials).

Key operation and maintenance activities to be undertaken include:

- Transport of materials and workers to and from the site
- Mechanical milling and spheronizing of graphite including collection of by-products (graphite fines)
- Chemical refinement of graphite (using caustic and acid processes)
- Bagging and export of product
- Treatment of raw water feed and process water.

4 Waste Management Hierarchy

Waste management for the Project will be undertaken in accordance with the waste management hierarchy (refer Figure 2-1), which underpins the objectives of the Waste to Resources EPP and in line with the South Australian Waste Strategy (EPA SA, 2020). The waste management hierarchy demonstrates the preferred approaches to waste management in the order of priority as follows:

A) Avoidance of the production of waste
B) Minimisation of the production of waste
C) Reuse of waste
D) Recycling of waste
E) Recovery of energy and other resources from waste
F) Treatment of waste to reduce potentially degrading impacts
G) Disposal of waste in an environmentally sound manner.

Options for waste management for priority is listed in Table 4-1, the approach to these priorities is included below.

4.1 Avoidance and Minimisation of Waste

The Project will avoid waste generation and endeavour to reuse waste material where practicable. Waste will be avoided through strategic selection of materials during design and purchasing which take into account options which may reduce waste generation for the Project. Careful planning for procurement of the specific types and quantities of materials required for construction activities will further minimise waste generation.

Measures to achieve avoidance and reduction of waste may include:

- Development of a procurement policy which considers waste avoidance measures such as:
    - Ordering site specific or prefabricated items where practicable to minimise surplus material
    - Consideration of packaging material provided by suppliers during purchasing and reduce this requirement where possible, or consider returnable packaging
    - Consideration of recycled items when selecting materials
- Refinement of waste stream estimates to ensure adequate on-site storage and waste segregation to facilitate recycling
- Refinement of estimated volumes of materials for construction
- Bulk supply of processing inputs and onsite storage in appropriate tanks rather than delivery in Intermediate Bulk Containers
- Minimisation of disturbance footprint to reduce the vegetative waste produced.

4.2 Reuse and recycling

Measures to separate waste streams will be implemented to maximise opportunities for reuse of waste materials onsite. This includes segregation of wastes into appropriate dedicated bins or areas onsite, or transportation to a designated recycling facility. The Project will reuse or recycle waste material where possible including concrete, timber, plastic, metals and solid waste output from process.

Measures to achieve reuse and recycling of waste may include:

- Reuse of process water and caustic recovered from treatment process
- Investigation of alternative markets for waste products
- Stockpiling and mulching of vegetative waste (including untreated timber pallets (if unable to be re-used)) for reuse in landscaping and rehabilitation of site
- Reuse of excavated materials for clean fill onsite, where appropriate
- Reuse of excess construction materials at another site.

4.3 Treatment and Disposal

If waste materials cannot be reused onsite, they will be collected by appropriately licensed contractors for offsite reuse, reprocessing, recycling or final disposal. Final disposal of wastes will be to a suitably licensed waste facility that is suitable for the type and quantity of waste. Waste tracking forms will be provided to the waste facility upon arrival where required.

Measures to manage the treatment and disposal of waste materials during construction and operations may include:

- Ensuring wastes which cannot be reused or recycled and require disposal are clearly segregated from those which have the potential to be reused
- Providing segregated bins for subcontractors to dispose of construction waste (i.e., metal, plastics and cardboard)
- Inducting contractors and staff into site waste management practices
- Disposing of hazardous materials in accordance with the handling and disposal requirements of the *Work Health and Safety Regulations 2012*
- Disposing of general wastes in accordance with local council requirements
- Ensuring onsite ablutions facilities are installed in accordance with the on-site Wastewater Systems Code and the *South Australian Public Health (Wastewater) Regulations 2013*.

Only appropriately licenced transport contractors will be engaged to transport waste material offsite. The contractors appointed to transport waste will be required to demonstrate and ensure that:

- They are licensed to transport the type of waste they are contracted to receive / handle
- Waste is transported to a licensed facility capable of receiving the type and quantity of waste
- All waste is adequately covered during transport
- Waste tracking forms are provided to the waste facility upon arrival.

