Construction Environmental Management Plan (CEMP)

TripleTwoNine Endeavour Road, Caringbah

Aliro Group Pty Ltd

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Prepared by:

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SLR Project No.: 630.031866.00001

31 October 2024

Revision: 1.1

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	15 October 2024	Louis Fleming	Sean Wilson	
1.1	31 October 2024	Louis Fleming	Sean Wilson	

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Aliro Group Pty Ltd (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.

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Acronyms and Abbreviations

AIA	Arboricultural Impact Assessment
ALIRO	Aliro Group Pty Ltd
ASSA	Acid Sulphate Soils Assessment
BAR	Biodiversity Assessment Report
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CTMP	Construction Traffic Management Plan
DA	Development Application
ESCP	Erosion, Sediment and Control Plan
GBD	General Biosecurity Duty
GFA	Gross Floor Area
LGA	Local Government Area
MAASSMP	Masterplan Area Acid Sulfate Soil Management Plan
NML	Noise Management Limit
NSW	New South Wales
PASS	Potential Acid Sulfate Soils
SEE	Statement Environmental Effects
SLR	SLR Consulting Australia Pty Ltd
TGS	Traffic Guidance Schemes
TPM	Tree Protection Measures
TPZ	Tree Protection Zone
VPA	Voluntary Planning Agreement
WHS	Workplace Health and Safety

1.0 Introduction

1.1 Development Overview

The Construction Environment Management Plan (CEMP) has been prepared by SLR Consulting Australia Pty Ltd (SLR) on behalf of Aliro Group Pty Ltd (Aliro). The proposed site is located at 13 Endeavour Road, Caringbah (subject site) which encompasses Lot 2 in DP 714965. The project consists of a staged redevelopment of the subject site known as TripleTwoNine estate.

This report has been prepared to ensure appropriate management practices are followed during the site's construction and redevelopment in accordance with mitigation measures presented within the current specialist technical reports and best practice measures. Additionally, this report has been prepared to support the submission of a Development Application (DA) with the Sutherland Shire Council. The Statement of Environmental Effects (SEE) can be found on the Sutherland Shire Council (Council) website.

The TripleTwoNine Estates DA seeks approval for the staged construction and redevelopment of the subject site. The works involve the demolition of existing infrastructure and the construction of eight new buildings in a staged manner. The site is proposed to facilitate the following uses:

- warehouse and distribution.
- light industrial.
- industrial retail outlet.
- commercial.
- childcare.
- café development.

Specifically, the DA is seeking consent for:

- Retention of existing Building 1 and Building 2.
- Staged early works for each proposed new building, including:
    - Demolition of existing structures, buildings, and hardstand including removal of trees.
    - Site establishment and preparation including earthworks, construction of stormwater and services infrastructure, and augmentation of utilities as required.
- Use of the site for the following land uses:
    - Warehouse and distribution centres with ancillary office space.
    - Light industrial use with ancillary office space up to a maximum Gross Floor Area (GFA) of 18,303m^2 across the site.
    - Industrial retail outlet.
    - Commercial office.
    - Centre-based child care centre.
    - Café.
- Staged construction and occupation of the following proposed buildings, with a total gross floor area of 38,108m^2:
    - Building 3.

  - Building 4.
  - Building 5 Block 1.
  - Building 5 Block 2.
  - Building 5 Commercial, comprising:
    - Commercial premises uses including office premises and a food and drink premises (café).
    - 68-place centre-based child care centre operating 6am-8pm Monday to Friday.
  - Building 6.
  - Building 7.
  - Building 8.
- Provision of a total of 563 car parking spaces in a stage manner, comprised of 189 retained car parking spaces and 374 new car parking spaces across the site.
- Operation of the site 24 hours per day, 7 days a week (for the operational phase).
- Landscaping works and estate domain works including estate roads and footpaths.
- Estate wayfinding signage and building identification/business identification signage zones.
- Dedication of land relating to the Captain Cook Drive roundabout through a Planning Agreement with Council.
- Enter into a Planning Agreement for the signalisation of the Endeavour Road and Captain Cook Drive intersection through a Voluntary Planning Agreement (VPA) with Council.

1.2 CEMP Context

This CEMP has been prepared to inform Sutherland Shire Council's assessment of the proposed DA and has been prepared in consideration of the *Guideline for the Preparation of Environmental Management Plans* (Department of Infrastructure, Planning and Natural Resources 2004).

This CEMP has included the following components:

- Environmental management framework, including key contacts, roles and responsibilities, and regulatory requirements.
- Environmental incidents and non-compliance management strategy.
- Complaints management strategy.
- Environmental management commitments and responsibilities.
- Monitoring, inspections and reporting requirements, and
- Contingency Management Plan.

1.3 Scope

This CEMP will provide the strategic basis for the more detailed site-specific CEMP (to be developed post DA approval) and has provided specific aspects that contractors will need to address and maintain consistency within their site-specific management plans.

Additionally, this CEMP has been prepared generally in accordance with Guideline for the Preparation of Environmental Management Plans. The specific recommended inclusions, along with where these requirements have been addressed within this CEMP, are listed in Table 1.

Table 1: CEMP Context

Guideline Recommendation Inclusions	Section
Background	
• Introduction	• Section 1.0
• Project Description	• Section 1.1 and Section 2
• EMP Context	• Section 1.2
• EMP Objectives	• Section 1.4
• Environmental Policy	• Not Applicable
Environmental Management	
• Environmental Management Structure and Responsibility	• Section 3.1 and 3.2
• Approval and Licensing Requirements	• Section 3.3
• Reporting	• Section 5.0
• Environmental Training	• Section 3.4
• Emergency Contacts and Response	• Not Applicable
Implementation	
• Risk Assessment	• Section 6.0
• Environmental Management Activities and Controls	• Section 4
• Environmental Management Plans or Maps	• Section 4

Guideline Recommendation Inclusions	Section
• Environmental Schedules	• Section 4
Monitor and Review	
• Environmental Monitoring	• Section 5.0
• Environmental Auditing	• Section 5.0
• Corrective Action	• Section 3.4 & 3.5
• EMP Review	• Section 7

1.4 Objectives

The objective of this CEMP is to:

- Provide a high-level CEMP to be used as a framework in developing site-specific CEMPs post DA approval.
- Ensure the Construction Environmental Management requirements for the site are adhered to in line with the mitigation measures.
- Establish the framework for managing and mitigating the potential for adverse environmental impacts as a result of the construction of the site.
- Establish a standard for site works to operation in a manner that avoids (where possible) or minimises impacts to the surrounding environment and stakeholders.

1.5 Preparation

This CEMP has been prepared by SLR Consulting (Australia) Pty Ltd (SLR). SLR provides global environmental and advisory solutions from a network of offices in Asia-Pacific, Europe, North America, and Africa. Author qualifications are listed in Table 2 below:

Table 2: Author Qualifications

Name, Role & Division	Qualifications	Experience
Stephen Shoesmith Principal Consultant Environmental Assessment & Management	MEnvMgt BEnvSc	Stephen is a Principal Consultant in the SLR Environmental Assessment & Management team and has demonstrated environmental management, impact assessment and policy experience. Stephen has significant site and corporate experience in environmental management, project management, environmental impact assessment, land restoration, decommissioning and closure planning, risk assessment as well as facilitation and preparation of Management Plans. Stephen has also worked as a regulator within the Department of Planning, Industry and Environment, which included post approval reviews, Policy reforms and Major Project Assessments.
Louis Flemming Senior Consultant Environmental Management, Permitting & Compliance	MEnvRskAsMnt BEnvSc	Louis is a Senior Consultant in the Environmental Assessment & Management teams and has demonstrated environmental management, compliance, risk assessment and stakeholder engagement experience. Louis has significant site experience in environmental management, compliance, and community/stakeholder engagement. Louis has also proficient experience in remediation and risk assessment through postgraduate work.

2.0 Development Description

2.1 Location

The TripleTwoNine Estate (subject site) is located at 13 Endeavour Road, Caringbah and legally described as Lot 2 DP 714965 within the Sutherland Shire Local Government Area (LGA).

The subject site is situated within the south-eastern extent of the Taren Point/Caringbah industrial precinct area. Additionally, the site is bound by Endeavour Road to the north, Solander Fields to the east, Captain Cook Drive to the south and west. The subject site is also approximately 24 kilometres (km) south of the Sydney Central Business District (CBD).

The subject site is surrounded by a mix of land uses including industrial/warehouse developments associated with the Caringbah/Taren Point employment area to the northwest. There is outdoor recreation uses to the southeast, low-density residential development to the south and south west, and another high-density mixed-land use to the east.

The proposed site's location and context is shown on Figure 1, and the proposed site plan is shown on Figure 2.

2.2 Construction Hours

Construction hours will be in accordance with conditions imposed by Council. The following are standard construction hours appropriate for adoption for the project detailed in Table 3 below. Site-specific CEMP's are to clearly state hours of work in additional management plans developed post DA approval.

Table 3: Hours of Work

Activity	Day	Time
Earthworks and construction	Monday – Friday	7am to 6pm
	Saturday	7am to 3pm
	Sunday	No work

The hours of any offensive noise generating development works will be limited to between 7 am to 6 pm, Mondays to Fridays: 8 am to 3 pm, Saturdays; and no such work to be undertaken at any time on Sundays or public holidays. Construction work outside of these hours may be adopted during construction, subject to relevant development certificates. Site specific CEMP's will document out of hours construction arrangements.

2.3 Construction Site Access

Construction site access will be primarily shared, via Gannons Road and Endeavour Road during staged works to maintain safe access for contractors and existing tenants.

Figure 1: Site Aerial Photograph (Source: SEE)



Figure 2: Proposed Site Plan (Source: SEE)



2.4 Construction Contact Details

Project managers and/or relevant site supervisors will maintain an updated on-site list for the construction contact details of relevant site representatives and builders, specifying their roles, names and contact details.

Additionally, site- specific CEMPs will be prepared to be consistent with these requirements, ensuring contact details for key personnel responsible for environmental management during construction are documented.

2.5 Proposed Construction Activities

The time frame for construction commencement will be determined by the timing of the development assessment and approvals through Council.

Table 4 outlines the proposed works and associated site preparation requirements. These will facilitate a suitable development platform for the development.

Table 4: Site Preparation Requirements

Project Element	Proposed Works
Demolition Works and tree removal	The proposal involves the demolition of existing buildings and structures. Along with the demolition of existing hardstands and the removal of trees.
Bulk earthworks	Bulk earthworks to be undertaken, with large amount of fill work required for the site.
Facility Development	Construction of the warehouse facility building pad, foundations, and site infrastructure
Infrastructure Works	Roads, Stormwater, Electricity, Potable water, Sewer and Telecoms establishment.
Site remediation works	Limited remediation works involving but not limited to the capping and covering of known areas of contamination and for any unexpected finds. Treatment, management and controls will be in place regarding acid sulfate soils for early works and site preparation.

3.0 Environmental Management Framework

3.1 Project Organisational Structure

Project contractors will be identified post DA approval and prior to the commencement of construction. Project contractors will have the responsibility for ensuring the project will be compliant with the relevant DA conditions.

Additionally, the Site Manager will be responsible for environmental monitoring and compliance in accordance with this CEMP and associated Sub-Plans (to be confirmed post DA approval). The Site Manager will report to the Workers Lifestyle Representative on a regular basis.

All consultants, contractors, sub-contractors, and all other personnel associated with construction works will report to the relevant developer/project manager.

3.2 Roles and Responsibilities

All personnel are responsible for the implementation of this CEMP. Site specific CEMPs (to be developed post DA approval) are to identify key personnel responsible for environmental management, as required for each site. The key personnel responsible for environmental management are listed in Table 5.

Table 5: Personnel Responsible for Environmental Management

Role	Responsibilities
Project Principal	• Environmental reporting responsibility associated with the development. • Record, notify, investigate, and respond to any environmental incidents and, where necessary, develop and implement corrective actions. • Overall responsibility for compliance with approval requirements. • Liaise with the Proponent to keep them informed of the project's progress. • Consult and engage with any subcontractors or interfacing contractors regarding the environmental management of the Site. • Provide adequate environmental inductions/training to employees and contractors regarding their requirements under this CEMP.
Project Manager	• All the responsibilities attributed to the Construction Contractor throughout this CEMP. • Environmental reporting responsibility associated with the development. • Ensuring that the appropriate management response and handling procedures are instigated and carried through in the event of an incident and/or non-compliance. • Regularly monitor the implementation of the CEMP to ensure implementation is being carried out in accordance with the document and the terms of this consent. • Assist the contractor to execute the responsibilities attributed to the Construction Contractor throughout this CEMP. • Provide guidance and assistance to the Contractor regarding the environmental reporting responsibilities associated with the development. • Guide the contractor to ensure that the appropriate management response and handling procedures are instigated and carried through in the event of an incident and/or non-compliance. • Consider and recommend to the Applicant any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community.

Role	Responsibilities
Work Health and Safety (WHS) Coordinator	• Ensure the legislative and corporate safety, health and environment management measures and controls are implemented and maintained. • Participate in risk and hazard identification and control. • Participate in incident investigations and management. • Participate in health and safety inspections.
Communications and Community Liaison Representative (if required)	• Lead and manage the community involvement activities, including liaison with property owners and key stakeholders. • Be the primary daily contact to the public handling of enquiries / complaints management / interface issues. • Maintain the complaints register and make available the complaints register to the Contractors Project Manager on a daily basis. • Be available for contact by local residents and the community at all reasonable times to answer any questions. • Liaise with property owners to co-ordinate access and to deal with specific property related issues arising from the upgrade works. • Lead the delivery of communication and community engagement strategies and plans. • Facilitate meetings, forums and arranging interviews to address concerns from community. • Provide advice and participate with the project teams to improve and enhance the delivery of communication services to the community. • Build, maintain collaborative and consultative working relationships with internal and external stakeholders. • Be available for contact by local residents, key stakeholders and community representatives to answer queries and provide more information or feedback.
All employees, contractors and subcontractors	• Ensure familiarity, implementation and compliance with this CEMP. • Support the Proponent's commitment to sustainability, environmental management, and compliance. • Work in a manner that will not harm the environment or impact on surrounding receptors. • Report all environmental incidents, non-compliances, and complaints to the Project Manager without delay. • Immediately notify the Project Manager of any hazard or potential hazard that may result in an incident and/or non-compliance, regardless of the nature or scale. • Take immediate action (where it is safe to do so) to prevent, stop, contain and/or minimise any adverse impact associated with an incident and/or non-compliance. • Report any inappropriate construction practices and/or environmental management practices to the Project Manager without delay.

3.3 Statutory Requirements

Site and development specific conditions of consent will be provided by Sutherland Shire Council upon approval of the project. The conditions relevant to the construction of the Project shall form part of this section in a revised, post consent and site-specific CEMP for the project.

The relevant statutory requirements of the site are listed and described in the SEE and summarised in Table 6.

Whilst other statutory documents have been considered in the preparation of this CEMP, only those with specific triggers/ requirements that relate to construction of the site have been documented.

Table 6: Relevant Statutory Requirements

Legislation	Requirements	Environmental Aspect
State Planning Context		
Environment Planning and Assessment Act 1979	Consideration of the impacts to the environment (both natural and built) and the community of proposed development or land-use change.	All
Biodiversity Conservation Act 2016	Comply with biodiversity conservation obligations.	Biodiversity
Marine Estate Management Act 2014	Consideration for key Fish Habitat Conservation areas and obligations.	Marine ecosystems and habitats
State Environmental Planning Policy (Industry and Employment) 2021	Compliance with the development and land use policies in relation to industry and employment.	Pollution control, noise management, social impacts and sustainable design and construction practices.
State Environmental Planning Policy (Resilience and Hazards) 2021	Remediation of contamination lands and consent requirements.	In the event of any unexpected find of contaminants/ contamination
State Environmental Planning Policy (Transport and Infrastructure) 2021	Compliance with Transport and Infrastructure planning provisions and controls.	Transport and Infrastructure.
State Environmental Planning Policy (Planning Systems) 2021	Compliance with the development controls	All

3.3.1 Site-specific CEMP

Prior to commencing operation, a more detailed site-specific CEMP (to be developed post DA approval) will be prepared in accordance with this Framework CEMP to the satisfaction of the Council.

The site-specific CEMP will provide detailed descriptions of actions taken to avoid, control and mitigate impacts during operation.

Site-specific sub-management plans will be developed to meet Council requirements post DA approval and incorporated into the site-specific CEMP.

3.4 Environmental Training

Project Managers will ensure that all employees and contractors involved in the project are appropriately inducted and trained prior to commencing work on site. Training in relation to environmental responsibilities and implementation of this CEMP will take place initially through the site induction training and then on an ongoing basis through ‘toolbox talks’ (or similar).

All employees, contractors (and their sub-contractors) conducting environmental training and site staff assigning work activities will demonstrate that they are competent and appropriately trained to train and manage construction site specific environmental issues.

A register of all environmental training carried out, including dates, names of persons trained, and trainer name and qualification details will be established and maintained for the duration of works. Site-specific CEMP’s will adhere to the minimum training requirements listed above and detail any additional site training requirements identified post approval.

3.4.1 Environmental Induction Training

The environmental induction training will cover all elements of the CEMP and will include, as a minimum, the information in Table 7.

Table 7: Environmental Induction Training

Inductions and Environmental Training	Reference / Notes
Purpose and objectives of the CEMP.	CEMP Section 1.3 and 1.4
Hours of Construction	CEMP Section 2.2
Conditions of any environmental licences, permits and consent approvals	CEMP Section 3.3
Potential environmental emergencies on site and the emergency response procedures (including the Emergency Spill Response Plan), locations and training in the use of emergency spill kits for spills on water and on land	CEMP Section 3.5
Reporting, and notification and management requirements for pollution, contamination, and other environmental incidents, and for damage and maintenance to environmental controls	CEMP Section 3.6

3.4.2 Toolbox Talks

Toolbox talks or similar will be held to identify environmental issues and controls when works commence in a new area of the site or a new activity, as well as when environmental issues arise on site. The toolbox talk will include but not be limited to:

- A description of the activity and the area.
- Identification of the environmental issues and risks for the area (including fauna or flora); and
- Outline the mitigations measures for the works and the area (see **Section 4**).

3.5 Incident Response and Handling Procedure

3.5.1 Performance Objective

To ensure that any incident and/or non-compliance caused by or relating to construction is effectively responded to, reported accordingly, and any resulting adverse environment and/or human health impact is promptly prevented or effectively managed.

3.5.2 Definitions

For the purposes of this CEMP and site-specific CEMPs the definitions detailed in Table 8 will be adopted and applied during construction.

Table 8: Incident Definitions

Term	Definition
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance.
Material Harm Incident	a) involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or b) results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment).

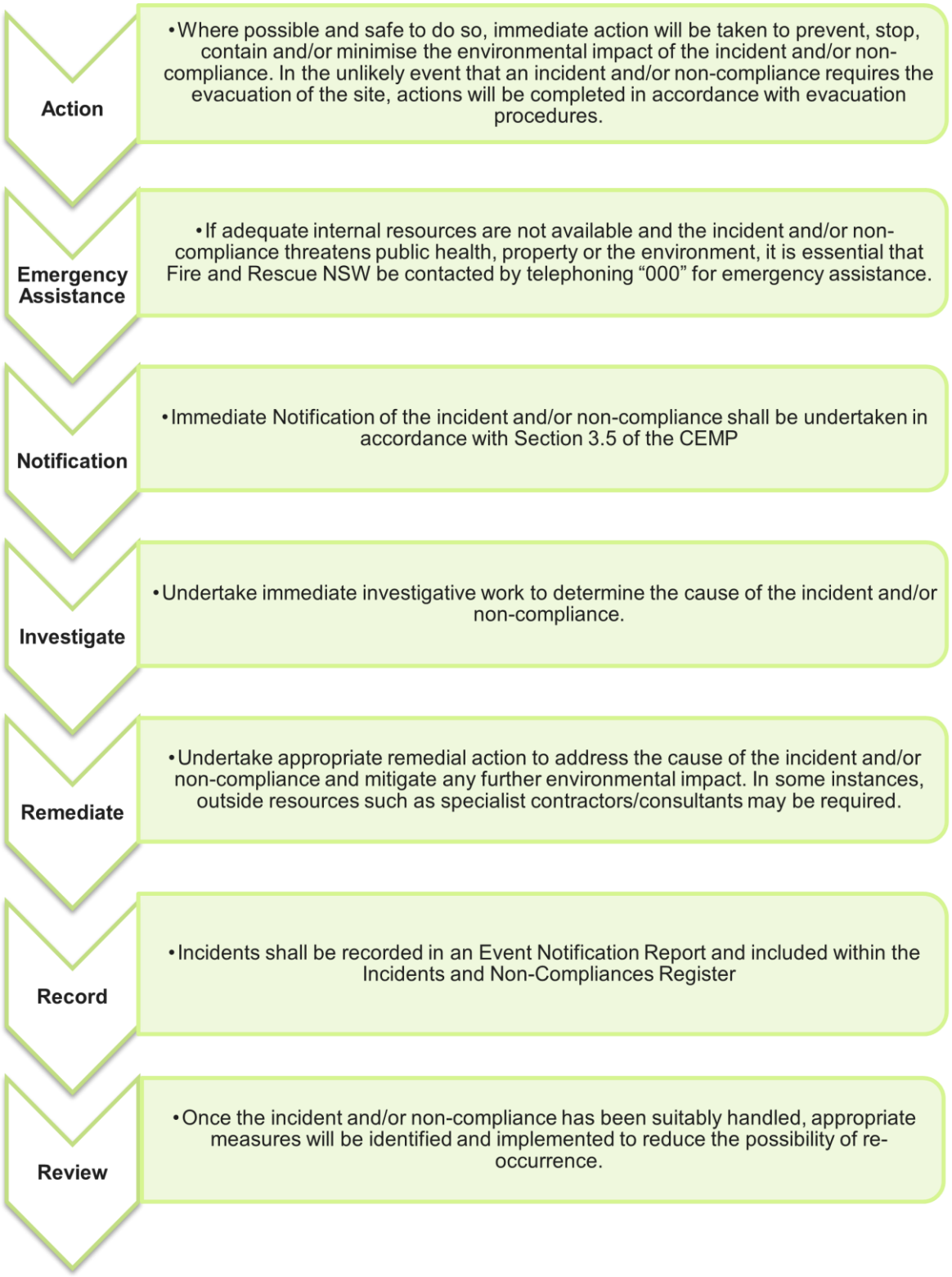
Term	Definition
Non-Compliance	An occurrence, set of circumstances or development that is a breach of the consent once approved
Minor Environmental Event	An incident that is minor where there has been no potential or actual material harm to the environment (see 'material harm' definition above).

All incidents will be identified and reported by any person to the Site Project Manager immediately.

3.5.3 Incident Response

In the instance of an incident, the Project Manager will implement the Incidents and Non-Compliance Handling Process shown in Figure 3.

Figure 3: Incidents and Non-Compliance Handling Process



3.5.4 Incident and Non-Compliance Notifications

In the instance of an incident, the notification protocols outlined in Table 9 will be implemented.

Table 9: Incident Notification Process

Notification Requirement	Responsibility	Timeframe Reference
Incidents		
Upon awareness of an incident, the Contractors Project Manager shall be notified of and provided with all relevant information pertaining to the potential or actual incident.	Any person engaged as an employee or undertaking an activity with regard to construction	Immediately after becoming aware of a potential or actual incident
The Construction's Project Manager will notify Aliro of any incident including all relevant information pertaining to the incident.	Construction's Project Manager	Immediately after becoming aware of a potential or actual incident
Aliro will review the relevant information pertaining to the incident and apply the Definitions in Table 8	Aliro	Immediately
Aliro will notify relevant agencies of an incident in writing	Aliro	Immediately
An Event Notification Report will be completed and provided to Aliro.	Project Manager	Within 24 hours
Aliro will provide a formal written notification of an incident to council.	Aliro	Within 7 days after becoming aware of incident

3.5.5 Register

Records of all incidents and non-compliances will be maintained in Aliro's incident register system. Details of all incidents and complaints will be retained for at least five years after the event to which they relate.

3.6 Complaints Response and Handling Procedure

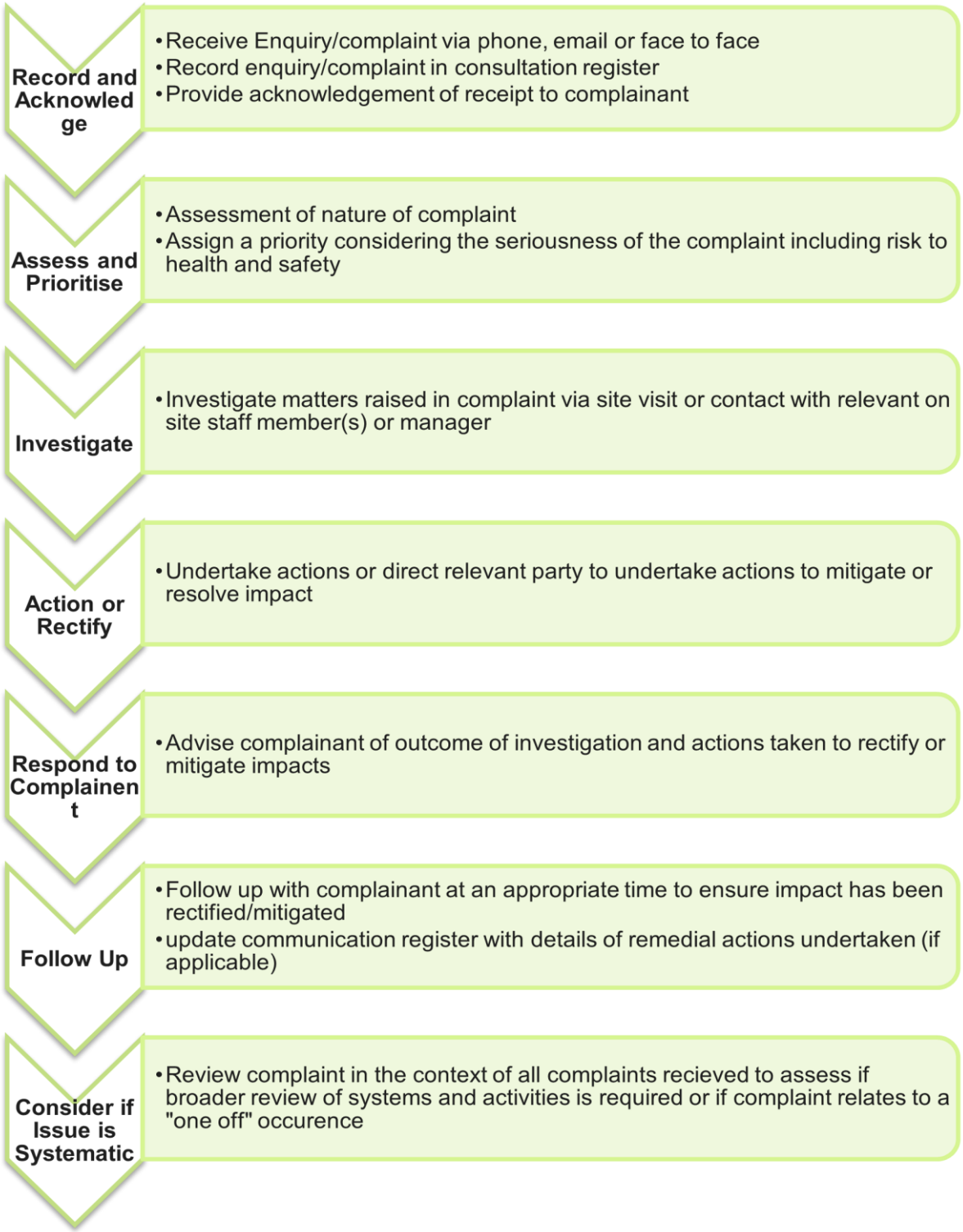
Site-specific CEMPs are to include a note that all employees who take a complaint will implement the Complaint Response and Handling Procedure shown in Figure 4:
Complaints Handling Procedure

3.6.1 Complaints Register

A Complaints Register will be maintained for the duration of construction and will contain the following:

- A separate reference sheet containing the relevant contact details.
- Blank hard copies of the Community Correspondence Register; and
- Copies of all completed Community Correspondence Registers, which are to be maintained for at least five years after the event to which they relate.

Figure 4: Complaints Handling Procedure



4.0 Environmental Management Commitments

Site-specific CEMPs will incorporate and describe environmental objectives and management commitments (shown in Section 4) that will be implemented during construction to ensure impacts are minimised and managed.

Environmental aspects with the potential to be impacted through the construction of the Project are addressed in the following sub-sections. These issues are considered to have the highest potential to result in a non-compliance with a legislative requirement or generate community complaints.

The tables in this section are a compliance management tool outlining how controls are to be implemented. Management commitments will be revised post the approval of the DA and the inclusion of additional specialised management plans in site-specific CEMPs.

4.1 General

Table 10 lists the general best practice environmental controls that will be implemented throughout the life of the development to minimise the potential for adverse impacts on the local environmental and surrounding receptors.

Table 10: General Environmental Management Controls

General Environmental Management Controls			
Description	**Responsibility**	**Timing**	**Reference**
General environmental site inspection to ensure all relevant environmental controls listed in this CEMP are in place and any required maintenance and/or remediation works are identified and undertaken.	Project Manager	Weekly	Best practice
A copy of all environmental records will be maintained, including: • Site environmental inspection reports • Environmental monitoring data • Internal and external audit reports • Reports of environmental incidents, environmental, associated actions taken, and follow-up actions • Minutes of management review meetings • Induction and training records.	Project Manager	For at least 5 years after completion	Best practice
Construction employees and contractors will be suitably inducted and trained in accordance with Section 3.4 of this CEMP.	Project Manager	Prior to commencing construction and ongoing	Best Practice
All reasonable and feasible measures will be implemented to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from construction.	Project Manager	Ongoing	Best Practice
All licences, permits, approvals and consents will be obtained and maintained as required for the development.	Project Manager	Prior to commencement and ongoing	Best Practice
Aliro will obtain relevant approvals from service providers before the construction of any utility works.	Project Manager	Prior to commencement	Best Practice

All plant and equipment will be maintained in a proper and efficient condition and operated in a proper and efficient manner.	Project Manager	Ongoing	Best Practice
Construction employees and contractors will be suitably inducted and trained prior to commencing any work on site.	Project Manager	Prior to commencement and ongoing	CEMP Section 3.4
The incidents and complaints will be promptly and effectively addressed in accordance with the management strategies contained within Sections 3.5 and 3.6 of this CEMP.	Project Manager	Ongoing	CEMP Sections 3.5 and 3.6.
Site induction training will be implemented to include noise awareness component, community consultation and response to complaints as provided in the construction management plan. Site induction training. The induction may also include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities. • location of nearest sensitive receivers • construction employee parking areas • designated loading/ unloading areas and procedures. • site opening/ closing times (including deliveries) • environmental incident procedures.	Project Manager	Ongoing	Best Practice
Maintain a complaint handling and management system and undertake measures to investigate complaints, cause of complaints and implement changes to work practices.	Project Manager	Prior to commencement and ongoing	Best Practice
Vehicles will be scheduled in such a manner as to not require queuing or parking on the road network surrounding the site.	Project Manager	Ongoing	Best Practice
All vehicles will access the site via approved routes only.	Project Manager	Ongoing	Best Practice
All drivers will follow the drivers code of conduct.	Project Manager	Ongoing	Best Practice
Suitable erosion and sediment control measures will be installed and maintained on-site, in accordance with the relevant requirements of the Managing Urban Stormwater: Soils and Construction - Volume 1: Blue Book (Landcom 2004) guideline.	Project Manager	Prior to commencement and ongoing	Best practice
If any item or object of Aboriginal heritage significance is identified on site: a) all work in the immediate vicinity of the suspected Aboriginal item or object must cease immediately. b) a 10 m wide buffer area around the suspected item or object must be cordoned off; and c) Heritage NSW must be contacted immediately. If any historic heritage archaeological relics are uncovered during earthworks or construction, then all works must cease immediately in that area.	All employees	Ongoing	Best Practice

Unexpected finds must be evaluated and recorded in accordance with the requirements of Heritage NSW.			
Adopt sound work procedures that aim to avoid and/or limit the creation of waste products during demolition and construction	Project Manager and All employees	Prior to commencement and Ongoing	Best Practice
Reduce the use of materials during the demolition phase that require treatment or disposal.	Project Manager and All employees	Prior to commencement and Ongoing	Best Practice
Implement systems for the separation and storage of materials that can be reused onsite.	Project Manager and All employees	Prior to commencement and Ongoing	Best Practice
Identify the potential applications of materials and facilitate their reuse offsite.	Project Manager and All employees	Prior to commencement and Ongoing	Best Practice
Identify all recyclable water products, utilising systems for separating and stockpiling identified recyclables. Ensuring clear signage is used to denote this information. Facilitate the recycling of material onsite or offsite.	Project Manager and All employees	Prior to commencement and Ongoing	Best Practice
Waste products which cannot be reused or recycles will be treated/disposed of at appropriately licensed facilities.	Project Manager and All employees	Prior to commencement and Ongoing	Best Practice
All site employees and sub-contractors will be required to attend inductions and training that will outline site specific waste management practices.	All employees	Prior to commencement and Ongoing	Best Practice
Dangerous goods will be stored and handled strictly in accordance with all relevant Australian Standards and the Environment Protection Manual for Authorised Officers: Bunding and Spill Management – technical bulletin (Environmental Protection Authority (EPA) 1997).	Project Manager and All employees	Prior to commencement and Ongoing	Best Practice
All chemicals, fuels and oils used on-site will be stored in appropriately bunded areas in accordance with all relevant Australian Standards, and/or EPA's Storing and Handling of Liquids: Environmental Protection – Participants Manual (Department of Environment and Climate Change, 2007).	Project Manager and All employees	Prior to commencement and Ongoing	Best Practice

4.2 Soil Management and Dewatering

The environmental management controls in Table 11 are specialist report and specific best practice methods that will be implemented to mitigate adverse Soil and Water impacts from construction. For further details, refer to Masterplan Area Acid Sulfate Soil Management Plan referenced in Appendix A.

Table 11: Soil Management and Dewatering Controls

Vegetation and Biodiversity Management Controls			
Description	**Responsibility**	**Timing**	**Reference**
The site management strategy to be implemented during works which may disturb potential acid sulfate soils (PASS) materials will ensure the following: • Adequate treatment of PASS material such that there is sufficient acid neutralising capacity and no net acidity following stabilisation (as	Project Manager and All employees	Ongoing	Masterplan Area Acid Sulfate Soil Management Plan

measured through appropriate field testing and laboratory validation). • Water discharged from any excavations and treatment areas (including run-off, water from dewatering and leachate) is neutral and discharged to stormwater once it has been shown to meet with the criteria specified in this plan or alternatively, shall be reused on site for dust suppression. • Groundwater quality indicators and levels are not significantly changed from the existing levels/quality during excavation activities and are re-established after the completion of construction works; and • Implementation of additional assessment procedures during earthworks operations for the effective treatment and management of any drained, disturbed or excavated acid sulfate soils.			(MAASSMP) Section 4
Prior to the commencement of excavation works which may disturb PASS materials at the site, including, if required, any deeper excavation activities with the potential to generate spoil comprising P/ASS, the following preparations should be considered: • The sequencing of proposed excavation, services installation and other activities should be planned in detail taking into account the time and space necessary to complete the PASS management activities outlined in this document. The planning should provide a contingency for treatment of additional quantities of materials in the event that the quantity of PASS material greater than anticipated is identified during implementation of the site works, or heavy rainfall events result in significant additional quantities of collected impacted water. • The actual areas of PASS occurrence where disturbance/excavation will occur (anticipated to be generally limited to deep excavations) as part of the site activities should be identified and suitable location(s) for treatment areas close to the areas of disturbance identified. Based on the proposed works, the available space for treatment and the approximate volume anticipated to be disturbed, staging of the disturbance activities should then be planned such that sufficient drying and mixing time can be achieved for all disturbed materials. The staging should also allow for adequate time to obtain the results of verification testing before the material is placed at the final location or removed from the site.	Project Manager and All employees	Prior to commencement and Ongoing	MAASSMP Section 4
All natural soils (including reworked natural peaty soils) within the PASS identified zones must be treated as PASS material until such a time as the material is demonstrated to be non-PASS material or treatment effectively reduces the risk associated with the material and validation results meet the relevant specifications.	Project Manager and All employees	Prior to commencement and Ongoing	MAASSMP Section 4

PASS materials that have been disturbed or excavated should be immediately transferred to the treatment area or treated in-situ as soon as practicable to minimise the quantity of soil, sediment and/or groundwater requiring treatment and the risk of environmental harm to the site and/or down-gradient receptors. Bunding, diversion drains, contaminated water treatment/containment etc may be used to contain surface water run-off from PASS storage and treatment areas. However, PASS materials must not be used in the construction of bunds and other diversion devices. Equipment used in the treatment of PASS shall be washed with an alkaline solution at the completion of each work period to minimize corrosion of equipment.			
Excavation works to be undertaken for the Masterplan Area in the identified PASS zones (anticipated to involve majority filling to raise site surfaces, with limited shallow excavations to facilitate any potential construction of services) should be undertaken in the following manner: • Fill/reworked material comprising black/grey silty clay (refer Section 3.4.1) requiring excavation should be removed and placed in a designated treatment area for further assessment and/or treatment. • Natural soils encountered ≥2-3 m bgs, if excavated, will require the immediate transfer to the treatment area upon excavation. The material will be required to be treated as PASS material. • Works including disturbance of natural rock will be subject to field testing upon initial exposure of underlying strata, either in-situ or as stockpiled material within the treatment zone. Field testing will include pHf and post peroxide pHfox, with both required to meet the validation criteria of pH 6 to be considered non-PASS soil. Alternatively, dependent upon the scheduling of the excavation works, laboratory pre-testing of soils from this zone may be undertaken using sPOCAS of SCr methods. If either the field criteria or laboratory analysis results indicate the material is considered to be PASS, then the material will require treatment as discussed in the following section. • Excavation works should be staged to limit the period of any required dewatering (and the consequential extent of groundwater drawdown in surrounding PASS areas). This may involve the excavation of smaller cells (than allowable within the treatment area); • At the completion of the day's activities, where excavation works result in the exposure of known or suspected PASS, a guard layer of fine aglime will be applied to the base of the excavation at a rate of no less than 5 kg lime/m2 of exposed soil. If the base of the excavation is to remain exposed for an extended period (i.e.	Project Manager and All employees	Prior to commencement and Ongoing	MAASSMP Section 4

more than three days) the lime coating should be checked and re-limed as necessary. Alternatively, the lime may be covered with a layer of compacted non-ASS material at least 0.3 m in thickness. • Any cut batters/exposed faces potentially including ASS, (i.e. faces at the edge of excavation faces, etc), shall be coated with fine aglime at a rate of no less than 5 kg/m2 and the lime coating should be checked and re-limed as necessary on a daily basis during periods of dewatering, whilst the faces are temporarily exposed and/or following wet weather events.			

4.3 Water Quality Mitigation Measures

The environmental management controls in Table 12 are taken from the specialist report and specific best practice methods that will be implemented to mitigate adverse water quality impacts from construction. For further details, refer to Biodiversity Assessment Report (BAR) referenced in Appendix B.

Table 12: Water Quality Management Controls

Vegetation and Biodiversity Management Controls			
Description	**Responsibility**	**Timing**	**Reference**
Sedimentation An Erosion, Sediment and Control Plan (ESCP) has been prepared by Sparks & Partners (15/09/2023), which details the proposed construction mitigation measures to prevent impacts to receiving waters. Providing the ESCP is implemented compliantly, and its efficacy monitored, it is considered that the risk of impacts from sedimentation would be low.	Project Manager	Prior to commencement and Ongoing	Biodiversity Assessment Report (BAR) Section 7.2
Contaminants Sediment curtains and waste capture nets are to be installed around the location of site stormwater outlets (prior to construction) within the concrete channel adjacent to the site.	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Contaminants Appropriate pore size netting shall be installed to enable the capture of fine particle matter during the breakthrough works that involve breaching the concrete wall of the channel to connect the new outlet.	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Contaminants Hazchem and Marine spill kits must be made available for the use in the control, containment and clean-up of chemical spills and any hydrophobic contaminant spills.	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Contaminants If any visual signs i.e., spillages increased turbidity, fish kills etc become evident, then woks must cease and not recommence until the problem is identified and rectified.	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2

Contaminants Timing of works must also avoid spring and larger king tides as well as periods of heavy rainfall to ensure that the works are able to be carried out within optimal conditions.	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2

4.4 Vegetation and Biodiversity

The environmental management controls in Table 13 are taken from the specialist report and specific best practice methods that will be implemented to mitigate adverse vegetation and biodiversity impacts from construction. For further details, refer to Biodiversity Assessment Report and Arboricultural Impact Assessment (AIA) referenced in Appendices C and D.

Additionally, it is important to note that while there is no high value biodiversity values mapped within the boundaries of the site, there is high biodiversity value vegetation to the north and adjacent to the subject site. This high biodiversity value vegetation comprises of Estuarine Mangrove Forest with small patches of Estuarine Saltmarsh fringing Woolooware Bay. Similarly, the Towra Point Aquatic Reserve which is a key fish habitat is located adjacent to the subject site but also not mapped within the boundaries of the site.

These areas are proposed to be retained and protected as part of the site's redevelopment. Additional considerations and controls relating to them may be included in site-specific CEMP's post approval.

Table 13: Environmental and Management Controls for Vegetation and Biodiversity

Vegetation and Biodiversity Management Controls			
Description	**Responsibility**	**Timing**	**Reference**
Vegetation being retained comprises peripheral native trees along the eastern boundary and northeastern boundaries as well as native vegetation within the southwest and southeast corners of the Site. Physical Tree Protection Measures (TPM) must be installed to protect all retained trees from incidental damage throughout the duration of the development.	Project Manager	Prior to commencement and Ongoing	Biodiversity Assessment Report (BAR) Section 6 and Arboricultural Impact Assessment (AIA) Section 9.3
As a minimum, tree protection fencing must be installed around Tree Protection Zone (TPZ) perimeter of any tree proposed for retention to form a barricaded tree protection zone. The fenced area should display signage that clearly identifies the area as a restricted tree protection zone, examples of appropriate signage have been included within the tree protection methodology.	Project Manager and Arborist	Prior to commencement and Ongoing	AIA Section 9.3
Restricted activities are imposed within all tree protection zones, detail of restrictions can be found in the tree protection methodology. Access to or works within the TPZ are strictly prohibited without the prior approval of the Project Arborist.	Project Manager and Arborist	Prior to commencement and Ongoing	AIA Section 9.3
Trees located within/adjacent to site access an egress points may require additional protection such as ground and trunk protection. This aspect should be reviewed by the Project Arborist upon the completion of the Construction Management Plan.	Project Manager and Arborist	Prior to commencement and Ongoing	AIA Section 9.3

Contaminants All works must be undertaken by competent contractors who have demonstrated experience and participated in relevant site inductions	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Contaminants Netting shall be of an appropriate pore size to enable the capture of fine particulate matter during the breakthrough works that involve breaching the concrete wall of the channel to connect the new outlet.	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Contaminants Hazchem and Marine spill kits must be made available for use in the control, containment and clean-up of chemical spills and any hydrophobic (water repelling) contaminant spills	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Contaminants Should any visual signs i.e., spillages increased turbidity, fish kills, etc become evident, then works must cease and not recommence until the problem is identified and rectified	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Contaminants Timing of works must avoid spring and larger king tides as well as periods of heavy rainfall to ensure that the works are able to be carried out within optimal conditions	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Biosecurity The following mitigation measures should be implemented to ensure that the contractor's biosecurity duty is fulfilled and introduction of new weed infestations is prevented. • Hygiene protocols should be implemented to ensure that plant and machinery enter / leave the site clean to prevent the spread of weed species. • Monitoring of the site and general surrounds for weed infestations should be undertaken by landscape contractors for the duration of the Project. • Plants and landscape materials must be free of disease	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2
Biosecurity Management, contractors and employees are required to fulfil their general biosecurity duty (GBD), which may simply be to ensure that their vehicles, boots and equipment are clean of any potential biosecurity risks. It is expected that management, contractors and employees should know all biosecurity risks associated with the industry, business and relevant day-to-day work activities. The presence or potential for biosecurity risks within the Site will be addressed at a project level during site inductions, and the biosecurity protocol below is	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2

to be presented to all contractors and its requirements made clear.			
Biosecurity All contractors are to follow the hygiene protocol detailed in Table 7-1 of the BAR, prior to clearing, during construction and post-construction.	Project Manager	Prior to commencement and Ongoing	BAR Section 7.2

4.5 Traffic Management

The environmental management controls in Table are taken from the specialist report that will be implemented to mitigate traffic impacts from construction. For further details, refer to Preliminary Construction Traffic Management Plan (CTMP) referenced in Appendix E

Table 14: Monitoring and Inspection Requirements

Traffic Management Controls			
Description	**Responsibility**	**Timing**	**Reference**
Construction Traffic on Endeavour Road/ Captain Cook Drive: Construction traffic will use the two (2) construction accesses to enter/ exit the site for the works. Construction traffic is anticipated to remain low to ensure the impacts to motorists within the area are kept to a minimum.	Site Engineer	Weekly	CTMP section 5.5
Management on deliveries: The site manager will manage deliveries to ensure that construction vehicle movements will remain low.	Site Manager	As required	CTMP section 5.5
Managing dirt on the public road network: The use of rumble grids positioned at the site's access points to Endeavour Road and Captain Cook Drive, as well as the use of water trucks and sweepers for both gates, shall ensure the existing network is free of dirt from the site.	Site Manager	As required	CTMP section 5.5
Safety during construction: Safety to motorists and the public throughout the area will be maintained during construction through the preparation and execution of site- specific TGSs. The TGSs will be implemented to manage and warn existing tenants for the presence of construction vehicles and activities within the site. The TGSs aims to identify all reasonably foreseeable hazards, assesses the hazards, and manages the hazards as best as possible by either eliminating or minimising the risks. The TGSs shall be monitored and updated accordingly where required.	Project Manager	Reviewed at each stage of construction	CTMP section 5.5
Reporting: Reporting and monitoring of movements during peak periods are to be undertaken to ensure that drivers are adhering to restricted times, and to ensure that the approved traffic generation and subsequent impacts on the road network are in line with those approved.	Site Engineer	Weekly	CTMP section 5.5
Induction to Drivers Code of Conduct: Vehicle operators accessing the construction site shall be inducted onto the Drivers Code of Conduct (to be prepared by Aliro) on an as required basis, prior to	Site Manager/ Project Manager	As required	CTMP section 5.5

entering the site. The Contractor is to maintain a register of inducted operators with evidence of induction by way of operator signatures being captured.			

5.0 Monitoring, Reporting and Auditing

Table 15 summarises the monitoring, reporting and auditing requirements for construction, based off specialist reports requirements and general best practice methods. Site-specific CEMPs must detail Monitoring, Reporting and Auditing requirements.