5 Potential Waste Sources and Management

The construction of the Project requires a range of materials including steel, electrical components, concrete, plastics and timber. Waste may be generated from these sources. Waste generated during operation will include solid waste outputs from the process as well as industrial wastes from servicing of facility components and domestic waste from onsite offices and crib rooms. Decommissioning will include demolition waste from removal of plant and processing buildings onsite, buildings and concrete footings.

Potential sources of waste generated during construction and operation are described in Table 5-1. Storage of waste (prior to treatment or disposal) will be at dry waste storage shown on site plan (Figure 5-1).

Table 5-1 Predicted waste streams generated by the Project

Waste Stream	Project Phase	Management (hierarchy step)
Processing water & brine	Operations	Treat (RO plant) & Dispose (discharge to channel)
Graphite Dust	Operations	Recover – consider potential markets for graphite fines
Demolition of buildings	Decommissioning	Reuse – disassemble plant and reuse, sell for reuse or recycle of material components.
Solid Processing Wastes: • Mixed silica aluminate & sodium silicate • Mixed calcium and magnesium carbonate • Calcium sulphate (gypsum)	Operations	Recover (investigating potential beneficial uses for third party industrial processes subject to testing and classification to identify a market). If markets are identified, appropriate testing in accordance with EPA requirements for reuse will be undertaken. Disposal (base case option is to dispose offsite – chemically neutral)
Boiler blowdown and cleaning chemicals	Operations	Disposal as trade waste
General construction: • Infrastructure and services • Laydown areas • Temporary offices	Construction	Reuse – temporary offices and other equipment or reusable construction materials to be transported to another site for use. Disposal – material to be disposed of at the appropriate facility (was separated into recyclable material and that destined for landfill).
Clean fill and spoil from excavated materials (including PASS)	Construction	Reuse – use for areas requiring fill or spread over rehabilitation areas before placement of topsoil.
Vegetation and organic materials from land clearance	Construction	Reduce – minimize clearance area Recycle – mulch or compost organic matter to provide material for screening vegetation and reestablishing construction laydowns etc. Mulched and composed material will be stockpiled onsite during construction, excess material not required for landscaping or revegetation will be disposed of to landfill.
Waste concrete	Construction	Reuse – transport to another site for use. Where not possible, waste concrete will be collected in washout bays, solidified and transported to a licensed facility for reuse or disposal.
Steel and metal	Construction	Reuse - sell excess for other developments or used metal for scrap.

Domestic waste	Construction, operations and decommissioning	Recycle – separate waste streams at source (recycling, food waste and landfill) to reduce unavoidable landfill
Timber	Construction and operations	Recycle – mulch or compost organic matter to provide material for screening vegetation and reestablishing construction laydowns etc.
Excess hazardous materials and chemicals or spill clean up materials.	Operations	Treat & Dispose – ensure all waste is appropriately disposed of in accordance with the relevant legislation. Onsite storage, while awaiting disposal, will be in bunded areas and spills cleaned up in accordance with the SA EPA guidelines.
Fragments of asbestos material identified in PSI (fragments are spread over a 25 by 50 m area)	Construction	Dispose – prior to construction commencing the identified asbestos on the site will be removed by a licenced contractor and disposed of in accordance with legislative requirements.
Septic wastewater	Construction and operations	Septic wastewater will be collected in an onsite septic wastewater services subject to a Wastewater Works Approval under the Public Health Act 2011 and subsidiary legislation. Wastewater will be collected in a tank with a contractor pumping it and transporting to a licenced facility.

Figure 5-1 Location of dry waste storage

6 Implementation

6.1 Roles and Responsibilities

Renascor has the primary responsibility for the management and minimisation of waste, and ensuring that all legislative and regulatory requirements are met. This will include ensuring all employees and contractors are aware of and abide by the requirements of this strategy, any supporting plans and procedures, legislative and regulatory requirements. Requirements for managing waste will be set out specifically in the Project's CEMP and OEMP.