Table 15: Monitoring and Inspection Requirements

Monitoring and Inspection Requirements			
Description	**Responsibility**	**Timing**	**Reference**
All works undertaken will be maintained in a safe condition at all times. It is noted that Council may at any time and without prior notification make safe any such works Council considers to be unsafe and recover all reasonable costs incurred from Aliro and/ or Construction Contractor.	Project Manager	At all times	Best practice
Inspection and maintenance of all plant and equipment items to ensure optimal operating condition.	Project Manager	As specified by the manufacturer/ supplier	Best practice
The Contractor will regularly monitor the implementation of the CEMP, and any other documents identified by Council, to ensure implementation is being carried out in accordance with the CEMP.	Project Manager	Ongoing	Best practice
A copy of all environmental records will be maintained, including: • Site environmental inspection reports • Environmental monitoring data • Internal and external audit reports • Reports of environmental incidents, environmental, associated actions taken, and follow-up actions • Minutes of management review meetings • Induction and training records.	Project Manager	For at least 5 years after completion	Best practice
The following inspection/monitoring regime will be implemented during the site works period and documented as appropriate to demonstrate compliance with this Acid Sulphate Soils Management Plan (ASSMP): • Stockpiles of material within the treatment area and of treated material will be inspected daily by the site contractors with pH measurements of any retained leachate taken and recorded. In the event that leachate is significantly acidic (pH < 5.0), the stockpiled material will be returned to the pre-treatment area until the laboratory results are available and the quantity of required additional lime application is known.	Project Manager	Ongoing	Acid Sulphate Soils Assessment (ASSA) Section 4

• In the event that an on-site sump/detention basin is used to manage water ingress, surface water monitoring points will be sampled and field tested and the pH recorded every day by site contractors during active site activities and weekly during periods where no active ground works are being undertaken within the PASS area; and • All treated excavation faces to be retained for more than three days will be inspected on the third morning and lime reapplied as necessary each following morning.			
Regular inspection of all excavation and treatment areas will be undertaken to identify potential indications of PASS oxidation. These inspections should note: • Unexplained scalding, corrosion or degradation of onsite steel equipment and concrete paved surfaces. • Formation of the mineral jarosite or other acidic salts in exposed or excavated soils. • Areas of surface water blue-green, blue-white in colour or extremely clarified indicating high concentrations of aluminium; • Rust coloured deposits on excavation faces, in drainage paths, on bunds, channels, etc indicating iron precipitates; and • Such inspections should also identify the presence of unusual odours, including strong organic or sulfurous smells (i.e. *rotten egg* gas).	Project Manager	Ongoing	ASSA Section 4
Visual assessments of bins and bin storage areas will be conducted by the Contractor during or after segregation and sorting of wastes into separate streams.	Project Manager	Ongoing	Best Practice
The Project Manager will be notified of any suspected or potential contamination exposed during construction activities and cease all work activities within the vicinity of actual or suspected contaminated land.	Employees / Contractors	Immediately	Best Practice

6.0 Contingency Management Plan

Table 15 lists the actions to be implemented if inspections, monitoring and/or auditing indicate that the mitigation measures listed in Section 4 and the specialist management plans are not effective in managing environmental impacts.

All Condition Red occurrences will be recorded in the Monthly Report and discussed during the toolbox talks.

Table 15: Contingency Management Plan

Key Element	Trigger / Response	Condition Green	Condition Amber	Condition Red
Noise impacts at sensitive receiver locations	Trigger	Noise levels do not exceed applicable Noise Management Levels (NMLs).	Noise levels exceed applicable NMLs.	Noise levels exceed Highly Noise Affected criteria (75 dBA).
	Response	Ongoing best practice management measures to minimise noise emissions.	Undertake all feasible and reasonable mitigation and management measures to minimise noise impacts.	Undertake all feasible and reasonable mitigation and management measures to ensure noise levels are below Highly Noise Affected criteria. If noise levels cannot be kept below applicable limits, then a different construction method or equipment will be utilised.
Vibration impacts at sensitive receiver locations	Trigger	Vibration intensive works undertaken outside minimum working distance for the specific equipment in use.	Vibration intensive works undertaken within minimum working distance for the specific equipment in use.	Vibration levels exceed applicable vibration limits.
	Response	Ongoing best practice management measures to minimise vibration emissions.	Undertake vibration monitoring for the duration of the works to confirm vibration levels.	Stop work. Undertake all feasible and reasonable mitigation and management measures to ensure vibration levels are below applicable limits. If vibration levels cannot be kept below applicable limits then a different construction method or equipment will be utilised.
Visible dust leaving the site	Trigger	Daily inspections show that there is no visible dust leaving the site.	Daily inspections show that there is visible dust leaving the site.	Daily inspections show that there is visible dust leaving the site multiple times during a day OR from multiple locations within the site.

Key Element	Trigger / Response	Condition Green	Condition Amber	Condition Red
	Response	Ongoing best practice management measures to minimise dust emissions.	Review and investigate construction activities and respective control measures, where appropriate. Implement additional remedial measures, such as deploying additional water sprays etc	Undertake an investigation of the dust generating activities, and if necessary, temporarily halt the dust generating activities.
Traffic Queuing	Trigger	No queuing identified.	Queuing identified within site.	Queuing identified on the public road.
	Response	No response required. Continue monitoring program.	Review the delivery schedule prepared by the builder. If drivers are not following the correct schedule, then they should be provided with additional training and an extra copy of the Driver Code of Conduct.	Review and investigate construction activities. If it is concluded that construction activities were directly responsible for the exceedance, implement remediation measures such as: • Temporary halting of activities and resuming when conditions have improved. • Stop all transportation into and out of the site. • Provide additional training.
Erosion	Trigger	No evidence of erosion.	Minor gully or tunnel erosions present and/or rilling. Evidence of sediment or sediment laden water leaving the site.	Significant gully or tunnel erosions present and/or rilling. Evidence of sediment or sediment laden water leaving the site.
	Response	Continue CEMP implementation.	A suitably trained person to inspect the site. Review of erosions and sediment structures. Remediate as appropriate.	A suitably trained person to inspect the site. Review of erosion and sediment structures. Remediate as soon as practical.
Water management structures	Trigger	Water management structures have been designed, constructed, and managed in accordance with the Blue Book and the ESCP.	Inspections indicate that water management structures illustrate minor non-compliance with the Blue Book and the ESCP.	Inspections indicate a failure of the water management structures.
	Response	Continue CEMP implementation.	A suitably trained person to inspect the site. Review of water management structures. Remediate as appropriate.	A suitably trained person to inspect the site. Remediate as soon as practical. Review of engineering design and revise ESCP.

Key Element	Trigger / Response	Condition Green	Condition Amber	Condition Red
Slope failure	Trigger	No significant erosion is present that would constitute a safety hazard or compromise the capability of supporting the end land use. Monitoring verifies there are no gully or tunnel erosion features, or rill erosion >200 mm deep.	Monitoring verifies there is gully or tunnel erosion features, or rill erosion 200 mm deep.	Monitoring verifies there is gully or tunnel erosion features, or rill erosion >200 mm deep.
	Response	No response required. Continue to monitor.	A suitably trained person to inspect the site. Investigate opportunities to install water management infrastructure to address erosion. Remediate as appropriate.	Undertake a review of the drainage of the area and provide recommendations to appropriately remediate the erosion. Remediate as soon as practicable.
Heritage	Trigger	No unknown heritage items uncovered.	Potential heritage item uncovered.	Potential heritage item uncovered causing significant delays to project.
	Response	Continue CEMP implementation.	Stop work and implement the unexpected finds protocol.	Stop work and implement the unexpected finds protocol. Heritage item to be salvaged and removed from site by a qualified archaeologist, if requested by Heritage NSW.
Unexpected Contamination	Trigger	No contamination uncovered during earthworks.	Areas of possible contamination uncovered.	Areas of contamination uncovered.
	Response	Continue CEMP implementation.	Stop work immediately and assess the contamination with the applicable guidelines.	Stop work immediately and engage a specialist consultant. A validation report is to be prepared following remediation.
Biodiversity Contaminants	Trigger	No contamination noted during works.	Areas of potential contamination noted during works.	Areas of contamination noted during works.
	Response	Continue CEMP implementation.	Stop work immediately and assess the contamination. Apply and assess the applicable procedures and guidelines.	Stop work immediately engage a specialist consultant or suitably trained person. Undertake a review of controls in place and remediate if required.

Key Element	Trigger / Response	Condition Green	Condition Amber	Condition Red
Biodiversity Biosecurity	Trigger	No biosecurity breaches during works.	Potential biosecurity breaches noted during works.	Biosecurity breaches noted during works.
	Response	Continue CEMP implementation.	Stop work immediately. Assess the breach and implications against guidelines and procedures.	Stop work immediately. Engage a suitably trained person to review biosecurity measures and controls. Remediate as soon as practical

7.0 Review Management

Review of the CEMP will be undertaken regularly by Aliro's Representative and will comprise, as a minimum, the following:

- Identification of areas of opportunity for improved environmental performance.
- Analysis of the causes of non-compliances, including those identified in environment inspections and audits.
- Verification of the effectiveness of corrective and preventative actions.
- Highlighting any changes in procedures resulting from process improvement.
- This CEMP will also be reviewed and, if necessary, revised in the following circumstances:
    - Where there is any change to the scope of the construction activities and/or disturbance footprint.
    - Where it is identified that the environmental performance is not meeting the objectives of the CEMP; and/ or
    - At the request of a relevant regulatory authority.

8.0 References

- Guideline for the Preparation of Environmental Management Plans (Department of Infrastructure, Planning and Natural Resources 2004)
- Draft construction noise guidelines (State of NSW and the NSW Environment Protection Authority 2020)
- Statement of Environmental Effects (SEE) (Ethos Urban, 2023)
- Biodiversity Assessment Report (BAR) (écologique, 2023)
- Vegetation Management Plan (VMP) (écologique, 2023)
- Arboricultural Impact Assessment (AIA) (Green Tree Consultancy, 2023)
- Masterplan Area Acid Sulfate Soil Management Plan (MAASSMP) (JBS&G, 2023)
- Erosion, Sediment Control Plan (ESCP) (Sparks & Partners, 2023)
- Construction Traffic Management Plan (CTMP) (SLR, 2024)

Appendix A Masterplan Area Acid Sulfate Soil Management Plan

Construction Environmental Management Plan (CEMP)

TripleTwoNine Endeavour Road, Caringbah

Aliro Group Pty Ltd

SLR Project No.: 630.031866.00001

31 October 2024

Aliro Trusco 1 Pty Ltd
C/- Aliro Management Pty Ltd

Masterplan Area Acid Sulfate Soil Management Plan

13 Endeavour Road, Caringbah, NSW

27 September 2023

64957/153701 Rev 1

JBS&G Australia Pty Ltd

www.jbsg.com.au

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Abbreviations

Term	Definition
AHD	Australian Height Datum
ASS	Acid Sulfate Soil
ASSMP	Acid Sulfate Soil Management Plan
ASSMAC	Acid Sulfate Soil Management Advisory Committee
bgs	Below Ground Surface
COC	Chain of Custody
DA	Development Application
DAWR	Australian Department of Agriculture and Water Resources
EPA	NSW Environment Protection Authority
ha	Hectare
LEP	Local Environment Plan
LOR	Limit of Reporting
PASS	Potential Acid Sulfate Soil
SAC	Site Action Criteria
S_{Cr}%	Chromium Reducible Sulfur (%)
sPOCAS	Suspended Potential Oxidation Combined Acidity and Sulfur (test method)
S_{pos}%	Potential Oxidisable Sulfur
SWL	Standing Water Level
TAA	Total Actual Acidity
TPA	Total Potential Acidity
TSA	Total Sulfidic Acidity

1. Introduction

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) has been engaged by Aliro Trusco 1 Pty Ltd (Aliro Trusco, the client), care of Aliro Management Pty Australia (Aliro) to prepare an Acid Sulfate Soil Management Plan (ASSMP) to support the Masterplan development activities at a parcel of land located at 13 Endeavour Road, Caringbah, NSW (the site). The site is legally identified as Lot 2 Deposited Plan (DP) 714965 and occupies and area of 12.5 hectares (ha). The site location and layout are shown in **Figures 1** and **2,** respectively.

The site is undergoing staged redevelopment for mixed land uses (commercial/industrial and community uses including construction of a childcare facility). Redevelopment activities are proposed for the stage of the development, herein referred to as the Masterplan Area, which will occur within a portion of the site (**Figure 2**), and will include the demolition / augmentation of existing buildings and construction of seven new warehouse buildings and augmentation to existing peripheral driveways/carparks, hardstand pavements and landscaped areas. Based on review of concept cut to fill design plans (**Appendix A**), development activities will generally involve filling to raise site surfaces across the majority of the Masterplan Area.

Previous investigations conducted by JBS&G for the entire site (JBS&G 2020[1]) and a Detailed Site Investigation (DSI) prepared for the Masterplan development area (JBS&G 2023[2]) identified potential and/or actual acid sulfate soils (P/ASS) across the site, characterised as a dark grey organic rich estuarine silty clays and alluvial grey silty sands (former reclaimed tidal mangroves) which were identified underlying site fill materials, and potentially in fill materials where estuarine sediments may be mixed. P/ASS are anticipated to be encountered at depths from approximately 2-3 m bgs and extent to at least 7 m bgs (JBS&G (2020/2023). Additional P/ASS data has since been obtained and is documented in **Section 3.4.2**.

The *Sutherland Local Environmental Plan (LEP) 2015* indicates the site falls within an area classified as Class 3 ASS. According to the LEP, development consent is required for any works in a Class 3 ASS area that extend beyond 1 metre below the natural ground surface and which are likely to lower the water table more than 1 m below ground surface (bgs). Such works would trigger the requirement for assessment and may require ASS management unless preliminary assessment indicates management is not required. However, based on review of concept cut to fill plans, the development activities will generally involve filling to raise the site surfaces across the Masterplan Area, with minor shallow detailed excavation in limited areas.

As such, an ASSMP is required to document procedures to be implemented to manage the potential environmental risk should deep excavations disturb these materials, although such excavations are not anticipated as noted above and described in **Section 1.3**. This ASSMP has been prepared in accordance with the general requirements of the *Acid Sulfate Soil Manual* (ASSMAC 1998[5]) and with consideration to the National Acid Sulfate Soils Guidance (DAWR 2018[6]).

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1 *Toyota Caringbah Due Diligence Assessment - 13 Endeavour Road, Caringbah NSW*, JBS&G, 25 February 2020 *(JBS&G 2020)*

2 *Detailed Site Investigation, Masterplan Area, 13 Endeavour Road, Caringbah NSW*. Prepared by JBS&G doc ref 64957/153895 Rev 0 dated 1 September 2022 (JBS&G 2023)

5 *Acid Sulfate Soil Manual*, NSW Acid Sulfate Soil Management Advisory Committee, August 1998 (ASSMAC 1998)

6 *National Acid Sulfate Soil Guidance*. Australian Government Department of Agriculture and Water Resources (DAWR), June 2018 (AGDAW, 2018)

1.2 Aims and Objectives

The aim of this ASSMP is to outline management techniques that may be employed to mitigate the potential environmental impacts associated with the risk of disturbance of ASS/PASS during the proposed site construction works. Specifically, the objectives of this ASSMP are to document:

- The known and anticipated site sub-surface characteristics expected to be encountered during future excavation works for consideration in development of future investigative and management activities;
- A monitoring and sampling strategy to be implemented prior to and during the proposed ground disturbance activities such that ASS/PASS may be appropriately identified and managed during the minor excavation works; and
- Evaluation of potential ASS/PASS management opportunities and constraints resulting in the identification of a preferred management strategy(ies).

Procedures for the management and validation of ASS during the future site excavation works so as to minimise the potential for adverse environmental impacts as a result of the ASS/PASS disturbance activities.

1.3 Proposed Development Details

As discussed in **Section 1.1** a multi-use development is proposed, detailed design plans are provided in **Appendix A**.

Under the current development scenario, seven new warehouse buildings will be constructed along with new internal road networks, carparks, loading docks and minor landscaped areas. A childcare centre is proposed to be established as part of the precinct, with development plans indicating this facility will be located in the southwest of the Masterplan Area. The works are anticipated to generally involve filling to raise the site surfaces across the Masterplan Area, with minor shallow detailed excavation in limited areas.

Proposed site development details are shown in **Figure 3**.

1.4 Summary of Key ASSMP Aspects

JBS&G has included the following brief ASSMP summary guide to aid the management of ASS/PASS which may be encountered during the proposed development activities (as summarised from the document presented herein):

- Based on previous investigations and additional more recently acquired data documented herein, P/ASS materials are typically associated with natural/reworked natural estuarine silty clays and alluvial sands (refer **Section 3.4**);
- Construction activities which have the potential to generate P/ASS include (but not limited to) isolated limited shallow excavations for service installations, potential limited disturbance of deep soils following dewatering activities (if required). General shallow site excavations are unlikely to disturb P/ASS (refer **Section 4.1**);
- JBS&G recommends the addition of neutralising chemicals as the preferred P/ASS treatment approach (refer **Section 4.3**);
- Existing data presents liming rates varying between 9 kg and 25 kg lime/tonne of PASS for appropriate treatment. Notwithstanding, the revising of liming rates will be required based on the placement (i.e. stockpiled) or extents (i.e. batters/exposed faces) of P/ASS materials (in accordance with **Section 4.3.6**); and
- Following validation of treated P/ASS material (in accordance with **Section 4.3.8**), the material will either be set aside for potential use as engineered fill material within the

development site, or where surplus to site requirements, will require off-site disposal as per the requirements of EPA (2014a[7]). In the case of offsite disposal, a final round of field pH testing should be undertaken prior to loading of the trucks to ensure that pH levels remain above 6.

[7] Waste Classification Guidelines Part 1: Classifying Waste. NSW EPA, November 2014 (EPA 2014a)

2. Acid Sulfate Soil General Information

2.1 Acid Sulfate Soils Background

ASSMAC (1998)[8] and DAWR (2018) provide useful information on acid sulfate soils. ASS is a common name given to naturally occurring sediments and soils containing iron sulfides (generally as iron sulfide or iron disulfide). These soil profiles are typically located in coastal, low-lying alluvial or estuarine areas such as mangroves, salt marshes, coastal rivers and creeks, estuaries, tidal lakes and coastal floodplains where historical iron rich sediment deposition in the presence of a sulfate source (commonly salt water), organic matter and microbial action over time has resulted in the formation of particular environmental conditions. ASS are predominantly encountered in areas where the soil profile has an elevation of less than 5 m Australian Height Datum (AHD), and may be found close to the ground level or at depth in the soil profile where continued deposition actions have resulted in raising of the ground levels.

Changes in environmental conditions which result in the exposure of these materials to air, via excavation or drainage of subsurface soils, can lead to the reaction of the iron sulfides with oxygen, causing the generation of sulfuric acid. This may result in significant environmental and infrastructure damage if the produced acid is spread by groundwater or surface water.

ASS consist of two major categories:

- ASS are soils that have been exposed to air which has caused the oxidation of iron sulfides to form sulfuric acid. Some of this acid is commonly neutralised by other soil particles in a process known as buffering, however the excess acid is spread by water movement through the soil; and
- PASS are soils which contain iron sulfides, but which have not been exposed to air and oxidised. These soils are generally kept from contact with air by permanent waterlogging or the density of the soil profile and so are relatively stable, or in equilibrium. In this state the soils are generally non-acidic and are considered harmless to the environment. However, oxidation of such soils through disturbance has the potential to generate acidic conditions.

Commonly, an ASS profile will consist of a combination of both ASS and PASS material as a result of ongoing chemical reactions in response to environmental changes including groundwater fluctuations and seasonal soil moisture changes.

The following types of general urban development activities could result in disturbance of ASS (both ASS and PASS):

- Deep bulk excavation works which encounter subsurface soil, installation of deep service infrastructure, alteration of existing site levels to achieve modified ground levels, dredging or otherwise mobilisation such that the sediment may become oxidised, etc.;
- Dewatering activities associated with construction works proposed at elevations below the standing water table, for example installation of deep drainage infrastructure, etc. which may result in ASS beyond the excavation extent becoming exposed to oxygen due to a lowering of groundwater levels, thereby generating acidic conditions; and
- Generation of spoil which may return ASS to the ground surface associated with foundation construction works, including piling spoil during continuous flight auger (CFA) piles or bored pile installation activities, directional drilling works for infrastructure services installation, etc.

[8] *Acid Sulfate Soils Assessment Guidelines* – NSW Acid Sulfate Soils Management Advisory Committee August 1998. Accessed 10 July 2020

As noted in **Section 1.3**, site-specific development works are anticipated to generally involve filling to raise the site surfaces across the Masterplan Area, with minor shallow detailed excavation in limited areas.

2.2 Laboratory Assessment Criteria

The assessment of site soil conditions with respect to ASS occurrence is completed in accordance with the guidance provided in ASSMAC (1998). The requirement to manage soils for ASS is evaluated by comparison of laboratory analysis results with Site Action Criteria (SAC) developed based on three broad soil texture categories. The SAC are based on the percentage of oxidisable sulfur or equivalent acid trail (i.e. titratable actual acidity-TAA or titratable potential acidity-TPA) results. There are two categories based on the scale of the proposed disturbance, with the SAC for small scale (i.e. less than 1000 tonnes) works based upon the texture of the soil material and the SAC for large scale works adopting the most sensitive SAC being the SAC for coarse textured soils in small scale works.

Table 2.1: ASSMAC Site Action Criteria based on General Soil Texture Categories

Type of material		Action Criteria 1-1000 tonnes disturbed		Action Criteria if more than 1000 tonnes disturbed	
Texture Range. McDonald at al. (1990)	Approx. clay content (%<0.002 mm)	Sulfur trail % S oxidisable (oven-dry basis) e.g. S_{Cr} or S_{pos}	Acid trail Mol H^+/tonne (oven-dry basis) e.g., TPA or TSA	Sulfur Trail % S oxidisable (oven-dry basis) e.g. S_{Cr} or S_{pos}	Acid trail Mol H^+/tonne (oven-dry basis) e.g., TPA or TSA
Coarse Texture Sands to loamy sands	≤5	0.03	18	0.03	18
Medium texture Sandy loams to light clay	5-40	0.06	36	0.03	18
Fine texture Medium to Heavy clays and silty clays	≥40	0.1	62	0.03	18

Exceedance of the SAC attributable to ASS material generally triggers the need to prepare a management plan and is based on the percentage of oxidisable sulfur (or equivalent TPA, TAA) for broad categories of soil. However, it is noted that other soil properties and constituents may cause acidic conditions in soils that are not related to acid sulfate soil conditions. This may include sources of organic acidity where the soils have a pH of less than 5 and positive titratable actual acidity (TAA) or titratable potential acidity (TPA) but have no detectable sulfur source (i.e. no S%). In this case, exceedance of the Acid Trail SAC does not trigger treatment of these soils (DWAR 2018e[9]).

Given the nature of the works to be undertaken at the site (expected to result in <1000 tonnes of materials disturbed) and with consideration to the variability of the soils types noted in previous investigations, the SAC adopted for assessment and management of ASS at this site are:

- Sulfur Trail Criteria (S_{pos} or S_{Cr} %) > 0.03 %;
- Acid Trail Criteria (TSA, TPA) > 18 mol H^+ / tonne soil.

2.3 Other Regulatory Guidance

Section 105 of the *Contaminated Land Management Act 1997* (CLM Act) allows the Environment Protection Authority (EPA) to "make or approve" guidelines for any purpose related to the objects of the Act. In addition to ASSMAC (1998), this management plan has been prepared with reference to the following:

- *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014a);

[9] *Guideline for the Dredging of Acid Sulfate Soil Sediments and Associated Dredge Spoil Management, Australian Government Department of Agriculture and Water Resources, June 2018 (DAWR 2018e)*

- *Waste Classification Guidelines Part 4: Acid Sulfate Soils* (EPA 2014b);
- *Contaminated Land Management: Guidelines for NSW Site Auditor Scheme*, 3rd Edition, EPA (2017); and
- *Protection of the Environment Operations Act* 1997 (POEO Act) and associated regulations.

Note is also made of the National Acid Sulfate Soil Guidance issued in June 2018 by the Australian Government Department of Agriculture and Water Resources (DAWR), including:

- *National Acid Sulfate Soil Guidance: A Synthesis* (DAWR 2018a);
- *National Strategy for the Management of Coastal Acid Sulfate Soils* (DAWR 2018b);
- *National Acid Sulfate Soils Sampling and Identification Methods Manual* (DAWR 2018c)*;*
- *National Acid Sulfate Soils Sampling and Laboratory Methods Manual* (DAWR 2018c)*;*
- *Guidance for the Dewatering of Acid Sulfate Soils in Shallow Groundwater Environments* (DAWR 2018d); and
- *Guideline for the Dredging of Acid Sulfate Soil Sediments and Associated Dredge Spoil Management* (DAWR 2018e).

3. Site Condition

3.1 Site Identification

The site details are summarised in **Table 2.1** and shown on **Figures 1** and **2**.

Table 2.1: Site Details

Lot/DP	Lot 2 DP 714965
Site Address	13 Endeavour Road, Caringbah, NSW
Local Government Authority	Sutherland Shire Council
Approximated Geographical Coordinates (MGA 56)	**Easting**: 327727.77 **Northing:** 6232248.46 (centre of site)
Site Area	Approximately 12.5 ha
Site Zoning	SP4 Enterprise Zone – Sutherland LEP 2015
Previous Use	Vacant Land then Commercial / Industrial Land Use
Current Use	Commercial / Industrial
Proposed Land Use	Commercial / Industrial with a Childcare facility

3.2 Geology and Soils

A review of the 1:100 000 scale Wollongong – Port Hacking Geological Map (DMR 1985)[10] identifies the site is underlain by man-made fill and organic-rich muddy, mostly "marine" sand. Man-made fill typically comprises dredged estuarine sand and mud, coal washing, industrial and household waste whereas the organic-rich muddy "marine" typically overlaid clean to muddy, shelly "marine" sand, sometimes with low dunes, then medium to fine-grained "marine" sand with podzols and shelly layers.

Review of the *Acid Sulfate Soil Risk Map for* Port Hacking (DLWC 1997) indicates that the site is located within an area classed as 'disturbed terrain'. Areas having this classification may include filled areas which often occur following reclamation of low-lying swamps for urban development. Other areas with this classification may include areas which have been mined, dredged, or have undergone heavy ground disturbance through general urban development.

JBS&G 2020 reported the presence of strong organic odours associated with silty clays and underlying silty sand, which were reported to be indicative of potential acid sulfate soils (PASS). Furthermore, JBS&G 2020 noted the presence of a strong sulfuric/organic odour in groundwater that was observed to be grey/brown in colour, which is further evidence for the presence of PASS conditions. Fill materials have been identified to comprise a combination of sub-grade gravels (underlying hardstand pavements) and silty sands and crushed sandstone materials. Detailed assessment of fill materials have identified they do not contain P/ASS properties.

3.3 Sutherland Council LEP (2015) Requirements

Review of the Sutherland LEP 2015 online portal indicates that the site falls within a category classified as Class 3 ASS. According to the LEP, development consent is required for any works in a Class 3 ASS area that extend beyond 1 metre below the natural ground surface and which are likely to lower the water table more than 1 m below ground surface (bgs). Such works would trigger the requirement for assessment and may require ASS management unless preliminary assessment indicates management is not required. It is noted that land within a category classified as Class 1 and 2 are located directly adjacent the site (mangroves associated with Woolooware Bay).

[10] *Wollongong – Port Hacking Geological Series Sheet 9029-9129 (Edition 1) 1983*. Department of Mineral Resource, Geological Survey of NSW (DMR 1983)

3.4 Environmental Investigations Addressing P/ASS

3.4.1 JBS&G (2020) – Due Diligence Assessment

The subsurface conditions encountered at the site were typically identified to comprise the following, with P/ASS material highlighted (**bold**):

- Fill – road base underlying hardstand pavement to a maximum depth of 0.5 m bgs (BH25) noted to comprise a silty sandy gravel with inclusions of igneous gravel and crushed concrete inclusions;
- Fill – heterogeneous silty sand with varied inclusions of small angular igneous gravel, crushed concrete/brick and sandstone fragments noted to depths of between 0 m bgs (BH30) and 3.7 m bgs (MW07);
- Fill – **Reworked estuarine silty clays** noted to contain organic matter/vegetation at sample locations BH26 to BH30 and MW06, to a depth between 0.1 m bgs and 4 m bgs.
- **Alluvial Sands** – silty sand observed underlying fill and/or estuarine silty clays, grey to brown well sorted medium to fine grained.
- Sandstone – off-white to grey fine-grained sandstone observed at depths between 3.5 m (MW06) and 6.8 m bgs (BH26) near the boundary with Captain Cook Drive.

Based on the field observations made by JBS&G 2020, fill material was generally encountered to a depth of 3.35 m bgs. Sandstone bedrock was encountered along the western portion of the site, with the anticipated depth to bedrock increasing toward the east (Woolooware Bay). Lithological logs from JBS&G (2020) are provided in **Appendix B**.

Estuarine silty clays are inferred to be disturbed/reworked materials based on the known site history (land reclamation activities) and observations made during the JBS&G (2020) investigation, noting some areas of the site may encounter undisturbed natural original sediments (consistent with the mapped geology and soils).

Moderate to strong organic/sulphuric odours was noted in estuarine clays and wet natural silty sands at depths of between 2.0 m and 7.0 m bgs.

JBS&G (2020) conducted field tests and laboratory analyses (sPOCAS) on representative soil samples. Sample locations are shown on **Figure 3**, and summarised laboratory results are provided in **Table 2.2** below. Laboratory reports and chain of custody (COC) documents are provided in **Appendix C**.

Table 2.2: Results of sPOCAS Analysis (JBS&G 2020)

Sample	Sample description	Texture	Action Criteria (1-1000 tonnes disturbed)		Action Criteria (>1000 tonnes disturbed)		P/ASS
			Sulfur Trail (S_{pos}%) - S %	Acid Trail (TPA/TSA) mol H^+/tonne	Sulfur Trail (S_{pos}%) - S %	Acid Trail (TPA/TSA) mol H^+/tonne	
		Coarse	0.03	18	0.03	18	
		Medium	0.06	36	0.03	18	
		Fine	0.1	62	0.03	18	
MW06 0.5-0.6	Fill, Silty sand, brown, fine grained with gravel, dry, no odour	Medium	<0.005	<5 /<5	<0.005	<5 /<5	No PASS
MW07 4-4.1	Sandy clay, brown/black, medium plasticity, moist, strong organic odour	Medium	**0.71**	**280 / 280**	**0.71**	**280 / 280**	**PASS/ASS**
BH26 4-4.1	Silty sand, brown, wet, homogenous well sorted, slight organic odour	Medium	**0.46**	**98 / 98**	**0.46**	**98 / 98**	**PASS/ASS**
BH26 6.7-6.8	Weathered sandstone, off-white, fine grained, no odour, top of unit immediately below saturated organic sediments	Medium	**0.12**	<5 /<5	**0.12**	<5 /<5	**PASS**
BH28 5-5.1	Silty sand, brown/grey, homogenous well sorted, saturated, strong organic odour	Medium	**0.22**	<5 /<5	**0.22**	<5 /<5	**PASS**
BH30 1-1.1	Fill, Sandy clay, light brown, soft medium plasticity, no odour	Fine	0.01	<5 /<5	0.01	<5 /<5	No PASS
BH30 3-3.1	Fill/reworked Silty clay, black/grey, medium plasticity, saturated, strong organic odour	Fine	**0.20**	<5 /<5	**0.20**	<5 /<5	**PASS**

Review of analytical results against adopted criteria (**Table 2.2**) indicates five of seven soil samples exceeded the action criterion for both 1-1000 tonnes of disturbed soils and the action criteria for <1000 tonnes of disturbed soils.

JBS&G 2020 indicated that PASS is generally likely to occur in the soils underlying site fill materials, including disturbed organic rich estuarine clays and alluvial silty sands.

Based on the preliminary data, the anticipated extent of P/ASS is across the majority of the site from a depth of approximately 3-7 m bgs. There is the potential that some fill materials containing reworked organic-rich sediments may also include P/ASS.

Soils for which analytical data are reported to be below the applicable ASSMAC (1998) action criteria are classified as non-ASS and do not require management.

3.4.2 Detailed ASS Assessment (October 2021)

To aid development of this ASSMP, JBS&G conducted a detailed ASS assessment across the developable area on 21 and 22 October 2021. The assessment was conducted in accordance with ASSMAC (1998) and the *National Acid Sulfate Soil Guidance* (Australian Government 2018).

Assessment activities were conducted with reference to detailed excavation plans proposed under the development (**Appendix A**). Sample locations are provided on **Figure 3**. A total of 21 test pits (WC01 to WC20 and WC18A) were advanced across the proposed excavation area(s) to inspect and assess underlying soil for indicators of PASS. Soil samples were collected at regular intervals or of differing lithologies to the maximum depth of proposed excavation at each location. At selected locations test pits were extended beyond the proposed excavation depth required as part of development to provide meaningful data on the actual depth of encountered P/ASS within the developable area.

ASS field tests were undertaken in accordance with the field testing procedure presented in the ASSMAC (1998), with field pH_f and pH_{fox} tests recorded. Testing comprised of mixing a subsample of the soil at a ratio of 1:5 soil to water (deionised water). The resulting soil suspension was tested for pH with the use of a portable meter. A second subsample of soil was collected and mixed at a ratio of 1:5 soil to a hydrogen peroxide solution. The resulting suspension was tested for pH (pH_{OX}). A total of 32 samples were subject to field screening which included topsoil material, subgrade gravel and crushed sandstone/sand fill material which are required to be excavated under the proposed development activities. No fill sample reported a significant drop in pH or a strong visual reaction indicative of PASS. A total of seven selected samples were submitted for sPOCAS laboratory analysis which included five samples of fill material (including samples collected at the approximate maximum proposed excavation depth under current development activities) and two samples of underlying natural estuarine clay identified at a depth of 2.3 to 2.5 m bgs.

Summarised laboratory results are provided in **Table 2.3** below with field logs provided in **Appendix B**. Laboratory reports and chain of custody (COC) documents are provided in **Appendix C**.

Table 2.3: Results of sPOCAS Analysis (October 2021)

Sample	Sample description	Texture	Action Criteria (1-1000 tonnes disturbed)		Action Criteria (>1000 tonnes disturbed)		P/ASS
			Sulfur Trail (S_{pos}%) - S %	Acid Trail (TPA/TSA) mol H^+/tonne	Sulfur Trail (S_{pos}%) - S %	Acid Trail (TPA/TSA) mol H^+/tonne	
		Coarse	0.03	18	0.03	18	
		Medium	0.06	36	0.03	18	
		Fine	0.1	62	0.03	18	
WC01 0.15-0.45	Fill, gravelly SAND, heterogenous dark grey crushed sandstone,	Course	<0.02	<2 /<2	<0.02	<2 /<2	No PASS
WC08 1.4-1.5	Fill, clayey SAND, heterogenous orange, inclusions of sandstone and clay clasts	Medium	<0.02	<2 /<2	<0.02	<2 /<2	No PASS
WC10 0.2-0.3	Fill, clayey SAND, heterogenous grey, loose medium sand with some gravel	Medium	<0.02	<2 /<2	<0.02	<2 /<2	No PASS

Sample	Sample description	Texture	Action Criteria (1-1000 tonnes disturbed)		Action Criteria (>1000 tonnes disturbed)		P/ASS
			Sulfur Trail (S_{pos}%) - S %	Acid Trail (TPA/TSA) mol H^+/tonne	Sulfur Trail (S_{pos}%) - S %	Acid Trail (TPA/TSA) mol H^+/tonne	
		Coarse	**0.03**	**18**	**0.03**	**18**	
		Medium	**0.06**	**36**	**0.03**	**18**	
		Fine	**0.1**	**62**	**0.03**	**18**	
WC11 0.2-0.4	Fill, SAND, heterogenous brown/orange with sandstone clasts and trace river gravel	Medium	<0.02	<2 /<2	<0.02	<2 /<2	No PASS
WC14 2.3-2.4	Natural, sandy CLAY, grey, firm low plasticity with minor organic inclusions	Fine	0.06	<2 /<2	<0.02	<2 /<2	No PASS
WC19 2-2.1	Fill, SAND, heterogenous medium grained varied inclusions of sandstone cobbles	Medium	<0.02	<2 /<2	<0.02	<2 /<2	No PASS
WC19 2.5-2.6	Natural, CLAY, heterogenous black organic rich peaty clay	Fine	**0.30**	**200/200**	**0.30**	**200/200**	**PASS/ASS**

Review of analytical results against adopted criteria (**Table 2.3**) indicates six of seven soil samples were below the action criterion for both 1-1000 tonnes of disturbed soils and the action criteria for >1000 tonnes of disturbed soils. Soil samples considered representative of fill materials required to be excavated during development activities are identified as non-P/ASS.

Two samples collected from underlying natural material at depths of 2.3 and 2.5 m bgs reported detectable sulfur trails, with one sample WC19 2.5-2.6 identified as P/ASS. The results are consistent with previous investigations (**Section 6.1.1**) and confirm that underlying natural soil P/ASS materials are unlikely the be disturbed under the current development activities.

4. Management Procedures

The aim of the following management procedures is to identify ASS/PASS material and implement appropriate mitigation measures such that the potential environmental impacts associated with disturbance of ASS/PASS during the proposed site remediation and construction works may be appropriately managed. Specifically, the objectives are to provide:

- A methodology for the identification of materials requiring management;
- Protocols for the on-site treatment and management of ASS/PASS materials and associated leachate water (as required) during the proposed works;
- Excavation inspection and validation assessment protocols to be implemented during the proposed works such that the extent of ASS/PASS material may be delineated from non-ASS material (overlying non-ASS material, residual soils, etc) to provide for off-site disposal of the balance of excavated material without the need for lime stabilisation);
- Soil and water quality targets for the excavation, treatment and removal of material encountered during the proposed works; and
- A contingency framework in the event that additional ASS conditions are encountered during the site works; monitoring indicates disturbance of off-site ASS materials; or the proposed treatment strategy fails.

4.1 Scope of Soil Disturbance Activities

As outlined in **Section 1.3**, the proposed development works will include augmentations to existing site structures, peripheral driveways and carparks with majority of the Masterplan Area involving filling to raise site surfaces and limited minor shallow excavation (less than 2 m bgs across the majority of the proposed development area). On this basis, it is anticipated that the following works will have the potential to result in disturbance of acid sulfate soils, where present:

- Excavation where required to facilitate the construction of features (such as services installation) that would require the excavation of soil to depths of ≥2-3 m bgs into alluvial soil (PASS), and/or that may result in a reduction in standing groundwater levels within the PASS profile (noting dewatering, if required, will be limited)); and
- Dewatering of saturated alluvial soil within excavation envelope(s) that may be required if encountered to facilitate limited shallow excavation works.

4.2 Evaluation of Potential Management Strategies

Where the presence of ASS has been identified (generally limited to natural clay-rich soils at depths beyond 2-2.4 m bgs within the developable area), evaluation of options to minimise the level of disturbance and to mitigate the potential impact of disturbance (if necessary) of the materials is required. As per ASSMAC (1998), potential mitigation approaches have been identified:

- Avoid ASS materials being encountered during works by not undertaking the proposed development works or by altering the proposed development plans, i.e. removing deep excavation and/or dewatering requirements;
- Where encountering ASS during works cannot be avoided, manage the potential for acid generation by neutralising disturbed materials, preventing movement of acid impacted water, and the use of suitable construction materials;
- If ASS materials have previously been disturbed, undertake works to mitigate the existing conditions, minimise the production of further acid during the proposed works and rehabilitate impacted areas;

- Treat soil by allowing full oxidation of the sulfide component under controlled conditions followed by flushing the acid from the soil with water and neutralisation of the subsequent leachate;
- Avoid using untreated ASS materials as fill material in non-ASS areas by either leaving material on-site, or managing the potential for acid generation prior to material being transported from the site of origin; and/or
- Reburial of ASS materials beneath the permanent water table or beneath a dense soil profile which excludes oxygen exposure such as an engineered clay cap. This may be undertaken on-site if there are low lying areas where reburial and consequential flooding of the soil profile or construction of a suitable capping layer can be undertaken as part of development works, or at an alternative off-site location provided that sufficient stabilisation of material is undertaken to minimise acid generation during transportation and handling.

The potential suitability of the various options is further discussed in the following sections.

4.2.1 Avoidance Strategies

Avoidance of ASS disturbance is generally considered to be the preferred means of ASS risk management where such actions can be achieved. Implementation of appropriate retention methods to minimise impacts to groundwater levels and associated saturated PASS material beyond the excavation extent will result in avoidance of disturbance of PASS material beyond the lateral extent of any proposed excavation envelopes.

In general, for any deep excavations (if required) extending beneath the water table and/or to approximate depths of 2.5-3 m bgs which may generate excess materials, the alternative management strategies detailed below will need to be considered. It is noted only shallow excavations are anticipated for the proposed development.

4.2.2 Management by Neutralisation

Neutralisation techniques can be used to treat ASS by the addition of chemicals that react with the produced acid to ensure that acid is not released from the treated material. The neutralisation activities should result in the pH of the disturbed materials (water and/or soil) being between 5.5 to 7.5 and requires that ASS material disturbed during site activities be treated with the preferred neutralising agent.

Laboratory analysis is used to assess the levels of existing and/or actual acidity and indicates the level of neutralising capacity required to react with all potential acidity that may be generated during/following disturbance of the ASS material.

The potential uncertainty associated with the quantity of neutralising capacity to be added is commonly managed by the use of a factor of safety of 1.5 (at minimum) (DER 2015)[11].

Sufficient capacity in terms of a suitable treatment area, machinery, budget to purchase the neutralising agent and time is necessary to successfully implement ASS neutralisation. Implementation of environmental controls is also necessary to ensure that all potentially acidic leachate produced during the treatment process is captured and adequately treated and that heavy metals which may be released during oxidation of ASS material are also appropriately managed.

An evaluation of potential neutralisation chemicals should be undertaken during the planning process and appropriate quantities of the preferred chemicals sourced for the duration of the site activities.

[11] *Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (June 2015)* – Government of Western Australia Department of Regulation. Accessed 9 July 2020.

In this ASSMP it is assumed the neutralising chemical is high quality agricultural lime (aglime). Further discussion regarding neutralising chemicals is provided in **Section 4.3.2.**

It is recommended that small scale treatment trials be implemented prior to broad scale implementation of alternative neutralising compounds. The small-scale trials should document the effectiveness of the revised approach in terms of the time, cost, availability, suitability, etc.

During works, a sufficient supply of aglime will be required to be kept on site at all times. The quantity is based on requirements for the treatment of acid sulfate soils to be neutralised within the treatment area; for application on exposed excavation faces where ASS is expected or suspected (such as the base of deeper excavations); and for wet weather events where existing applications will require replacement and/or treatment of acidic water is necessary. Receipts, dockets and other field records showing the storage locations of all chemicals and location of all applications of neutralising agents must be kept.

ASS management by neutralisation is considered to be a suitable option for the proposed works as:

- Excavation of volumes of alluvial material where required as part of the development works;
- The proposed works are able to be staged in a manner which will allow treatment of ASS material in a timely manner;
- Via staging of the excavation works, a contractor will be able to ensure sufficient space can be made available within the site to set aside a treatment area(s) close to the identified ASS disturbance which can be hydraulically isolated from the remainder of the site;
- Appropriate machinery to mix the soil and neutralisation chemicals can be supplied by the civil works/earthworks contractors completing works on site; and
- Following successful completion of the neutralisation process, the treated soils are no longer considered to be ASS materials and so may either be reused on site as engineered fill material, or alternatively, may be removed off-site as waste.

4.2.3 Full Oxidation and Leachate Collection

In the event that the acid production potential is relatively low, or there is a relatively low quantity of material to be treated, consideration may be given to the excavation and exposure of the soils to promote full oxidation. This option requires the implementation of environmental controls to ensure that all acid produced is flushed from the soil as leachate. Similar to management by neutralisation, a suitable treatment area is necessary where material can be spread and reworked to allow oxygen to react with the sulfides in the soil and where all leachate produced can be captured and treated by neutralisation.

This method is considered not to be a viable option for larger material volumes as the process of soil oxidation may take extended periods (weeks to months) to reach completion. There is also a significant level of uncertainty in the volumes of leachate that would require neutralisation and disposal due to climatic variation, including rainfall events. Given the currently unknown anticipated volume of material requiring treatment, noting limited shallow excavations only are anticipated, the requirement to maintain environmental controls for this period and the potential for such works to delay the construction program, this option is considered undesirable when compared to the relatively low cost of neutralisation chemicals as discussed in **Section 4.3.2**above.

4.2.4 Reburial of ASS Material

Strategic reburial or interment techniques can be used to manage PASS material by prevention of oxidation through permanent storage in an anoxic environment. These techniques are often

adopted where areas are available for reburial and cost savings can be achieved by avoiding soil handling labour and neutralisation chemical costs. An alternative method of achieving reburial is over excavation of non-acid sulfate soil materials followed by reinstatement of the excavation with potential ASS material. Potential reburial sites must have a permanent groundwater table level above the proposed top of the reburial cell or alternatively measures to minimise oxygen exposure to ensure that the material is returned to an anoxic environment.

Reburial may occur within the site or alternatively, where appropriate licences are obtained, at a site lawfully able to accept this material in accordance with the requirements of EPA (2014). Notwithstanding, it should be noted that, at the time of reporting (as presented herein), no known public accessible waste disposal facilities licensed to accept untreated ASS for burial.

Excavation of ASS and creation of re-interment voids must be staged to ensure that adequate space is available for all ASS materials to be adequately reburied below a permanent water table and that the ASS will not be buried in conditions that may cause the formation of acidic conditions. A maximum period of time between the commencement of disturbance and completion of interment works of approximately 48 hours should be adopted in all instances. If the material is to remain exposed for longer the 24 hours the pH levels should be monitored every 12 hours to ensure acid conditions are not developing.

On this site, given the required depth of excavation to expose the PASS material, the potential excavation requirements and the standing water table (≥2 m bgs), strategic reburial of PASS without neutralisation is considered unlikely to be a practicable management option.

4.2.5 Separation Techniques

Separation techniques are increasingly being implemented to reduce the quantity of PASS material requiring treatment in areas where works include the disturbance of large quantities of PASS. These activities include the removal of fine ASS particles including pyrite and monosulfides from coarser grained soil particles. This results in two material streams, concentrated 'ASS fines' and non-ASS material which can be removed from the management process. Management of ASS fines would then involve implementation of other ASS management techniques such as reburial, neutralisation, etc.

Separation is typically implemented by creating a soil slurry where fine particles can be suspended in solution away from heavier soil particles using methods such as sluicing or cycloning. Typically, such methods require suitably grained soils such as sand or non-consolidated sediments and a significant water source to implement the separation.