During the construction phase, a construction contractor will be responsible for undertaking waste management and minimisation in accordance with this strategy, Renascor specifications and legislative and regulatory requirements. The construction contractor will be responsible for implementing obligations outlined in the CEMP.

Licenced waste transport contractors will be employed during construction and operation (as required) and will be responsible for undertaking waste transport and disposal activities in accordance with this strategy, Renascor specifications, legislative and regulatory requirements and licence conditions.

6.2 Awareness and training

Renascor will develop and implement an awareness and training program that will be delivered to all employees and contractors involved in waste generation or management. The training will include:

- The application of the waste management hierarchy
- Common waste sources and waste streams generated from the Project
- Dangerous goods segregation and hazard classification codes
- Spill response
- Community impacts of poor waste management.

6.3 Monitoring

Regular inspections and monitoring will be undertaken for the Project during construction and operation to ensure the measures put in place to manage waste (e.g. collection and storage areas, licensed contractors) are implemented, maintained, reviewed and updated as required.

Monitoring will include the following:

- Records of the type, quantity and locations of waste generated
- Regular (timing to be determined) inspection of waste storage containers to ensure that they are maintained in a condition appropriate for their use and containment of the specific waste
- Regular (timing to be determined) inspection of skips and / or bins to ensure that cross contamination does not occur
- Records of all waste removed from site including products for reuse.

6.3.1 Reporting and compliance

Workers will report all incidents related to waste management (including any notice received from a government agency) to the Renascor Site Management within one hour of the incident occurring, or if not reasonably practicable, as soon as possible. The relevant notification entry will be made into the Renascor Incident Management System (IMS) within 24 hours.

Renascor will also regularly report on waste related matters (frequency to be determined and in accordance with regulatory requirements) including the following:

- Results of inspections and formal environmental audits
- Report of compliance with approval and licencing conditions
- Summary of complaints received during the Project construction and operation.

Non-compliances will be reported to the Renascor Site Management and appropriate corrective actions undertaken in line with Renascor's ESMS.

6.3.2 Review

This Strategy will be formally reviewed annually by the Siviour BAM Facility Senior Management.

Review will include a process of adaptive management, whereby the effectiveness and performance of current controls and mitigation measures are assessed and improved to ensure robust environmental performance.

Appendix 18 Draft Discharge Criteria Management Plan

Table of Contents

1 Introduction 2

1.1 Monitoring Objectives 2

2 Legislative Requirements 3

3 Background Information 4

3.1 Description of Receiving Environment 4

3.2 Project Description 6

4 Monitoring 8

4.1 Sampling Locations 8

4.2 Sampling Methodology 8

4.3 Analytical Methods 8

4.4 Proposed Trigger Values and Management Actions 9

5 Reporting and Compliance 10

6 Review 11

1 Introduction

This Draft Discharge Management Plan has been prepared to accompany Renascor's Environment Impact Statement (EIS) for the Battery Anode Material (BAM) Facility in the Bolivar area of Adelaide's northern suburbs as part of the Siviour Battery Anode Material Project (Siviour BAM Project).

EPA Licence Number	To be obtained post approval as part of OEMP
Project Name	Siviour BAM Facility
Address	Robinson Road, Bolivar
Contact Name	TBD
Contact details	TBD

1.1 Monitoring Objectives

This monitoring plan has been developed to fulfil two objectives:

1. Monitor BAM Facility treated process water return to the SA Water outfall channel against Environmental Protection Authority (EPA) compliance criteria (to be set by EPA licence) to demonstrate compliance with EPA licence.
2. Monitor data (including real time data) to allow for adaptive management techniques.

2 Legislative Requirements

The *Environment Protection Act 1993* creates a general environmental duty to take all reasonable and practical steps to prevent or minimise any resulting environmental harm. It outlines requirements and standards within Environment Protection Policies, including the *Environment Protection (Water Quality) Policy 2015* (Water Quality EPP) which provides the structure for managing and regulating surface and groundwater quality within SA.