Environmental controls are required during the separation processes to ensure that the PASS fines do not undergo oxidation prior to the implementation of other management measures and validation of the non-ASS stream would then be necessary to confirm that the ASS fines have been adequately removed.

On this site, separation techniques are considered not to be a viable management option as these techniques cannot be used as a standalone management option and as such the ASS fines once separated would still require further treatment. The use of separation techniques would require the construction of sluicing channels or installation of cyclone treatment equipment to manage the quantities of slurry produced during the treatment process and provide sufficient areas for drying of the separated non-ASS portions following separation of the ASS fines.

4.2.6 Selection of Preferred Management Strategies

Evaluation of potential management strategies has identified the use of neutralisation techniques where disturbance cannot be avoided as the most appropriate technique for this site.

Management measures for identified PASS material will include the application of neutralisation chemicals to excavated PASS material, neutralisation of exposed excavation faces during staged

treatment works and neutralisation of groundwater seepage and drainage leachate produced during the excavation and treatment works. Following validation to confirm the acid generation potential of the material has been appropriately neutralised, the material will either be set aside for potential use as engineered fill material within the development site, or alternatively, will require off-site disposal as per the requirements of EPA (2014).

4.3 General Site Management Strategy

The site management strategy to be implemented during works which may disturb PASS materials will ensure the following:

- Adequate treatment of PASS material such that there is sufficient acid neutralising capacity and no net acidity following stabilisation (as measured through appropriate field testing and laboratory validation);
- Water discharged from any excavations and treatment areas (including run-off, water from dewatering and leachate) is neutral and discharged to stormwater once it has been shown to meet with the criteria specified in this plan or alternatively, shall be reused on site for dust suppression;
- Groundwater quality indicators and levels are not significantly changed from the existing levels/quality during excavation activities and are re-established after the completion of construction works; and
- Implementation of additional assessment procedures during earthworks operations for the effective treatment and management of any drained, disturbed or excavated acid sulfate soils.

4.3.1 Pre-disturbance Works

Prior to the commencement of excavation works which may disturb PASS materials at the site, including, if required, any deeper excavation activities with the potential to generate spoil comprising P/ASS, the following preparations should be considered:

- The sequencing of proposed excavation, services installation and other activities should be planned in detail taking into account the time and space necessary to complete the PASS management activities outlined in this document. The planning should provide a contingency for treatment of additional quantities of materials in the event that the quantity of PASS material greater than anticipated is identified during implementation of the site works, or heavy rainfall events result in significant additional quantities of collected impacted water;
- The actual areas of PASS occurrence where disturbance/excavation will occur (anticipated to be generally limited to deep excavations) as part of the site activities should be identified and suitable location(s) for treatment areas close to the areas of disturbance identified. Based on the proposed works, the available space for treatment and the approximate volume anticipated to be disturbed, staging of the disturbance activities should then be planned such that sufficient drying and mixing time can be achieved for all disturbed materials. The staging should also allow for adequate time to obtain the results of verification testing before the material is placed at the final location or removed from the site.

4.3.2 Neutralisation Chemicals

An evaluation of potential neutralisation chemicals should be undertaken during the planning process and appropriate quantities of the preferred chemicals sourced for the duration of the site activities. For the purposes of this plan, the neutralising chemical is assumed to be high quality aglime. The aglime should be fine ground (<1 mm) calcium carbonate ($CaCO_3$) or calcite (limestone

or marble powder). In the event that neutralising products other than high quality aglime are selected for use in this project, there are several issues that should be considered:

- Is there any potential environmental risk associated with use of the compounds (i.e. other components that may contaminate water, result in a much higher pH value (i.e. hydrated lime), stain treatment areas, etc); and
- Will the neutralising agent be of comparable effectiveness or will properties including: neutralising value, effective neutralising capacity, solubility, pH, chemical components, moisture content, impurities and particle size; require the quantity of agent addition to be varied by a consistent factor.

It is recommended that, if ASS or PASS materials are anticipated to be generated during works, a small-scale treatment trial be implemented at the commencement of site works prior to broad scale implementation of alternative neutralising compounds. The small-scale trials should document the effectiveness of the revised approach in terms of the time, cost, availability, suitability, etc.

4.3.3 Treatment Area Design

As noted above, the treatment area should be situated in an appropriate location(s) with respect to site disturbance activities. In addition, consideration should also be given to the ease with which environmental controls can be implemented and potential requirement for off-site disposal of the material once stabilised and validated. More than one treatment area may be needed depending on site layout and constraints during works.

Small Quantities

It is anticipated the proposed development works will involve small scale disturbance activities, it is anticipated that a large lined skip bin or suitable structure could be used as a 'treatment cell' to minimise the potential for release of acidic leachate or partially treated soil.

Large Quantities

In the event large quantities of material are disturbed which would exceed that able to be managed in a large skip bin, one or more treatment areas should be established with consideration of the following:

- The treatment area should be established separate to the area of disturbance but able to be accessed from the area of disturbance by plant/vehicles transporting the material to be treated and material to be removed from the treatment area at the completion of stabilisation activities;
- The treatment area should be sufficiently large to facilitate a pre-treatment stockpile area, a treatment pad, water/sediment collection and treatment measures, post treatment stockpile storage area and lime storage area.
- The treatment area should be isolated from major external surface water catchments, including overland surface water flow and potential flood water, deep excavation flooding by rainfall events, by ground surface contouring, installation of perimeter drains or bunds covered with an impervious layer (concrete, geomembrane, compacted non-ASS clay, etc).
- Infiltration of surface water (rain or drainage) through the ASS to groundwater within the treatment area should also be prevented to the extent possible. Alternatively, a layer of lime stabilised soil should be prepared on the ground surface within the treatment area that will act to neutralise any acidic water that my infiltrate the ground surface during treatment activities. The application should be no less than5 kg lime/m^2 of treatment area. This application should not be taken into account when material to be treated is placed within the treatment area as the neutralisation capacity of these added chemicals

will decrease with time as a result of insoluble iron coating generation and it is difficult to ensure that there has been adequate mixing of the neutralising agent within the soil added to the site.

- Pre-treatment and post-treatment stockpile areas should be separately bunded or drained to minimise the potential for re-acidification of treated material.
- The treatment pad should be of a size that would allow treatment of material by a single machine over a reasonable timeframe to minimise the oxidation of material during spreading and treatment. Assuming the material the subject of treatment is spread to a depth of approximately 0.3 m, a single treatment area 10 m by 20 m could treat 60 m^3 of material per treatment cycle. Should capacity to treat more material be required, two or three treatment pads could be established, separated by a suitable width to allow for excavator movement between the bunds of each pad.
- The bund surrounding each treatment pad may be constructed of concrete, compacted non-ASS clay, sand and lime filled sandbags or other suitable materials that are relatively impervious and can be coated with a guard layer of lime to neutralise acidic leachate that may contact the bund.
- The base of the treatment pad should be surfaced with concrete, asphaltic concrete, or soil mixed with lime as discussed above. This base should be graded where possible at a minimum fall of 1° to facilitate drainage of leachate such that it can be collected and/or pumped to a treatment/holding tank.
- Once well mixed with a suitable quantity of neutralisation agent, the material should be transferred to the post treatment stockpile area. Here the validation testing will be completed, and the material will remain until receipt of the validation results. The material will then be cleared for beneficial reuse within the site, or alternatively for off-site disposal to landfill.
- Surface water flows will be diverted around the treatment area where possible. Water falling within the various portions of the treatment area will be collected at appropriate locations and transferred either to a holding tank or artificial detention basin. The water quality will be monitored to ensure only water of suitable quality is discharged from the treatment area of the site. Dilution of water collected within the treatment area is not an acceptable method of treatment at this site. Contaminants resulting from oxidation of ASS should be collected, treated and/or managed on-site. Water discharges from the site must not have a significant impact on pH, buffering capacity, colour or ionic composition of the receiving water body (stormwater, groundwater, sewer, etc).
- A sufficient supply of aglime should be kept on site at all times for the treatment of PASS to be neutralised within the treatment area, for application on exposed excavation faces where ASS is expected or suspected; and for wet weather events where existing applications will require replacement and/or treatment of acidic water is necessary. Receipts, dockets and other field records showing the storage locations of all chemicals and location of all applications of neutralising agents must be kept.
- The supply shall be stored in a covered and bunded area to prevent accidental exposure to water and deterioration of the inherent neutralising capacity. ASS treatment materials should be stored in a manner that minimise the exposure of the materials to wet or humid conditions. Such conditions may result in the clumping or surface crusting of particulate lime which can reduce the level of effectiveness in neutralising water or soil.

4.3.4 General Site Management

All natural soils (including reworked natural peaty soils) within the PASS identified zones must be treated as PASS material until such a time as the material is demonstrated to be non-PASS material or treatment effectively reduces the risk associated with the material and validation results meet the relevant specifications.

PASS materials that have been disturbed or excavated should be immediately transferred to the treatment area or treated in-situ as soon as practicable to minimise the quantity of soil, sediment and/or groundwater requiring treatment and the risk of environmental harm to the site and/or down-gradient receptors.

Bunding, diversion drains, contaminated water treatment/containment etc may be used to contain surface water run-off from PASS storage and treatment areas. However, PASS materials must not be used in the construction of bunds and other diversion devices.

Equipment used in the treatment of PASS shall be washed with an alkaline solution at the completion of each work period to minimize corrosion of equipment.

4.3.5 Excavation Works

Excavation works to be undertaken for the Masterplan Area in the identified PASS zones (anticipated to involve majority filling to raise site surfaces, with limited shallow excavations to facilitate any potential construction of services) should be undertaken in the following manner:

- Fill/reworked material comprising black/grey silty clay (refer **Section 3.4.1**) requiring excavation should be removed and placed in a designated treatment area for further assessment and/or treatment;
- Natural soils encountered ≥2-3 m bgs, if excavated, will require the immediate transfer to the treatment area upon excavation. The material will be required to be treated as PASS material;
- Works including disturbance of natural rock will be subject to field testing upon initial exposure of underlying strata, either in-situ or as stockpiled material within the treatment zone. Field testing will include pH_f and post peroxide pH_{fox}, with both required to meet the validation criteria of pH 6 to be considered non-PASS soil. Alternatively, dependent upon the scheduling of the excavation works, laboratory pre-testing of soils from this zone may be undertaken using sPOCAS of S_{Cr} methods. If either the field criteria or laboratory analysis results indicate the material is considered to be PASS, then the material will require treatment as discussed in the following section;
- Excavation works should be staged to limit the period of any required dewatering (and the consequential extent of groundwater drawdown in surrounding PASS areas). This may involve the excavation of smaller cells (than allowable within the treatment area);
- At the completion of the day's activities, where excavation works result in the exposure of known or suspected PASS, a guard layer of fine aglime will be applied to the base of the excavation at a rate of no less than 5 kg lime/m^2 of exposed soil. If the base of the excavation is to remain exposed for an extended period (i.e. more than three days) the lime coating should be checked and re-limed as necessary. Alternatively, the lime may be covered with a layer of compacted non-ASS material at least 0.3 m in thickness;
- Any cut batters/exposed faces potentially including ASS, (i.e. faces at the edge of excavation faces, etc), shall be coated with fine aglime at a rate of no less than 5 kg/m^2 and the lime coating should be checked and re-limed as necessary on a daily basis during periods of dewatering, whilst the faces are temporarily exposed and/or following wet weather events.

4.3.6 Treatment of Excavated PASS Material (incl. Liming Rate)

Treatment of PASS soils will comprise the addition of sufficient quantities of finely ground neutralising agent to treat all oxidisable sulfur and actual acidity and provide a factor of safety to compensate for potential impurities in the neutralising agent, non-homogenous mixing and limitations to the solubility of the neutralising agent.

Existing laboratory data (see **Appendix C**) presents **liming rates varying between 9.4 kg and 25 kg lime/tonne of PASS** for treatment. As such, segregation of PASS material is considered appropriate prior to application of treatment lime to ensure that appropriate liming rates are applied to address the acid generation capacity of the different materials in an efficient manner.

The excavated PASS material will be immediately transferred to the treatment area and placed either in a stockpile within the pre-treatment stockpile area or immediately on the treatment pad. Treatment of excavated material should occur within one day of excavation of the material.

If stockpiled, the material should be formed into a conical stockpile to minimise the exposure of the material to air. In the event of significant wet weather periods, the stockpiles should be covered with builder's plastic or similar to limit the infiltration of rainfall into the stockpiles.

If site conditions require the stockpiling of material for longer than 24 hours, the stockpiles should be treated with a guard layer of aglime of no less than 5 kg lime/ m^2 per vertical metre of soil in the stockpile. This would result in a 2m high stockpile requiring an application of no less than 10 kg lime/m^2 surface area. The stockpile should then be covered with an impervious surface (i.e. builder's plastic) that covers the top and sides of the stockpile to minimise drying by wind and sun and to prevent rainfall entering the stockpile.

Following placement within the treatment pad the material should be spread to a depth that will allow the material to be properly treated by thoroughly mixing neutralising agent through the soil. The actual depth of spreading will be somewhat dependent upon the soil type, the machinery used to mix the material and the form of the neutralising agent. However, the nominal spread depth should initially be no more than 0.3 m. Mixing of the lime and soil mixture may be undertaken by harrowing, rotary hoeing, using an excavator shaker bucket to blend the material, the use of a pug mill or similar equipment.

Care shall be taken to ensure that mixing occurs throughout the depth of the layer. The soil must be managed to achieve a consistency that will allow for thorough mixing of the soil and neutralising agent to ensure that the effective neutralisation occurs. This may require drying of the disturbed material (with associated management of any acidic leachate and other resulting contaminants), mechanical turning and breaking up of soil. Drying should not be undertaken during foreseeable wet weather events due to the increased risk of runoff flushing acid from the material and into uncontrolled areas.

Following mixing, aglime shall be spread at a rate of no less than 5 kg lime/m^2 around the toe of the treated soil, around a 1 m perimeter between the toe of the material and across the exposed face of the bund to neutralise any leachate released from the soil. Once the soil has sufficiently dried that no more leachate is being released, the material should be turned to ensure that all leachate is released from the treatment area.

If there is a likelihood that neutralisation treatment of particular soils encountered during works (i.e. heavy clays) will not be effective for the soil type/s, a small-scale trial to demonstrate that the proposal is practical should be performed before larger scale disturbance of this soil type.

4.3.7 Water Management During Treatment

Surface drainage and groundwater that comes into contact with PASS materials has the potential to become acidic and contaminated with heavy metals leached from the acidified soil. Sources of water may include ground surface drainage associated with rainfall, dewatering product produced during

any deeper excavation works if required, leachate produced during treatment of excavated soils, and groundwater inflow into any open deep excavations.

In general, soil and water at the site is required to be managed under an earthworks Soil and Water Management Plan to be prepared by the Principal Contractor prior to the commencement of site works. However, in addition to these requirements, water from within the treatment area will be required to be collected, assessed and if necessary, treated prior to discharge from the site. Once pH and contaminant concentrations are considered suitable for discharge from the site, the water may be used for dust suppression at the site and/or released to the site stormwater system.

Additional water holding tanks may be necessary in the vicinity of the treatment works zones to store collected water prior to treatment. The water holding capacity directly related to the acid sulfate soil excavation and treatment areas should be maintained at a minimum quantity associated with a 1 in 10 year rainfall event to ensure that sufficient capacity is available to store all potentially acidic water that may be generated during site works.

Water will be neutralised, where required by the addition of lime within a dedicated treatment tank or lined detention basin. Lime shall be added incrementally and thoroughly mixed within the treatment vessel. Approximate lime application rates based on initial pH are provided in **Table 4.1** below.

Table 4.1 Treatment of Acidic Dewatering

Water pH	Agricultural Lime / 1000L Water
0.5	11.7kg
1.0	3.7kg
1.5	1.2kg
2.0	0.37kg
2.5	0.12kg
3.0	37g
3.5	12g
4.0	4g
4.5	1.2g
5.0	0.37g
5.5	0.12g

Lime addition and mixing shall continue until the pH of the water is within the range of 6.5 – 8.5.

In the event water volumes greater than the capacity of the water treatment holding capacity are produced during the acid sulfate soil management activities, consideration should be given to off-site disposal of water via a licensed contractor or treatment of water using neutralisation chemical dosing within holding tanks prior to re-irrigation of open excavations once the pH of the water has been demonstrated to be suitable.

4.3.8 Validation of Treated PASS Material

Following the application and mixing of lime to the PASS at the treatment pad the material should be allowed to stand for a minimum of 48 hours prior to validation assessment. The spread soil should then be assessed to establish whether the following performance criteria have been achieved:

- The neutralising capacity of the treated soil must exceed the sum of the TAA and TPA of the soil, i.e. there is no net acidity in the soil as measured by sPOCAS / SCr < 0.03%S;
- Post neutralisation, the soil pH is greater than pH 5.5 (and preferably less than 9); and
- Excess neutralising potential should remain in the soil as all acid generation reactions may not be complete and so the soil may still have further capacity to generate acidity.

Validation testing using field tests to measure the soil/water pH shall be undertaken at a rate of ten samples per treatment batch (to a maximum quantity of 100 m^3, or a rate of 1 sample per 20 m^3). Field testing will include pH_f and post treatment peroxide pH_{fox}, with both required to meet the post neutralisation criteria noted above for all samples per treatment batch.

Confirmatory laboratory analysis (pH and sPOCAS / SCr) will be undertaken at a rate of two samples per treatment batch (to a maximum quantity of 100 m^3, or a rate of 1 sample per 100 m^3 for larger quantities). The samples obtained for laboratory analysis may be obtained by compositing three subsamples obtained from the treatment material to provide a broader indication of net acidity levels.

Samples should be obtained immediately following movement of the material from the treatment pad area to the post-treatment stockpile area of the treatment zone. Each stockpile should be identified with a unique identifier and its location logged with the laboratory validation sample identification so that laboratory results can then be matched to each stockpile within the post-treatment area. Following additional applications of neutralisation chemicals, a greater density of validation sampling is necessary to confirm the successful neutralisation.

In the presence of positive field validation tests, laboratory analysis of validation samples may be employed to determine the level of net acidity and confirm that the treatment has been successful or provide an indication of the quantity of further aglime application necessary to neutralise the soil.

If negative field tests occur but the confirmatory laboratory analysis results indicate that there is still net acidity, a further application of aglime will be mixed with material to ensure additional neutralisation capacity, prior to further confirmatory analysis.

Following receipt and logging of the successful laboratory validation results, the stockpile may then be released for beneficial reuse of material at the site, or alternatively, for off-site disposal. In the event that the laboratory results indicate that the stockpile requires further treatment, the material should be returned to the treatment pad as a unique treatment batch and treated as required prior to re-sampling.

4.3.9 Site Condition Monitoring

It is anticipated that monitoring of conditions will be undertaken by both the site contractors and an independent appropriately qualified consultant to ensure that the appropriate environmental controls are in place and the treatment strategy is minimising the environmental risk associated with the ASS materials.

The following inspection/monitoring regime will be implemented during the site works period and documented as appropriate to demonstrate compliance with this ASSMP:

- Stockpiles of material within the treatment area and of treated material will be inspected daily by the site contractors with pH measurements of any retained leachate taken and recorded. In the event that leachate is significantly acidic (pH < 5.0), the stockpiled material will be returned to the pre-treatment area until the laboratory results are available and the quantity of required additional lime application is known;
- In the event that an on-site sump/detention basin is used to manage water ingress, surface water monitoring points will be sampled and field tested and the pH recorded every day by site contractors during active site activities and weekly during periods where no active ground works are being undertaken within the PASS area; and
- All treated excavation faces to be retained for more than three days will be inspected on the third morning and lime reapplied as necessary each following morning.

Regular inspection of all excavation and treatment areas will be undertaken to identify potential indications of PASS oxidation. These inspections should note:

- Unexplained scalding, corrosion or degradation of onsite steel equipment and concrete paved surfaces;
- Formation of the mineral jarosite or other acidic salts in exposed or excavated soils;
- Areas of surface water blue-green, blue-white in colour or extremely clarified indicating high concentrations of aluminium; and
- Rust coloured deposits on excavation faces, in drainage paths, on bunds, channels, etc indicating iron precipitates.
- Such inspections should also identify the presence of unusual odours, including strong organic or sulfurous smells (i.e. rotten egg gas).

4.3.10 Removal of Neutralised PASS from the Site

Only material confirmed to be below the criteria listed in **Section 4.3.8** will be considered as stabilised ASS material for potential reuse within or removal from site. A final round of field pH testing should be undertaken prior to loading of the trucks to ensure that pH levels remain above 6. Material to be removed from the site will be classified in accordance with current EPA (2014) requirements and disposed of to a licensed facility permitted to accept the material.

5. Responsibilities

The selection of samples for environmental analysis as per **Section 4.2** shall be undertaken by a suitably qualified and experienced environmental or geotechnical consultant. Results of analysis shall be assessed and evaluated by a suitably qualified and experienced consultant.

Implementation of the physical treatment, material management and environmental controls portions of this ASSMP will be the responsibility of the site contractor engaged to complete remediation and/or construction earthworks within the site. The monitoring of conditions, unless otherwise specified in the monitoring sections will be the responsibility of a suitable qualified environmental consultant who will regularly inspect the site, the treatment area and treatment activities and implement the validation assessments to document compliance with this ASSMP.

The contractor should appoint a foreman or other responsible employee to undertake the appropriate monitoring activities as designated in this ASSMP. This person should be appropriately trained by the environmental consultant in all actions to be completed by the contractor. Where doubt arises concerning the results of the inspections or of field test validity, the environmental consultant should be contacted for verification of appropriate actions.

The contractor is not authorised to make any changes to this ASSMP or implement unapproved variations to the treatment and/or monitoring protocols outlined in this document unless explicit written approval is obtained from the environmental consultant prior to implementation of the changes.

Where ambiguity or conflicts in procedures arise, it is the contractor's responsibility to seek clarification on appropriate actions from the environmental consultant.

ASS mitigation measures should be documented as they apply to all individual works activities to be undertaken at the site. All persons responsible for the works activities should be made aware of their responsibilities in writing and suitable ASS management training should be provided to those persons to ensure that the responsibilities can be achieved.

Where contingency actions are necessary, or in the event that non-compliance with the ASSMP is identified by the contractor, the environmental consultant should be immediately informed in writing. The environmental consultant will then be obliged to provide a timely response documenting the necessary corrective actions.

6. Contingencies

In the event of unexpected events, including the identification of additional PASS zones at the site, or the failure of management measures as described in this ASSMP, the associated environmental risk will be managed by the evaluation and implementation of the contingency procedures and mitigation strategies.

6.1.1 Additional Acid Sulfate Soil Identification

In the event that site excavation works encounter the potential for additional acid sulfate soil areas at the site, identified by visual cues, field testing or laboratory analysis, the additional areas will be treated as per the PASS zone material treatment protocols. If the material is to be excavated as part of the development works, the excavation will be undertaken in stages with suitable volumes to allow the completion of the neutralisation treatment process prior to excavation of the next stage.

If the proposed works do not require excavation of the identified material, exposed surfaces will be treated with a guard layer of lime upon exposure. Groundwater seepage will be monitored, and neutralising agents added as necessary to manage the potentially acidic leachate produced.

6.1.2 Failure of Initial Acid Neutralisation Treatment

As described in **Section 4.3.8** following the treatment of materials within the treatment pad area, validation sampling will be completed to assess the success of the neutralisation process prior to removal of the material from the holding area. In the event that the validation testing indicates that neutralisation of the material is incomplete (i.e. pH<6 or S>0.03 %), a further application of lime and repeat of the treatment procedure will be undertaken prior to further validation assessment. If the proposed techniques fail, further consideration may be given to alternative management strategies as outlined in **Section 4.3**.