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (*ANZECC, 2000) and revision (ANZG, 2018) are referenced by the Water Quality EPP and provide additional guidance on planning and managing water quality or sediment quality, including the derivation of guidance values.

ANZG (2018) sets out a systematic approach to the management and assessment of water quality for aquatic and marine ecosystems. The guidelines refer to locally derived baseline values as the most appropriate source of water quality standards and targets as well as providing default guideline values where local baseline data is not available. This area falls within the Adelaide Coastal Water Quality Improvement Plan (ACWQIP) (EPA, 2013). The ACWQIP sets water quality objectives to be achieved in the gulf for a number of analytes, a monitoring and adaptive management plan and reporting requirements.

The BAM Facility produces treated process water that is returned to the SA Water outfall channel; a man made wastewater channel and as such is not defined as surface water (i.e. the surface water quality requirements under the various policies and guidelines do not apply). The channel enters Gulf St Vincent at Freshwater Creek estuary. As the legislative water quality criteria do not apply to the SA Water outfall channel this DCMP has been developed as best practice and based on ANZG and ACWQIP where appropriate.

3 Background Information

3.1 Description of Receiving Environment

As detailed previously, the Project site is located approximately 3 km east of the coast at St Kilda. Treated process water from the project will be returned to the SA Water outfall channel which travels for approximately 11 km before entering the Gulf St Vincent at Freshwater Creek estuary. The broader estuary environment, including at the location of Freshwater Creek location, comprises mangroves within the intertidal zone and seagrass beds in adjacent coastal waters. The estuary and coastal environment across the wider area provides important feeding and nursery grounds for migratory birds, fish, crustaceans and molluscs.

The coastline from the southern end of Torrens Island to Lower Light is protected under both the *Adelaide Dolphin Sanctuary Act 2005* and the Winaityinaityi Pangkara – Adelaide International Bird Sanctuary.

A number of existing industries in the vicinity that have potential impacts on the Gulf St Vincent (including through marine discharge). These include the operating Port in Port Adelaide as well as a number of marinas and boat ramps, thermal discharge from Torrens Island Power Station, discharge from multiple WWTPs, septic tanks and community wastewater management systems around the greater Adelaide area, and stormwater run off from urban areas (CSIRO, 2007). It is noted since the review of Adelaide Coastal Waters in 2007 there has been increasing urban infill and development of the North South connector which has increased the volumes of urban stormwater being discharged to Gulf St Vincent.

The key threats to this region are high levels of suspended solids, turbidity and nutrients resulting in growth of epiphytes and reduced light for seagrass beds (EPA SA, 2013b). In late 2020 a die back event impacted approximately 9 ha of mangroves, 10 ha saltmarsh and 5 ha of sparsely vegetated or aquatic ecosystems (DEW, 2023b).

Existing Marine Water Quality

Historic industrial, commercial and urban development have had significant impacts on water quality in the Port River estuary itself. Heavy metal concentrations have however shown a decrease since the 1970s, with the phasing out of lead based petrol (CSIRO, 2007).

A summary of water quality parameters for EPA monitoring Site 8 (ACWQIP, 2008) are provided in Table 3-1. It should be noted that a longer-term (1995- 2008) data set for Site 7 (the closest to monitoring Site 8) show overall similar values (EPA SA, 2023b).

Table 3-1 Summary of background marine water quality data at EPA monitoring Site 8 (1995 – 2000)

Metal (Units)	Mean	Standard deviation	90th Percentile
Turbidity (NTU)	1.8 NTU	1.4 NTU	3.5 NTU
Salinity (µS)	56,023 µS	4,298 µS	62,300 µS
Temperature (°C)	18 °C	4.7 °C	24 °C
Cadmium (mg/L)	0.0020 mg/L	0.0002 mg/L	0.0020 mg/L
Copper (mg/L)	0.013 mg/L	0.008 mg/L	0.016 mg/L
Lead (mg/L)	0.010 mg/L	-	0.010 mg/L
Mercury(mg/L)	0.00036 mg/L	0.00012 mg/L	0.00050 mg/L
Iron (mg/L)	0.075 mg/L	0.076 mg/L	0.172 mg/L
Soluble Aluminium (mg/L)	0.039 mg/L	0.024 mg/L	0.071 mg/L
Total Aluminium (mg/L)	0.055 mg/L	0.040 mg/L	0.102 mg/L
Soluble Zinc (mg/L)	0.027 mg/L	0.021 mg/L	0.053 mg/L
Total Zinc (mg/L)	0.040 mg/L	0.038 mg/L	0.083 mg/L
Ammonia (N) (mg/L)	0.27 mg/L	0.45 mg/L	0.50 mg/L
Oxidised nitrogen (mg/L)	0.21 mg/L	0.21 mg/L	0.51 mg/L
Total Phosphorous (mg/L)	0.06 mg/L	0.06 mg/L	0.11 mg/L

Marine Water Quality Targets

The Adelaide Coastal Water Quality Improvement Plan (ACWQIP) (EPA SA, 2013b) sets out the key parameters in Table 3-2 as targets for the waters surrounding Adelaide in the Gulf St Vincent.

Table 3-2 Water Quality Objectives set out in Adelaide Coastal Water Quality Improvement Plan

Parameter	ACWQIP water quality objective	Notes
Physical parameters		
Suspended solids	< 3 mg/L (90 percentile)	
Turbidity	<1 NTU > 200 m offshore (90 percentile)	
pH	7.5 to 8.5	
Metals (95% level of protection)		
Copper	0.0013 mg/L (90 percentile)	Marine water quality exceeded this limit at time of ACWQIP
Lead	0.0044 mg/L (90 percentile)	
Zinc	0.015 mg/L (90 percentile)	Marine water quality exceeded this limit at time of ACWQIP
Cadmium	0.0055 mg/L (90 percentile)	
Organics (95% protection)		
Oils and petroleum hydrocarbons	< 1 mg/L (95 percentile)	

3.2 Project Description

The Project involves the construction and operation of a downstream mineral processing facility to produce PSG as a key component of battery anodes. The BAM Facility comprises of:

- Micronisation and spheronisation milling trains
- Caustic roast kiln
- Water treatment equipment (including reverse osmosis plant, demineralisation, caustic process water treatment and acid process water treatment)
- Leach tanks (caustic and acid), filtration structures and repulp tanks
- Industrial buildings
- Product storage silos
- Chemical reagents and waste storage including appropriate bunding and hardstand
- Truck loading and unloading facilities, access and egress
- Product bagging plant equipment
- Mechanical, hydraulic and pneumatic conveyance and feed structures
- Water pipes to the Bolivar Wastewater Treatment Plant (WWTP) outfall channel including intake and outfall points.

Other associated infrastructure upgrades, including an upgrade of Robinson Road, electricity and gas supply lines, are outside the scope of this project.

Raw water for the Project will be sourced from the SA Water outfall channel. Treated process water from the Project will be returned to the SA Water outfall channel (see above) which travels in an open channel for approximately 11 km before entering the Gulf St Vincent at Freshwater Creek estuary (refer Figure 3-1).

The Bolivar WWTP and proposed Project outfall location is located at the start of the SA Water outfall channel, and other sources discharge to the channel downstream diluting the treated process water further before it reaches the marine environment. Proposed location of monitors in relation to intake and outfall pipelines is shown in Figure 3-1.

Figure 3-1 Location of intake and outfall points for the BAM Facility

4 Monitoring

4.1 Sampling Locations

Sample locations are shown in Figure 3-1 and summarised in Table 4-1.

Table 4-1 Monitoring locations

Location	Description	Types of monitoring
-34.744, 138.555	Up stream	Real time monitoring (EC, pH, Temp) Water Quality sampling and testing
-34.738, 138.552	Down stream	Real time monitoring (EC, pH, Temp) Water Quality sampling and testing

4.2 Sampling Methodology

Real time monitors will be installed in the flow path of the channel to ensure it provides a well mixed sample of the water quality. Real time monitors will record:

- Electrical Conductivity (EC) – as proxy for salinity (ppt)[1]
- Temperature
- pH

Real time monitors will be accessed quarterly for maintenance purposes (replacing batteries, cleaning, calibration etc) or more frequently if required.