7. Conclusions

Based on investigation to date and associated limitations in **Section 8**, site detailed characterisation data available for subsurface conditions across the site and within the Masterplan development area has identified the occurrence of PASS material at depth, primarily situated within natural alluvial soils at depths of ≥2.5-3 m bgs, and beneath the water table.

This ASSMP provides a methodology to manage the risks associated with the proposed activities which when successfully implemented will minimise the environmental risks associated with disturbance of the ASS materials.

8. 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.

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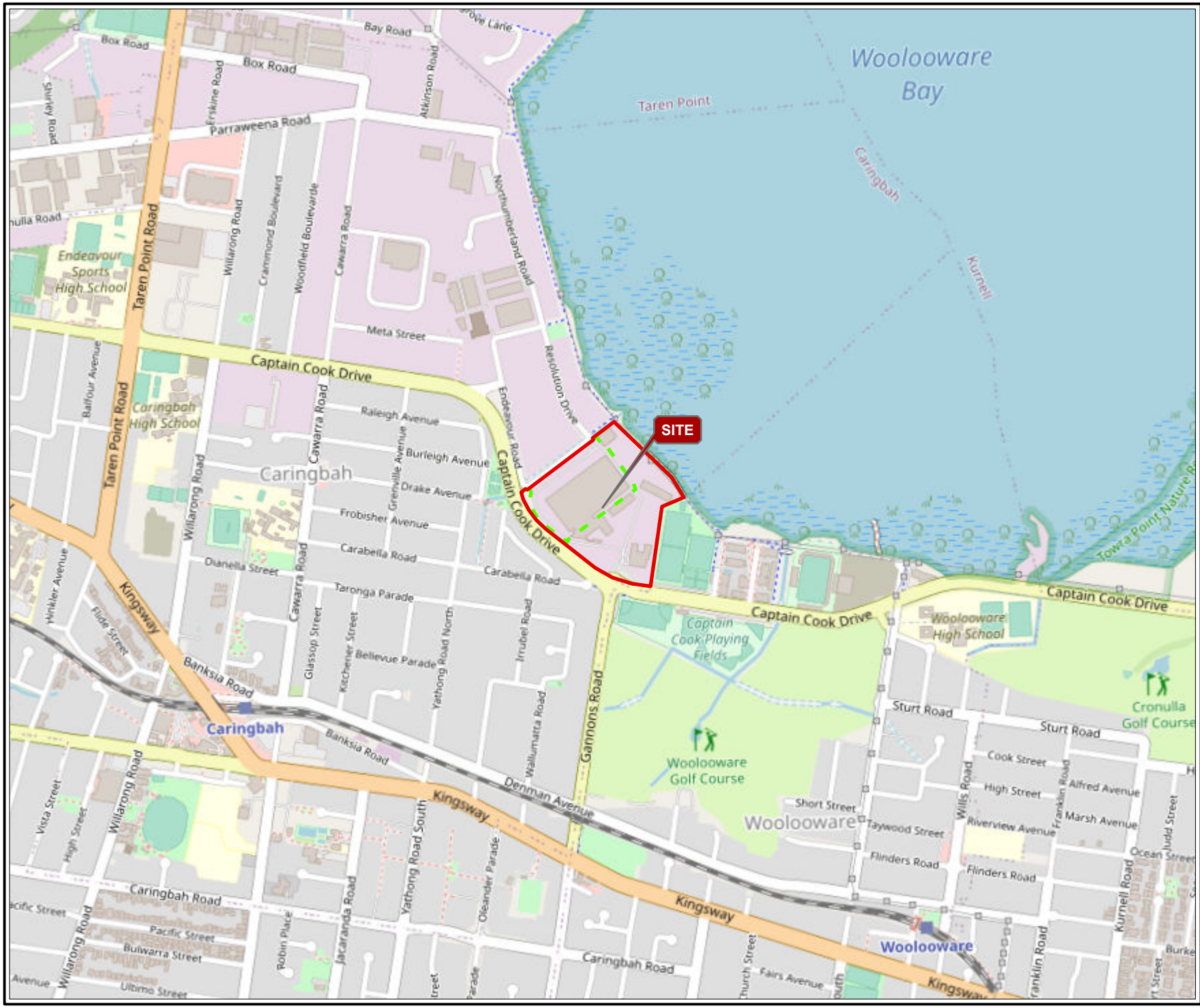
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the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

- Approximate Site Boundary
- Stage 2 TripleTwoNine Masterplan Development

JBS&G

Job No: 58037	
Client: Aliro	
Version: R02 Rev A	Date 2/08/2023
Drawn By: IA	Checked By: RC

Scale 1:15,000

0 140 280

metres

Coord. Sys. GDA 1994 MGA Zone 56

13 Endeavour Road
Caringbah NSW

SITE LOCATION

FIGURE 1

File Name: 64957_CaringbahEstateRevisedMasterplanWorks_R02
Reference: © OpenStreetMap (and) contributors, CC-BY-SA



Legend

- Approximate Site Boundary
- NSW Cadastre
- Stage 2 TripleTwoNine Masterplan Development
- Northern Portion of the Site: Reclaimed Tidal Mangrove Swamp
- Southern Portion of the Site: Reclaimed Tidal Mangrove Swamp
- UST
- Site Features
- Remote Fill Point

JBS&G

Job No: 64957	
Client: Aliro	
Version: R03 Rev A	Date 2/08/2023
Drawn By: IA	Checked By: RC
Scale 1:2,600	

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 56

13 Endeavour Road
Caringbah, NSW

SITE LAYOUT

FIGURE 2

File Name: 64957_CaringbahEstateRevisedMasterplanWorks_R02
Reference: Nearmap - www.nearmap.com (Capture Date: 01/06/2020)



Legend

- Approximate Site Boundary
- NSW Cadastre

JBS&G

Job No: 64957	
Client: Aliro	
Version: R01 Rev A	Date 27/09/2023
Drawn By: IA	Checked By: RC

Scale 1:2,600

0 25 50
metres

Coord. Sys. GDA 1994 MGA Zone 56

13 Endeavour Road
Caringbah, NSW

PROPOSED SITE LAYOUT

FIGURE 3

File Name: 64957_CaringbahEstateRevisedMasterplanWorks_R01
Reference: Nearmap - www.nearmap.com (Capture Date: 01/06/2020)



Legend

- Approximate Site Boundary
- Stage 2 TripleTwoNine Masterplan Development
- Northern Portion of the Site: Reclaimed Tidal Mangrove Swamp
- Southern Portion of the Site: Reclaimed Tidal Mangrove Swamp

Historical Sample Locations

- Borehole Location, AECOM 2019
- Borehole Location, CES 2005
- Borehole/Groundwater Monitoring Well Location, AECOM 2019
- Sample Location, Noel Arnold & Ass. 2012
- Test Pit Location, Golder 1998

Sample Locations - JBS&G 2019

- Borehole Location, JBS&G 2019
- Groundwater Monitoring Location, JBS&G 2019
- Soil Vapour Sample Location, JBS&G 2019

Sample Locations (2020)

- Borehole Location
- Ground Gas Monitoring Wells

Sample Locations (2022)

- Soil Sample
- Testpit

JBS&G

Job No: 64957

Client: Aliro

Version: R02 Rev A	Date 2/08/2023
Drawn By: IA	Checked By: RC

Scale 1:2,800

0 25 50

metres

Coord. Sys. GDA 1994 MGA Zone 56

13 Endeavour Road
Caringbah, NSW

HISTORICAL SAMPLE LOCATIONS

FIGURE 4

File Name: 64957_CaringbahEstateRevisedMasterplanWorks_R02
Reference: Nearmap - www.nearmap.com (Capture Date: 01/06/2020)

Appendix A Detailed Design Plans





LEVEL 1

BUILDING 4

NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum) LEVELS SHOWN ARE INDICATIVE ONLY AND SUBJECT TO FURTHER CIVIL DETAIL DESIGN. THESE MIGHT VARY +/- 1000 mm

EXTENT OF RETAINING WALLS SHOWN AS INDICATIVE ONLY SUBJECT TO CIVIL REVIEW

GROSS LETTABLE AREA (GLA) IS THE TOTAL FLOOR AREA OF A BUILDING, MEASURED FROM THE OUTSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL ROOFED AREAS

5% OF CARPARKING SPACES PROVIDED TO BE DEDICATED AS CAR SHARING BAYS
5% OF CARPARKING SPACES PROVIDED TO BE DEDICATED AS ELECTRICAL VEHICLE BAYS

DEVELOPMENT ANALYSIS

USE		GFA (EXCL LOADING ZONE)
BUILDING 3		
WAREHOUSE	3A	649 m²
WAREHOUSE	3B	676 m²
WAREHOUSE	3C	677 m²
WAREHOUSE	3D	677 m²
WAREHOUSE	3E	698 m²
WAREHOUSE	3F	805 m²
OFFICE	3A	126 m²
OFFICE	3B	127 m²
OFFICE	3C	127 m²
OFFICE	3D	127 m²
OFFICE	3E	127 m²
OFFICE	3F	126 m²
TOTAL AREA		4,942 m²
BUILDING 4		
WAREHOUSE	GROUND LEVEL	4,132 m²
WAREHOUSE	LEVEL 1	3,028 m²
OFFICE MEZZANINE	GROUND LEVEL	841 m²
OFFICE MEZZANINE	LEVEL 1	924 m²
TOTAL AREA		8,925 m²
BUILDING 5		
WAREHOUSE	5A	1,071 m²
WAREHOUSE	5B	3,047 m²
WAREHOUSE	5C	2,162 m²
WAREHOUSE	5D	2,732 m²
WAREHOUSE	5E	2,023 m²
OFFICE	5A	333 m²
OFFICE	5B	432 m²
OFFICE	5C	403 m²
OFFICE	5D	424 m²
OFFICE	5E	391 m²
TOTAL AREA		13,018 m²

BUILDING 5 COMMERCIAL	
CHILDCARE	649 m²
CHILDCARE OUTDOOR	571 m²
COMMERCIAL GF	619 m²
COMMON FACILITIES	47 m²
TOTAL AREA	1,886 m²

BUILDING 6		
WAREHOUSE	6A	354 m²
WAREHOUSE	6B	597 m²
WAREHOUSE	6C	594 m²
WAREHOUSE	6D	920 m²
OFFICE	6A	89 m²
OFFICE	6B	118 m²
OFFICE	6C	117 m²
OFFICE	6D	171 m²
TOTAL AREA		2,960 m²

BUILDING 7		
WAREHOUSE	7A	698 m²
WAREHOUSE	7B	647 m²
WAREHOUSE	7C	644 m²
WAREHOUSE	7D	694 m²
WAREHOUSE	7E	647 m²
WAREHOUSE	7F	644 m²
OFFICE	7A	117 m²
OFFICE	7B	118 m²
OFFICE	7C	117 m²
OFFICE	7D	110 m²
OFFICE	7E	118 m²
OFFICE	7F	117 m²
TOTAL AREA		4,671 m²

BUILDING 8		
WAREHOUSE	8A	736 m²
WAREHOUSE	8B	642 m²
OFFICE	8A	139 m²
OFFICE	8B	130 m²
TOTAL AREA		1,647 m²

GRAND TOTAL GFA	38,049 m²

SITE COVERAGE	
TOTAL SITE AREA	123,898.129 m²
BUILDING 3 - 8 FOOTPRINT	31,903 m²
BUILDING 1 & 2 FOOTPRINT APPROX.	27,878 m²
SITE COVERAGE APPROX.	48.25%
LANDSCAPING	14.02%

LEGEND

- ESTATE BOUNDARY
- FORESHORE LINE BOUNDARY
- TRANSMISSION EASEMENT
- LANDSCAPE SETBACK
- BUILDING SETBACK
- 2.5 m BICYCLE & PDESTRIAN SHARED PATH
- PEDESTRIAN CONCRETE FOOTPATH
- PERMEABLE HARD SURFACE
- PYLON SIGN
- RW — RETAINING WALL
- OA — OUTDOOR AREA
- RWT — RAIN WATER TANK
- W — WASTE AREA
- MSB — MAIN SWITCH BOARD
- PL — PARCEL LOCKERS
- BG — BOOM GATE
- RPC — RAISED PEDESTRAIN CROSSING
- DP — DELIVERY PARKING BAY
- SP — SHARED PARKING BAY (5%)
- EV — ELECTRICAL VEHICLE BAY (5%)
- EXISTING TREE PROTECTION ZONE
- PROPOSED TREE
- BIORETENTION BASIN / RAIN GARDEN

PARKING PROVISION

		CARS	
Building 1A		51	-
Building 1B		81	-
Building 1C		12	-
Building 1D		35	-
Building 1E		10	-
Building 2		12	-
Building 3		19	12
Building 4		131	64
Building 5	Block 1	48	12
Building 5	Block 2	19	8
Building 5	Childcare	17	4
Building 5	Commercial	15	8
Building 6		29	8
Building 7		62	12
Building 8		22	4
TOTAL		563	132

MOTORBIKES	26

No.	DATE:	REVISION:	BY:	CHK:
P12	01.08.2023	FOR COORDINATION	AS	JF
P13	25.08.2023	90% DA	AS	JF
P14	06.09.2023	ISSUE FOR APPROVAL	AS	JF
P15	12.09.2023	ISSUE FOR APPROVAL	AS	JF
A	22.09.2023	FOR LODGEMENT	AS	JF

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
ESTATE MASTERPLAN

TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: AS
SCALE: 1:1000 @ A1
SCALE: 1:2000 @ A3

JOB NO: 22366
DRAWING NO: 005
REVISION: A

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NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

FOOTPATHS MUST BE PROVIDED IN ACCORDANCE WITH THE PRINCIPLES OUTLINED IN THE AUSTRALIAN MODEL CODE FOR RESIDENTIAL DEVELOPMENT (AMCORD) FOR PEDESTRIAN FACILITIES (MIN 1.2M PEDESTRIAN FOOTPATHS; 2.5M SHARED PATHS)

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LEGEND

- INDICATES EXTENT OF HEAVY DUTY HARDSTAND TO CIVIL ENGINEERS DETAILS
- INDICATES EXTENT OF LIGHT DUTY PAVEMENT TO CIVIL ENGINEERS DETAILS
- 2.5 m SHARED PEDESTRIAN /CYCLE PATH AS PER SSC BICYCLE NETWORK PLAN. CONCRETE WITH PAVER BANDING
- AREA OF GRASS / LANDSCAPING, REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR LANDSCAPE LAYOUT AND DETAILS
- SITE BOUNDARY
- FORESHORE BOUNDARY LINE
- TRANSMISSION EASEMENT
- PARKING BAY PROVIDED FOR BUILDING 2
- PARKING BAY ALLOCATED TO OTHER ESTATE TENANCIES
- SG SLIDING GATE
- PS PYLON SIGN
- RW RETAINING WALL
- EV ELECTRICAL VEHICLE BAY

No.	DATE:	REVISION:	BY:	CHK:
P1	03.08.2023	90% DA ISSUE	PR	JF
P2	07.09.2023	ISSUE FOR APPROVAL	AS/PR	JF
P3	12.09.2023	ISSUE FOR APPROVAL	AS/PR	JF
A	22.09.2023	ISSUE FOR LODGEMENT	AS	JF

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
BUILDING 2
SITE PLAN

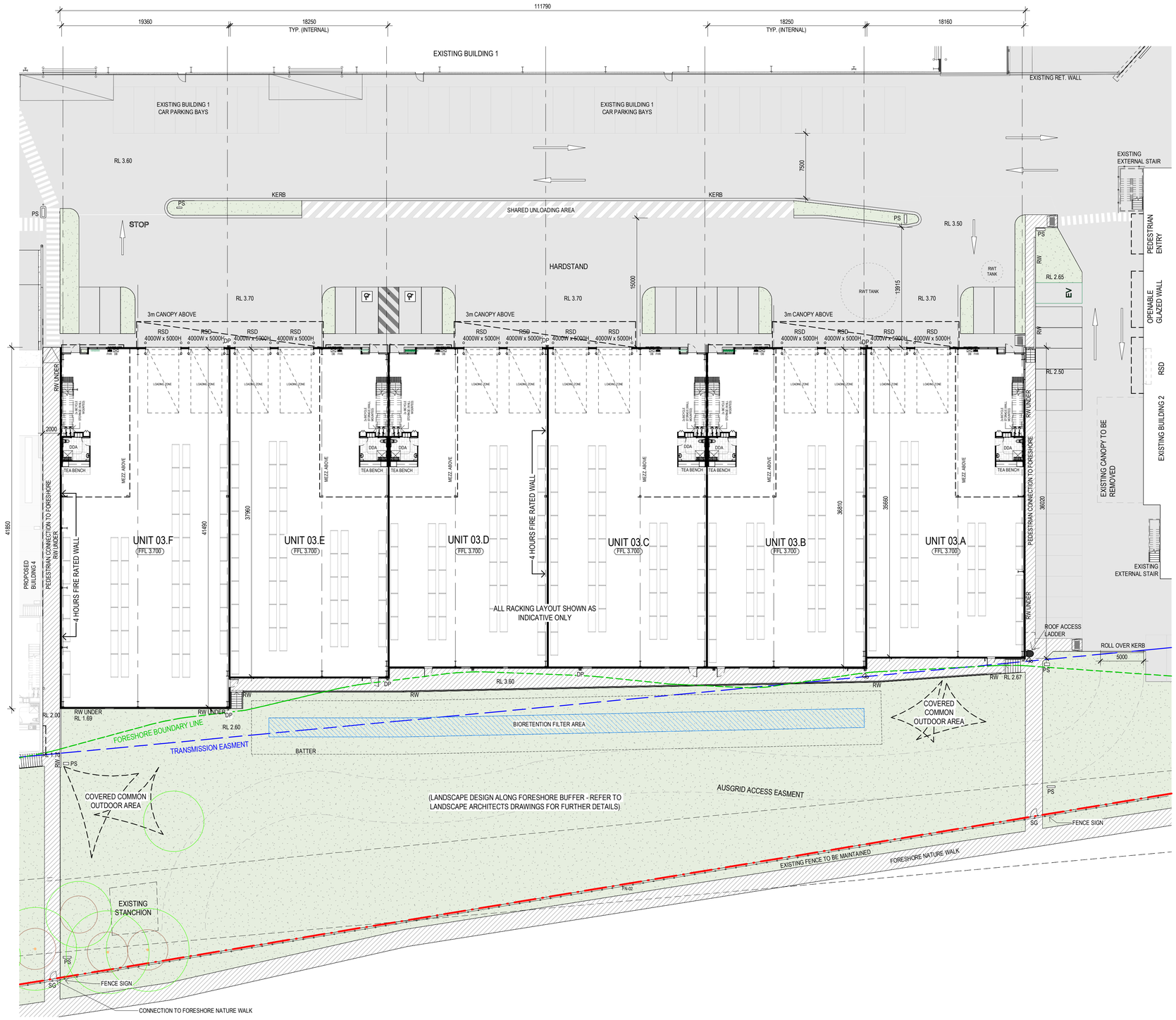
TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: PR
SCALE: 1 : 250 @ A1
SCALE: 1 : 500 @ A3

JOB NO: 21366
DRAWING NO: 200
REVISION: A

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NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

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LEGEND

- INDICATES EXTENT OF HEAVY DUTY HARDSTAND TO CIVIL ENGINEERS DETAILS
- INDICATES EXTENT OF LIGHT DUTY PAVEMENT TO CIVIL ENGINEERS DETAILS
- CONCRETE PAVING
- AREA OF GRASS / LANDSCAPING, REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR LANDSCAPE LAYOUT AND DETAILS
- SITE BOUNDARY
- FORESHORE BOUNDARY LINE
- TRANSMISSION EASEMENT
- PARKING BAY PROVIDED FOR BUILDING 3
- PARKING BAY ALLOCATED TO OTHER ESTATE TENANCIES
- EXISTING TREE PROTECTION ZONE
- EXISTING STRUCTURAL ROOT ZONE
- BIORETENTION BASIN
- FN-01 — 1800mm HIGH BLACK VINYL COATED CYCLONE WIRE FENCE, 3 BARB WIRES TO 2100mm HIGH
- FN-02 — 1800mm HIGH BLACK PAINTED METAL PICKET (DIPLOMAT / PALISADE STYLE) FENCING
- RWT — INGROUND RAINWATER TANK - REFER TO CIVIL DRAWINGS FOR DETAILS
- SG / SW — SLIDING GATE / SWING GATE
- RSD — ROLLER SHUTTER DOOR
- FHR — FIRE HOSE REEL
- RW — RETAINING WALL

DEVELOPMENT ANALYSIS

	UNIT	GFA
BUILDING 3		
WAREHOUSE	3A	649 m²
OFFICE	3A	126 m²
WAREHOUSE	3B	676 m²
OFFICE	3B	127 m²
WAREHOUSE	3C	677 m²
OFFICE	3C	127 m²
WAREHOUSE	3D	677 m²
OFFICE	3D	127 m²
WAREHOUSE	3E	698 m²
OFFICE	3E	127 m²
WAREHOUSE	3F	805 m²
OFFICE	3F	126 m²
TOTAL AREA		4,942 m²

PARKING BAYS PROVIDED
Building 3 — 19

No.	DATE:	REVISION:	BY:	CHK:
P8	29.08.2023	90% DA ISSUE	AS	JF
P9	05.09.2023	ISSUE FOR APPROVAL	PR	JF
P10	07.09.2023	ISSUE FOR APPROVAL	AS/PR	JF
P11	12.09.2023	ISSUE FOR APPROVAL	AS/PR	JF
A	22.09.2023	ISSUE FOR LODGEMENT	AS	JF

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
BUILDING 3
SITE PLAN

TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: PR
SCALE: 1 : 250 @ A1
SCALE: 1 : 500 @ A3

JOB NO: 21366
DRAWING NO: 300
REVISION: A

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DEVELOPMENT ANALYSIS

USE	GFA
GROUND LEVEL	
WAREHOUSE	4,132 m²
OFFICE MEZZANINE	841 m²
LEVEL 1	
WAREHOUSE	3,028 m²
OFFICE MEZZANINE	924 m²
TOTAL BUILDING 4	8,925 m²

PARKING BAYS PROVIDED	
NEAR ESTATE ENTRY	36
ON GROUND LEVEL	49
ON LEVEL 1	46
TOTAL	131

NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

FOOTPATHS MUST BE PROVIDED IN ACCORDANCE WITH THE PRINCIPLES OUTLINED IN THE AUSTRALIAN MODEL CODE FOR RESIDENTIAL DEVELOPMENT (AMCORD) FOR PEDESTRIAN FACILITIES (MIN 1.2M PEDESTRIAN FOOTPATHS; 2.5M SHARED PATHS)

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LEGEND

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- INDICATES EXTENT OF LIGHT DUTY PAVEMENT TO CIVIL ENGINEERS DETAILS
- CONCRETE PAVING
- AREA OF GRASS / LANDSCAPING, REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR LANDSCAPE LAYOUT AND DETAILS
- SITE BOUNDARY
- FORESHORE LINE
- TRANSMISSION EASEMENT
- PARKING BAYS PROVIDED FOR BUILDING 5
- PARKING BAYS ALLOCATED TO OTHER ESTATE TENANCIES
- PROPOSED TREES
- EXISTING TREE PROTECTION ZONE
- EXISTING STRUCTURAL ROOT ZONE

FN-01	1800mm HIGH BLACK VINYL COATED CYCLONE WIRE FENCE, 3 BARB WIRES TO 2100mm HIGH
FN-02	1800mm HIGH BLACK PAINTED METAL PICKET (DIPLOMAT / PALISADE STYLE) FENCING
FN-03	1800mm TIMBER-LOOKING SCREEN
RWT	RAINWATER TANK NOTE: TANKS WILL BE USED FOR TOILETS, LANDSCAPE IRRIGATION AND WASH DOWN WHERE SUITABLE. REFER TO SUSTAINABLE MANAGEMENT PLAN (SMP) FOR FURTHER INFORMATION
SG / SW	SLIDING GATE / SWING GATE
PA	PERSONNEL ACCESS DOOR
RSD	ROLLER SHUTTER DOOR
FHR	FIRE HOSE REEL
DP	DOWNPIPE
RWH	RAINWATER HEAD
RW	RETAINING WALL
TX	TRANSFORMER KIOSK
PS	PYLON SIGN

No.	DATE:	REVISION:	BY:	CHK:
P6	31.07.2023	FOR INFORMATION	AS	JF
P7	29.08.2023	90% DA ISSUE	AS	JF
P8	05.09.2023	ISSUE FOR APPROVAL	PR	JF
P9	11.09.2023	ISSUE FOR APPROVAL	AS	JF
A	22.09.2023	ISSUE FOR LODGEMENT	AS	JF

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
BUILDING 4
SITE PLAN

TRUE NORTH

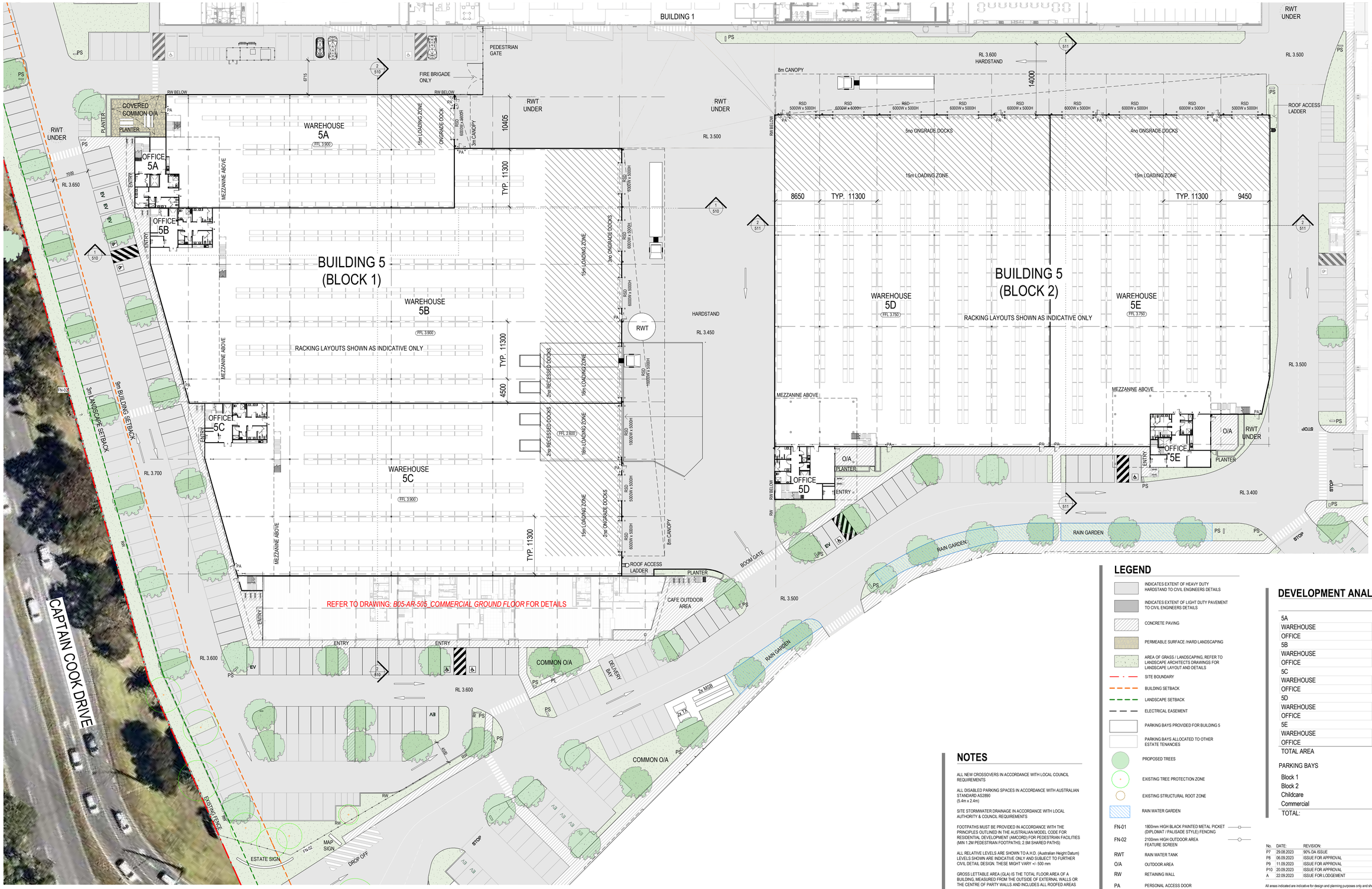
CLIENT:
.
Aliro

DATE: SEPTEMBER, 2022
DRAWN BY: AS
SCALE: 1:250 @ A1
SCALE:

JOB NO: 21366
DRAWING NO: 400
REVISION: A

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6120 OFFICE 5A | 57000 TENANT 5A | 90000 BUILDING 5 BLOCK 1 | 30000 HARDSTAND | 97800 BUILDING 5 BLOCK 2 | 16500 SETBACK



LEGEND

- INDICATES EXTENT OF HEAVY DUTY HARDSTAND TO CIVIL ENGINEERS DETAILS
- INDICATES EXTENT OF LIGHT DUTY PAVEMENT TO CIVIL ENGINEERS DETAILS
- CONCRETE PAVING
- PERMEABLE SURFACE /HARD LANDSCAPING
- AREA OF GRASS / LANDSCAPING, REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR LANDSCAPE LAYOUT AND DETAILS
- SITE BOUNDARY
- BUILDING SETBACK
- LANDSCAPE SETBACK
- ELECTRICAL EASEMENT
- PARKING BAYS PROVIDED FOR BUILDING 5
- PARKING BAYS ALLOCATED TO OTHER ESTATE TENANCIES
- PROPOSED TREES
- EXISTING TREE PROTECTION ZONE
- EXISTING STRUCTURAL ROOT ZONE
- RAIN WATER GARDEN
- FN-01 1800mm HIGH BLACK PAINTED METAL PICKET (DIPLOMAT / PALISADE STYLE) FENCING
- FN-02 2100mm HIGH OUTDOOR AREA FEATURE SCREEN
- RWT RAIN WATER TANK
- O/A OUTDOOR AREA
- RW RETAINING WALL
- PA PERSONAL ACCESS DOOR
- PS PYLON SIGN
- PL PARCEL LOCKERS

NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

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(5.4m x 2.4m)

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ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum) LEVELS SHOWN ARE INDICATIVE ONLY AND SUBJECT TO FURTHER CIVIL DETAIL DESIGN. THESE MIGHT VARY +/- 500 mm

GROSS LETTABLE AREA (GLA) IS THE TOTAL FLOOR AREA OF A BUILDING, MEASURED FROM THE OUTSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL ROOFED AREAS

GROSS FLOOR AREA (GFA) IS THE TOTAL FLOOR AREA OF A BUILDING, MEASURED FROM THE INSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL ROOFED AREAS

DEVELOPMENT ANALYSIS

	GFA (EXCLUDING GUNS)
5A	
WAREHOUSE	1,071 m²
OFFICE	333 m²
5B	
WAREHOUSE	3,047 m²
OFFICE	432 m²
5C	
WAREHOUSE	2,162 m²
OFFICE	403 m²
5D	
WAREHOUSE	2,732 m²
OFFICE	424 m²
5E	
WAREHOUSE	2,023 m²
OFFICE	391 m²
TOTAL AREA	13,018 m²

PARKING BAYS

Block 1	48
Block 2	19
Childcare	17
Commercial	15
TOTAL:	99

No.	DATE:	REVISION:	BY:	CHK:
P7	29.08.2023	90% DA ISSUE	AS	JF
P8	06.09.2023	ISSUE FOR APPROVAL	AS/PR	JF
P9	11.09.2023	ISSUE FOR APPROVAL	AS	JF
P10	20.09.2023	ISSUE FOR APPROVAL	AS	JF
A	22.09.2023	ISSUE FOR LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
BUILDING 5
SITE PLAN

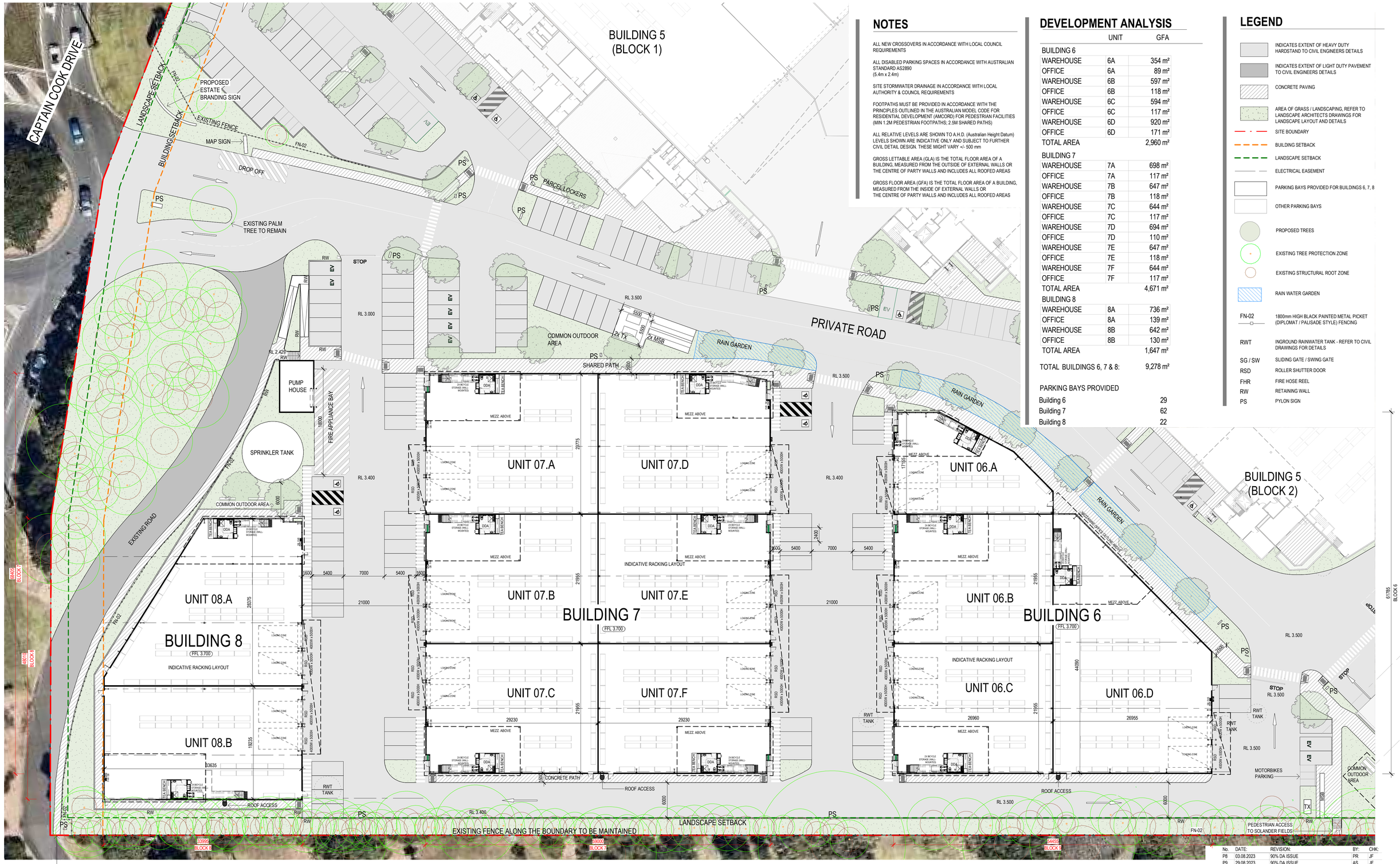
TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2022
DRAWN BY: AS
SCALE: 1:300 @ B1
SCALE:

JOB NO: 21366
DRAWING NO: 500
REVISION: A

watson young



NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

FOOTPATHS MUST BE PROVIDED IN ACCORDANCE WITH THE PRINCIPLES OUTLINED IN THE AUSTRALIAN MODEL CODE FOR RESIDENTIAL DEVELOPMENT (AMCORD) FOR PEDESTRIAN FACILITIES (MIN 1.2M PEDESTRIAN FOOTPATHS; 2.5M SHARED PATHS)

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum) LEVELS SHOWN ARE INDICATIVE ONLY AND SUBJECT TO FURTHER CIVIL DETAIL DESIGN. THESE MIGHT VARY +/- 500 mm

GROSS LETTABLE AREA (GLA) IS THE TOTAL FLOOR AREA OF A BUILDING, MEASURED FROM THE OUTSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL ROOFED AREAS

GROSS FLOOR AREA (GFA) IS THE TOTAL FLOOR AREA OF A BUILDING, MEASURED FROM THE INSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL ROOFED AREAS

DEVELOPMENT ANALYSIS

	UNIT	GFA
BUILDING 6		
WAREHOUSE	6A	354 m²
OFFICE	6A	89 m²
WAREHOUSE	6B	597 m²
OFFICE	6B	118 m²
WAREHOUSE	6C	594 m²
OFFICE	6C	117 m²
WAREHOUSE	6D	920 m²
OFFICE	6D	171 m²
TOTAL AREA		2,960 m²
BUILDING 7		
WAREHOUSE	7A	698 m²
OFFICE	7A	117 m²
WAREHOUSE	7B	647 m²
OFFICE	7B	118 m²
WAREHOUSE	7C	644 m²
OFFICE	7C	117 m²
WAREHOUSE	7D	694 m²
OFFICE	7D	110 m²
WAREHOUSE	7E	647 m²
OFFICE	7E	118 m²
WAREHOUSE	7F	644 m²
OFFICE	7F	117 m²
TOTAL AREA		4,671 m²
BUILDING 8		
WAREHOUSE	8A	736 m²
OFFICE	8A	139 m²
WAREHOUSE	8B	642 m²
OFFICE	8B	130 m²
TOTAL AREA		1,647 m²
TOTAL BUILDINGS 6, 7 & 8:		9,278 m²

PARKING BAYS PROVIDED	
Building 6	29
Building 7	62
Building 8	22

LEGEND

- INDICATES EXTENT OF HEAVY DUTY HARDSTAND TO CIVIL ENGINEERS DETAILS
- INDICATES EXTENT OF LIGHT DUTY PAVEMENT TO CIVIL ENGINEERS DETAILS
- CONCRETE PAVING
- AREA OF GRASS / LANDSCAPING, REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR LANDSCAPE LAYOUT AND DETAILS
- SITE BOUNDARY
- BUILDING SETBACK
- LANDSCAPE SETBACK
- ELECTRICAL EASEMENT
- PARKING BAYS PROVIDED FOR BUILDINGS 6, 7, 8
- OTHER PARKING BAYS
- PROPOSED TREES
- EXISTING TREE PROTECTION ZONE
- EXISTING STRUCTURAL ROOT ZONE
- RAIN WATER GARDEN
- FN-02 — 1800mm HIGH BLACK PAINTED METAL PICKET (DIPLOMAT / PALISADE STYLE) FENCING
- RWT — INGROUND RAINWATER TANK - REFER TO CIVIL DRAWINGS FOR DETAILS
- SG / SW — SLIDING GATE / SWING GATE
- RSD — ROLLER SHUTTER DOOR
- FHR — FIRE HOSE REEL
- RW — RETAINING WALL
- PS — PYLON SIGN

No.	DATE:	REVISION:	BY:	CHK:
P8	03.08.2023	90% DA ISSUE	PR	JF
P9	29.08.2023	90% DA ISSUE	AS	JF
P10	05.09.2023	ISSUE FOR APPROVAL	PR	JF
P11	11.09.2023	ISSUE FOR APPROVAL	PR	JF
A	22.09.2023	ISSUE FOR LODGEMENT	AS	JF

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
BUILDINGS 6, 7 & 8
SITE PLAN

TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: PR/AS
SCALE: 1/300 @ A1
SCALE:

JOB NO: 21366
DRAWING NO: 600
REVISION: A

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Appendix B JBS&G 2020 Borehole Logs

TEST PIT WC01

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit			Bitumen	Fill - BITUMEN	DR		No OAS
	0.05		Fill	Fill - Gravelly SAND, Dark Grey, heterogeneous, damp, well graded, medium sand, angular, loose, Trace small bitumen fragments	DP	WC01_0.02-0.12	No OAS
	0.1						
	0.15		Fill	Fill - Sandy CLAY, Orange/light grey, heterogeneous, damp, low plasticity, firm, Little sandstone cobbles (1cm), trace organics	DP	WC01_0.15-0.45	No OAS
	0.2						
	0.25						
	0.3						
	0.35						
	0.4						
	0.45						Depth of Required Bulk Excavation @ 0.45 m
	0.5						End of Hole Program
	0.55						
	0.6						
	0.65						

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TEST PIT WC02

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit			Bitumen	Fill - BITUMEN	DR		No OAS
	0.05		Fill	Fill - Gravelly SAND, Dark Grey, heterogeneous, damp, well graded, medium sand, angular, loose, Trace small bitumen fragments	DP	WC02_0.02-0.12	No OAS
	0.1						
	0.15		Fill	Fill - Clayey SAND, Brown, heterogeneous, damp, well graded, medium sand, angular, loose, Trace electrical wire	DP	WC02_0.15-0.45	No OAS
	0.2						
	0.25						
	0.3						
	0.35						
	0.4						
	0.45						Depth of Required Bulk Excavation @ 0.45 m
	0.5						End of Hole Program
	0.55						
	0.6						
	0.65						

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TEST PIT WC03

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.1		Bitumen	Fill - BITUMEN	DR	WC03_0.02-0.12	No OAS
			Fill	Fill - Gravelly SAND, Dark Grey, heterogeneous, damp, well graded, medium sand, angular, loose, Trace small bitumen fragments	DP		No OAS
	0.2		Fill	Fill - Silty SAND, Brown, heterogeneous, damp, well graded, medium sand, sub-angular, loose, Trace crushed sandstone	DP	WC03_0.20-0.45	No OAS
	0.3						
	0.4						
	0.5						Depth of Required Bulk Excavation @ 0.45 m
	0.6						End of Hole Program
	0.7						
	0.8						
	0.9						
	1						
	1.1						
	1.2						
	1.3						
	1.4						
	1.5						
	1.6						
	1.7						
	1.8						
	1.9						
	2						
	2.1						
	2.2						
	2.3						
	2.4						

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TEST PIT WC04

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0		Bitumen	Fill - BITUMEN	DR		No OAS
	0.1		Fill	Fill - Gravelly, clayey SAND, Dark Grey, heterogeneous, damp, medium sand, angular, loose, trace ash, organics, gravel	DP	WC04_0.02-0.12	No OAS
	0.2		Fill	Fill - Silty SAND, Brown, heterogeneous, damp, medium sand, angular, loose, trace shells and ash	DP	WC04_0.20-0.45	No OAS
	0.5						Depth of Required Bulk Excavation @ 0.45 m
	0.8		Fill	Fill - Sandy CLAY, Grey, heterogeneous, dry, low plasticity, firm, some shale	DP		No OAS
	1					WC04_1.00-1.10	
	2		SP	Natural - Silty SAND, Black/speckled, homogenous, moist, medium sand, angular, loose, trace organics	M		Organic odour identified
	2.1					WC04_2.10-2.20	
	2.2						End of Hole Program
	2.4						

TEST PIT WC05

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0		Bitumen	Fill - BITUMEN	DR		No OAS
	0.1		Fill	Fill - Sandy GRAVEL, Grey, heterogeneous, damp, coarse gravel, angular, medium dense	DP	WC05_0.02-0.12	No OAS
	0.2		Fill	Fill - Clayey SAND, Orange/brown, heterogeneous, damp, medium sand, angular, loose, trace crushed sandstone and gravel (igneous)	DP	WC05_0.20-0.30	No OAS
	0.3						Depth of Required Bulk Excavation @ 0.3 m
	0.4						
	0.5		Fill	Fill - Sandy CLAY, Grey, heterogeneous, dry, low plasticity, firm, some shale	DP		No OAS
	0.6						
	0.7						
	0.8						
	0.9						
	1					WC05_1.00-1.10	
	1.1						
	1.2						
	1.3						
	1.4						
	1.5		Fill	Fill - Clayey SAND, Dark Grey, heterogeneous, damp, medium sand, angular, loose, trace organics	DP	WC05_1.50-1.60	No OAS
	1.6						
	1.7						End of Hole Refusal on hard unknown surface
	1.8						
	1.9						

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TEST PIT WC06

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit			Bitumen	Fill - BITUMEN	DR		No OAS
	0.05		Fill	Fill - Sandy GRAVEL, Grey, heterogeneous, damp, coarse gravel, angular, medium dense	DP	WC06_0.02-0.12	No OAS
	0.1						
	0.15						
	0.2						
	0.25		Fill	Fill - Clayey SAND, Grey, heterogeneous, damp, coarse gravel, angular, loose, trace small gravel	DP	WC06_0.25-0.35	No OAS
	0.3						Depth of Required Bulk Excavation @ 0.3 m
	0.35						
	0.4						
	0.45						
	0.5						End of Hole Program
	0.55						
	0.6						
	0.65						

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TEST PIT WC07

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0		Bitumen	Fill - BITUMEN	DR		No OAS
	0.05		Fill	Fill - Sandy GRAVEL, Grey, heterogeneous, damp, coarse gravel, angular, medium dense	DP	WC07_0.02-0.12	No OAS
	0.1						
	0.15						
	0.2						
	0.25		Fill	Fill - Clayey SAND, Grey, heterogeneous, damp, coarse gravel, angular, loose, trace small gravel	DP	WC07_0.25-0.35	No OAS
	0.3						Depth of Required Bulk Excavation @ 0.3 m
	0.35						
	0.4						End of Hole Program
	0.45						
	0.5						
	0.55						
	0.6						
	0.65						

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TEST PIT WC08

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0		Bitumen	Fill - BITUMEN	DR		No OAS
	0.1		Fill	Fill - Sandy GRAVEL, Grey, heterogeneous, damp, coarse gravel, angular, medium dense	DP	WC08_0.02-0.12	No OAS
	0.2						
	0.3		Fill	Fill - Clayey SAND, orange, heterogeneous, damp, medium sand, angular, loose, inclusions of sandstone and clay clasts	DP	WC08_0.30-0.40	Depth of Required Bulk Excavation @ 0.3 m
	0.4						
	0.5						
	0.6		Fill	Fill - Clayey SAND, orange, heterogeneous, damp, medium sand, angular, loose, inclusions of sandstone and clay clasts	DP		No OAS, Pocket of rubble inside wall of test pit @ 0.6 - 0.9 m with large sandstone boulders (0.5 m), timber, scrap metal and plastic
	0.7						
	0.8						
	0.9						
	1					WC08_1.00-1.10	
	1.1						
	1.2						
	1.3						
	1.4					WC08_1.40-1.50	
	1.5						End of Hole Refusal on large boulder
	1.6						
	1.7						
	1.8						
	1.9						