Quarterly water quality samples will be undertaken at these locations in accordance with methodology in *Regulatory monitoring and testing water and wastewater sampling* (EPA, 2007).

4.3 Analytical Methods

Quarterly water quality samples will be analysed in a NATA approved laboratory at the frequency and for the analytes set out in Table 4-2.

Table 4-2 Monitoring frequency

Frequency	Parameters Measured	Notes
Real time (RT)	Salinity, pH, temperature	Checked, cleaned and calibrated quarterly or as soon as practicable when there is a noticeable decline in RT monitoring data.
Quarterly	Salinity (in field meter, refractometer, or salinity / density meter), pH	To calibrate real time monitors

[1] Salinity calculated using standard method developed by Australian Water Quality Centre

4.4 Proposed Trigger Values and Management Actions

Comparing salinity (calculated from EC and temperature data) and pH between the upstream and downstream monitoring locations (6 hour rolling averages) will be used to determine performance of the BAM WWTP and quality of treated process water. See Table 4-3 for the triggers and actions appropriate.

Table 4-3 Trigger and Response Plan

Analyte	Value	Action
pH	Below 7.35 and above 8.75 at downstream monitor – 6 hour rolling average	Review operation of effluent treatment plants to ensure operating within normal parameters.
EC	Downstream monitor reading 3 ppt above upstream monitor over a 6 hour rolling average period.	Review operation of effluent treatment plants to ensure operating within normal parameters.
EC	Downstream monitor reading 3 ppt above upstream monitor over a 24 hour rolling average period.	Investigate the source of the increase, identify action to rectify.
EC	Downstream monitor reading 3 ppt above Upstream monitor over a 72 hour rolling average period.	Cease discharge if sustained increase (>3 ppt increase) for > 72 hours.
Temperature	n/a	Use for EC to ppt conversion.

Salinity is calculated using the following equation:

$$TDS = \frac{(0.548 \times EC) + (2.2 \times 10^{-6} \times EC^2) - (2.06 \times 10^{-12} \times EC^3)}{100}$$

Where:

- TDS is Total Dissolved Solids (g/L), and
- EC is specific conductivity (µS/cm) normalised to 25°C (Based on 2% per degree difference from 25°C).

TDS (g/L) is converted to parts per thousand (ppt) by dividing by 1.026. This assumes an average seawater density of 1.026 g/ml based on a salinity of 37 psu and a water temperature of 20°C at a depth of 15 metres.

Water quality samples will be collected on a quarterly basis and analysed for metals of interest to inform ongoing management of the effluent treatment plant.

5 Reporting and Compliance

All incidents related to water management (including trigger criteria being met, any notice received from a government agency or a non-compliance) will be reported to the Renascor Site Management within one hour of the incident occurring, or if not reasonably practicable, as soon as possible. The relevant notification entry will be made into the Renascor Incident Management System (IMS) / Environmental and Social Management System (ESMS) within 24 hours.

Following updated sample results the overall trends will be analysed to inform updated water treatment as required. Environmental Monitoring data will be required regularly (frequency to be determined in accordance with regulatory requirements) including:

- Results and interpretation of water quality and flow rate modelling.
- Report of compliance with approval and licencing conditions
- Summary of incidents occurred during the reporting period and appropriate investigations and actions undertaken to remedy them.

Non-compliances will be reported to the Renascor Site Management and appropriate corrective actions undertaken in line with the Renascor ESMS.

Key roles and responsibilities will be presented in the overarching OEMP.

6 Review

This procedure will be formally reviewed at least annually by the Siviour BAM Facility Project Manager.

Review will include a process of adaptive management, whereby the effectiveness and performance of current controls and mitigation measures are assessed and improved to ensure robust environmental performance.