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TEST PIT WC09

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit			Bitumen	Fill - BITUMEN	DR		No OAS
	0.05		Fill	Fill - Sandy GRAVEL, Grey, heterogeneous, damp, coarse gravel, angular, medium dense	DP	WC09_0.02-0.12	No OAS
	0.1						
	0.15						
	0.2						
	0.25						
	0.3						Depth of Required Bulk Excavation @ 0.3 m
	0.35						
	0.4		Fill	Fill - SAND, orange/brown, heterogeneous medium sand, angular, loose, some gravel and standstone clasts (1-15 cm)	DP	WC09_0.40-0.50	No OAS
	0.45						
	0.5						
	0.55						
	0.6						
	0.65						
	0.7						
	0.75						
	0.8					WC09_0.80-0.90	
	0.85						
	0.9						End of Hole Program
	0.95						

TEST PIT WC10

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0		Bitumen	Fill - BITUMEN	DR	WC10_0.00-0.02	No OAS
	0.1		Fill	Fill - Sandy GRAVEL, Grey, heterogeneous, damp, coarse gravel, angular, medium dense	DP	WC10_0.02-0.12	No OAS
	0.2		Fill	Fill - Clayey SAND, grey, heterogeneous, damp, medium sand, angular, loose, some gravel	DP	WC10_0.20-0.30	No OAS
	0.3						Depth of Required Bulk Excavation @ 0.3 m
	0.4						
	0.5						
	0.6						
	0.7						
	0.8						
	0.9		Fill	Fill - SAND, yellow, heterogeneous, damp, medium sand, angular, loose, trace brick and charcoal	DP	WC10_0.90-1.00	No OAS
	1						
	1.1						
	1.2						
	1.3						
	1.4						
	1.5						
	1.6						
	1.7						
	1.8						
	1.9					WC10_1.90-2.00	
	2						End of Hole Program

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TEST PIT WC11

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

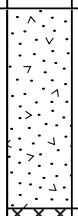
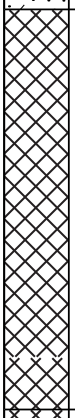
Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.05		Bitumen	Fill - BITUMEN	DR		No OAS
	0.1		Concrete	Fill - CONCRETE stabalised sand	DR		No OAS
	0.15		Fill	Fill - Sandy GRAVEL, Grey, heterogeneous, damp, coarse gravel, angular, medium dense	DP	WC11_0.15-0.20	No OAS
	0.2		Fill	Fill - SAND, brown/orange, heterogeneous, damp, medium sand, angular, loose, some sandstone clasts (1-15 cm) trace round river cobbles	DP	WC11_0.20-0.40	No OAS
	0.25						
	0.3						
	0.35						
	0.4						End of Hole Program
	0.45						
	0.5						
	0.55						
	0.6						
	0.65						

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TEST PIT WC12

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 22-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** CK

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.05		Concrete	Fill - CONCRETE and tile	DR		No OAS
	0.1		Fill	Fill - ROADBASE stabalised sand	DR		No OAS
	0.15						
	0.2						
	0.25						
	0.3		Fill	Fill - SAND, red, heterogeous, damp, medium sand, angular, loose, inclusions of small round shale gravels	DP	WC12_0.30-0.45	No OAS
	0.35						
	0.4						End of Hole, Depth of Required Bulk Excavation @ 0.45 m
	0.45						
	0.5						
	0.55						
	0.6						
	0.65						

TEST PIT WC13

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 22-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** CK

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.05 0.1 0.15 0.2 0.25 0.3		Fill	Fill - Silty SAND, brown, heterogeous, damp, fine sand, sub-rounded, loose, minor shale and gravel (igneous) inclusions	DP	WC13_0.00-0.20 WC13_0.20-0.45	No OAS
	0.35 0.4 0.45		Fill	Fill - Clayey SAND, grey, heterogeneous, damp, medium sand, angular, loose, some crushed sandstone	DP		No OAS End of Hole, Depth of Required Bulk Excavation @ 0.45 m
	0.5 0.55 0.6 0.65						

TEST PIT WC14

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 22-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** CK

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.2		Bitumen	Fill - BITUMEN	DR	WC14_0.02-0.30	No OAS
			Fill	Fill - GRAVEL	DR		No OAS
	0.4		Fill	Fill - Shale CLAY, grey, heterogeneous, damp, low plasticity, firm, some crushed sandstone	DP	WC14_0.30-0.40	No OAS
	0.6		Fill	Fill - SAND, brown/grey, hetergeneous, damp, medium sand, angular, loose, some sandstone and shale (2-3 cm)	DP		No OAS
	0.8						
	1					WC14_1.00-1.10	
	1.2						
	1.4						
	1.6						Depth of Required Bulk Excavation @ 1.5 m
	1.8						
	2					WC14_2.00-2.10	
	2.2						
	2.4		SC	Natural - clayey SAND, grey, heterogeneous, wet, low plasticity, firm, minor organic inclusions	W	WC14_2.30-2.40	No OAS
							End of Hole Program
	2.6						
	2.8						

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TEST PIT WC15

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 22-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** CK

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.2		Fill	Fill - Silty, gravelly SAND, brown, heterogeneous, damp, fine sand, sub-rounded, loose, inclusions of roots and concrete	DP	WC15_0.00-0.20	No OAS ACM fragment found, sample taken
	0.4		Fill	Fill - SAND, yellow/brown, heterogeneous, damp, medium sand, angular, loose, inclusions of shale, large sandstone boulders and trace plastic	DP	WC15_0.20-0.30	No OAS
	0.6						
	0.8						
	1					WC15_1.00-1.10	
	1.2						
	1.4						
	1.6						Depth of Required Bulk Excavation @ 1.5 m
	1.8					WC15_1.70-1.80	
	2		SW	Natural - clayey SAND, yellow, homogenous, wet, medium sand, angular, loose, well sorted	W	WC15_1.80-1.90	No OAS
	2.2						
	2.4					WC15_2.40-2.50	
	2.6						End of Hole Program
	2.8						

TEST PIT WC16

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 22-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** CK

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.1		Fill	Fill - Silty SAND, brown, heterogeneous, damp, fine sand, sub-rounded, loose, minor shale and gravel inclusions	DP	WC16_0.00-0.20	No OAS
	0.2		Fill	Fill - SAND, yellow/brown, heterogeneous, damp, medium sand, angular, loose, inclusions of sandstone cobbles and trace organics (roots/wood)	DP	WC16_0.20-0.40	No OAS
	0.3						
	0.4					WC16_0.40-1.00	
	0.5						Depth of Required Bulk Excavation @ 0.45 m
	0.6						
	0.7						
	0.8						
	0.9						
	1						End of Hole Program
	1.1						
	1.2						
	1.3						
	1.4						
	1.5						
	1.6						
	1.7						
	1.8						
	1.9						

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TEST PIT WC17

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 22-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** CK

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.05		Asphalt	Fill - ASPHALT	DR	WC17_0.00-0.02	No OAS
	0.1		Fill	Fill - Sandy GRAVEL, grey, heterogeneous, dry, coarse gravel, angular, medium dense, igneous gravel, trace contrete, bitumen, small crushed brick and tile	DR	WC17_0.02-0.12	No OAS
	0.15						
	0.2						
	0.25						
	0.3					WC17_0.30-0.40	
	0.35						
	0.4						
	0.45						Depth of Required Bulk Excavation @ 0.45 m
	0.5						Pocket of sand @ 0.5 m, hand dug in corner, uncovered small electric conduit
	0.55						
	0.6						End of Hole Program
	0.65						
	0.7						
	0.75						
	0.8						
	0.85						
	0.9						
	0.95						

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TEST PIT WC18

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.05		Bitumen	Fill - BITUMEN	DR	WC18_0.00-0.30	No OAS
	0.1		Fill	Fill - gravelly SAND, dark grey, heterogeneous, dry, medium sand, angular, loose, inclusions of stabalised sand	DR	WC18_0.02-0.12	No OAS
	0.15						
	0.2					WC18_0.20-0.45	
	0.25						
	0.3		Fill	Fill - SAND, dark grey, homogenous, damp, medium sand, angular, loose	DP	WC18_0.30-0.40	No OAS
	0.35						
	0.4						End of Hole, Depth of Required Bulk Excavation @ 0.45 m
	0.45						
	0.5						
	0.55						
	0.6						
	0.65						
	0.7						
	0.75						
	0.8						
	0.85						
	0.9						
	0.95						

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TEST PIT WC18A

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 22-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** CK

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.1 0.2 0.3		Fill	Fill - silty SAND, brown, heterogeneous, damp, fine sand, sub-rounded, loose, high root concentration in top 150 mm, inclusions of wood, small gravels, shale (igneous)	DP	WC18A_0.00-0.30	No OAS
	0.3 0.4 0.5 0.6		Fill	Fill - gravelly SAND, grey, heterogeneous, dry, medium sand, angular, dense, inclusions of sandstone, shale, gravels, trace roots/rootlets	DR	WC18A_0.30-0.40	Small piece of fibrous material found, No OAS Depth of Required Bulk Excavation @ 0.4 m
	0.6 0.7 0.8 0.9 1 1.1		Fill	Fill - SAND, white/yellow, homogenous, dry, medium sand, angular, loose	DR		No OAS End of Hole Program
	1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9						

TEST PIT WC19

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 21-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** IL

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0		Bitumen	Fill - BITUMEN	DR	WC19_0.02-0.12	No OAS
			Fill	Fill - Gravelly SAND, Dark Grey, heterogeneous, damp, medium sand, angular, loose, trace small bitumen fragments	DP		
	0.2		Fill	Fill - SAND, white/yellow, homogenous, damp, medium sand, angular, loose, inclusion of a layer of large sandstone boulders at 0.45 m	DP	WC19_0.20-0.45	
	0.4						Depth of Required Bulk Excavation @ 0.45 m
	0.6						
	0.8						
	1					WC19_1.00-1.10	
	1.2						
	1.4						
	1.6						
	1.8						
	2					WC19_2.00-2.10	
	2.2						
	2.4						
	2.6		CL-SC	Natural - CLAY, black, heterogeneous, damp, low plasticity, firm, organic rich, peaty	DP	WC19_2.50-2.60	No OAS
							End of Hole Program
	2.8						

TEST PIT WC20

PROJECT NUMBER 62048	**DRILLING COMPANY**	**EASTING** N/A
PROJECT NAME Caringbah	**DRILLING DATE** 22-Oct-21	**NORTHING** N/A
CLIENT ISPT	**DRILL RIG** N/A	**COORD SYS** N/A
ADDRESS 13 Endeavour Road Caringbah	**DRILLING METHOD** Test Pit	**COORD SOURCE**
	DIMENSIONS x m	**LOGGED BY** CK

COMMENTS

Drilling Method	Depth (m bgl)	Graphic Log	Lithological Class	Lithological Description	Moisture	Samples	Additional Observations
Test Pit	0.05		Fill	Fill - silty SAND, brown, heterogeneous, dry, fine sand, sub-rounded, loose, inclusions of vegetable matter, roots, mulch	DR		No OAS
	0.1		Fill	Fill - silty SAND, brown, heterogeneous, dry, fine sand, sub-rounded, loose, inclusions of vegetable matter, roots, mulch	DR	WC20_0.10-0.40	No OAS
	0.15						
	0.2						
	0.25						
	0.3						
	0.35						
	0.4						End of Hole, Depth of Required Bulk Excavation @ 0.4 m
	0.45						
	0.5						
	0.55						
	0.6						
	0.65						
	0.7						
	0.75						
	0.8						
	0.85						
	0.9						
	0.95						

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BH25

Project Number: 58037
Client: Aliro Management Pty Ltd
Project Name: Caringbah Due Dilligence
Site Address: Captain Cook Drive, Caringbah

Date: 20-Jan-20
Logged By: MK
Contractor: Terratest
Total Hole Depth (mbgs): 4.1
Bore Diameter (mm): 150

Eastings (GDA 94): -
Northings (GDA 94): -
Zone/Area/Permit#: -
Reference Level: Ground Surface
Elevation (m): -

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Core				Fill	CONCRETE.		
Solid Flight Auger		0.20		Fill	ROAD BASE - black/grey, heterogeneous, loose with inclusions of roadbase/crushed concrete.	BH25 0.2-0.3 PID = 3.2 ppm	No odours, staining or ACM noted.
		0.50		Fill	Clayey Gravelly SAND - yellow/grey, heterogeneous, poorly sorted, dry with inclusions of rocks and styrofoam.	BH25 0.5-0.6 PID = 2.7 ppm	No odours, staining or ACM noted.
	1					BH25 1.0-1.1 PID = 3.8 ppm	No odours, staining or ACM noted.
	2	2.00		Fill	As above, grades to grey and damp.	BH25 2.0-2.1 PID = 7.7 ppm	Slight organic odour. No staining or ACM noted.
		2.30		Fill	Sandy Silty CLAY - grey/black, medium plasticity, wet with inclusions of roots.		Wet.
		2.80		SM	Silty SAND - grey, homogeneous, wet, medium grained, well sorted.		
	3					BH25 3.0-3.1 PID = 8.1 ppm	Organic odour. No staining or ACM noted.
	4					BH25 4.0-4.1 PID = 9.6 ppm	Strong organic odour. No staining or ACM noted.
		4.10			Borehole BH25 terminated at 4.1m		
	5						
	6						
	7						

BH26

Project Number: 58037
Client: Aliro Management Pty Ltd
Project Name: Caringbah Due Dilligence
Site Address: Captain Cook Drive, Caringbah

Date: 20-Jan-20
Logged By: MK
Contractor: Terratest
Total Hole Depth (mbgs): 7
Bore Diameter (mm): 150

Eastings (GDA 94): -
Northings (GDA 94): -
Zone/Area/Permit#: -
Reference Level: Ground Surface
Elevation (m): -

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Solid Flight Auger				Fill	ASPHALT.		
		0.10		Fill	Silty CLAY - grey, reworked, heterogeneous, dry, low plasticity.	BH26 0.2-0.3 PID = 8.1 ppm	No odours, staining or ACM noted.
		0.35		Fill	Clayey Gravelly SAND - yellow/cream, heterogenous, poorly sorted, dry with inclusions of igneous gravels.	BH26 0.5-0.6 PID = 6.2 ppm	No odours, staining or ACM noted.
	1					BH26 1.0-1.1 PID = 5.3 ppm	No odours, staining or ACM noted.
	2					BH26 2.0-2.1 PID = 4.7 ppm	No odours, staining or ACM noted.
		2.80		Fill	Sandy CLAY - grey, medium plasticity, moist with inclusions of organic matter.		
	3					BH26 3.0-3.1 PID = 10.1 ppm	Organic odour. No staining or ACM noted.
		3.40		SM	Silty SAND - brown, homogeneous, wet, medium grained, well sorted.		
	4					BH26 4.0-4.1 PID = 11.7 ppm	Slight organic odour. No staining or ACM noted.
	5					BH26 5.0-5.1 PID = 11.3 ppm	Saturated. Slight organic odour. No staining or ACM noted.
	6						Sample not taken as high saturation had yielded no soil return from auger.
		6.80		SANDSTONE	SANDSTONE - light grey, dry, hard.	BH26 6.7-6.8 PID = 11.7 ppm	No odours, staining or ACM noted.
	7						
		7.00			Borehole BH26 terminated at 7m		End of hole upon sandstone refusal.

BH27

Project Number: 58037
Client: Aliro Management Pty Ltd
Project Name: Caringbah Due Dilligence
Site Address: Captain Cook Drive, Caringbah

Date: 20-Jan-20
Logged By: MK
Contractor: Terratest
Total Hole Depth (mbgs): 4.1
Bore Diameter (mm): 150

Eastings (GDA 94): -
Northings (GDA 94): -
Zone/Area/Permit#: -
Reference Level: Ground Surface
Elevation (m): -

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Solid Flight Auger				Fill	ASPHALT.		
		0.10		Fill	Sandy GRAVEL - grey, heterogeneous, dry with inclusions of road base and crushed concrete.	BH27 0.2-0.3 PID = 2 ppm	No odours, staining or ACM noted.
		0.40		Fill	Clayey Silty SAND - grey, heterogeneous, dry with inclusions of igneous gravels. Increase in clay content at 2 m bgs.	BH27 0.5-0.6 PID = 3.1 ppm	No odours, staining or ACM noted.
	1					BH27 1.0-1.1 PID = 3.5 ppm	No odours, staining or ACM noted.
	2	2.00		Fill	Silty CLAY - black, reworked, heterogeneous, dry, low plasticity, with inclusions of organic matter (vegetation).	BH27 2.0-2.1 PID = 6.5 ppm	Strong organic odour. No staining or ACM noted.
	3					BH27 3.0-3.1 PID = 7.9 ppm	No odours, staining or ACM noted.
		3.50		SM	Silty SAND - Grey, homogeneous, wet, medium grained, well sorted.		Wet.
	4					BH27 4.0-4.1 PID = 8.6 ppm	Organic odour. No staining or ACM noted.
		4.10			Borehole BH27 terminated at 4.1m		
	5						
	6						
	7						

BH28

Project Number: 58037
Client: Aliro Management Pty Ltd
Project Name: Caringbah Due Dilligence
Site Address: Captain Cook Drive, Caringbah

Date: 21-Jan-20
Logged By: MK
Contractor: Terratest
Total Hole Depth (mbgs): 7.1
Bore Diameter (mm): 150

Eastings (GDA 94): -
Northings (GDA 94): -
Zone/Area/Permit#: -
Reference Level: Ground Surface
Elevation (m): -

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Solid Flight Auger				Fill	ASPHALT.		
		0.10		Fill	Clayey Gravelly SAND - yellow/cream, heterogeneous, poorly sorted, dry with inclusions of sandstone gravels.	BH28 0.2-0.3 PID = 5.3 ppm	No odours, staining or ACM noted.
						BH28 0.5-0.6 PID = 6.1 ppm	No odours, staining or ACM noted.
	1					BH28 1.0-1.1 PID = 6.3 ppm	No odours, staining or ACM noted.
	2	2.00		Fill	Sandy Silty CLAY - dark grey/black, reworked, heterogeneous, low plasticity, wet with inclusions of roots.	BH28 2.0-2.1 PID = 7.6 ppm	Organic odour. No staining or ACM noted.
				Fill	As above, no inclusions.		
	3					BH28 3.0-3.1 PID = 9.8 ppm	Organic odour. No staining or ACM noted.
	4	4.00		SM	Silty SAND - grey/black, heterogeneous, wet, medium grained, well sorted with inclusions of shells.	BH28 4.0-4.1 PID = 11.1 ppm	Strong organic odour. No staining or ACM noted.
	5	5.00		SM	As above, no inclusions.	BH28 5.0-5.1 PID = 10.9 ppm	Saturated. Strong organic odour. No staining or ACM noted.
	6					BH28 6.0-6.1 PID = 11.3 ppm	Strong organic odour. No staining or ACM noted.
	7					BH28 7.0-7.1 PID = 11.7 ppm	Strong organic odour. No staining or ACM noted.
		7.10			Borehole BH28 terminated at 7.1m		

BH29

Project Number: 58037
Client: Aliro Management Pty Ltd
Project Name: Caringbah Due Dilligence
Site Address: Captain Cook Drive, Caringbah

Date: 21-Jan-20
Logged By: MK
Contractor: Terratest
Total Hole Depth (mbgs): 6.1
Bore Diameter (mm): 150

Eastings (GDA 94): -
Northings (GDA 94): -
Zone/Area/Permit#: -
Reference Level: Ground Surface
Elevation (m): -

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Solid Flight Auger				Fill	ASPHALT - with inclusions of underlying igneous roadbase.		
		0.10		Fill	Silty SAND - black/grey, heterogeneous, dry, medium to course grained, loose with inclusions of minor crushed concrete gravels.	BH29 0.2-0.3 PID = 3.1 ppm	No odours, staining or ACM noted.
						BH29 0.5-0.6 PID = 2.5 ppm	No odours, staining or ACM noted.
	1					BH29 1.0-1.1 PID = 3.5 ppm	No odours, staining or ACM noted.
	2					BH29 2.0-2.1 PID = 7.6 ppm	No odours, staining or ACM noted.
		2.60		Fill	Sandy Silty CLAY - black, reworked, medium plasticity, wet with inclusions of organic material.		
	3					BH29 3.0-3.1 PID = 8.8 ppm	No odours, staining or ACM noted.
	4	3.90		SM	Silty SAND - grey/black, heterogeneous, wet, medium grained with inclusions of shells.	BH29 4.0-4.1 PID = 9.5 ppm	No odours, staining or ACM noted.
	5	5.00		SM	As above, no inclusions.	BH29 5.0-5.1 PID = 10.2 ppm	Saturated. No odours, staining or ACM noted.
	6					BH29 6.0-6.1 PID = 10.5 ppm	No odours, staining or ACM noted.
		6.10			Borehole BH29 terminated at 6.1m		
	7						

BH30

Project Number: 58037
Client: Aliro Management Pty Ltd
Project Name: Caringbah Due Dilligence
Site Address: Captain Cook Drive, Caringbah

Date: 21-Jan-20
Logged By: MK
Contractor: Terratest
Total Hole Depth (mbgs): 4.5
Bore Diameter (mm): 150

Eastings (GDA 94): -
Northings (GDA 94): -
Zone/Area/Permit#: -
Reference Level: Ground Surface
Elevation (m): -

Method	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Solid Flight Auger				Fill	Silty Gravelly SAND - dark brown, heterogeneous, moist, medium coarse grained with sandstone inclusions.	BH30 0.2-0.3 PID = 5.1 ppm	Wet. No odours, staining or ACM noted.
						BH30 0.5-0.6 PID = 5.9 ppm	No odours, staining or ACM noted.
	1	0.80		Fill	Sandy CLAY - light brown, heterogeneous, soft, medium plasticity.	BH30 1.0-1.1 PID = 5.3 ppm	No odours, staining or ACM noted.
		1.20		Fill	Silty SAND - black/grey, heterogeneous, dry, medium to coarse grained, loose with inclusions of sandstone gravels.		
	2					BH30 2.0-2.1 PID = 5.1 ppm	Strong organic odour. No staining or ACM noted.
		2.50		Fill	Sandy Silty CLAY - black/grey, reworked, medium plasticity, wet with inclusions of roots.		
		2.80		Fill	As above, saturated, no inclusions.		
	3					BH30 3.0-3.1 PID = 8.9 ppm	Strong organic odour. No staining or ACM noted.
		3.50		SM	Silty SAND - grey/black, heterogeneous, wet, medium grained, poorly sorted.		
	4					BH30 4.0-4.1 PID = 9.8 ppm	Strong organic odour. No staining or ACM noted.
		4.50			Borehole BH30 terminated at 4.5m		Hole abandoned as high saturation yielded no soil return from auger.
	5						
	6						
	7						

MW06

Project Number: 58037
Client: Aliro Management Pty Ltd
Project Name: Caringbah Due Dilligence
Site Address: Captain Cook Drive, Caringbah

Date: 20-Jan-20
Logged By: CK
Contractor: Terratest
Total Hole Depth (mbgs): 3.5
Bore Diameter (mm): 150

Eastings (GDA 94): -
Northings (GDA 94): -
Zone/Area/Permit#: -
Reference Level: Ground Surface
Elevation (m): -

Water Level Initial (mbgs): 2
Surface Finish: Roadbox
Casing / Screen Type: Class 18 PVC - 50mm
Casing Bottom Depth (mbgs): 1.5
Screen Bottom Depth (mbgs): 3.5

Method	Water (mbgs)	Well Details	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Solid Flight Auger						Fill	Sandy SILT - brown/yellow, heterogeneous, dry, non plastic, firm with inclusions of crushed concrete, road base and shale gravels.	MW06 0.0-0.1 PID = 2 ppm	No odours, staining or ACM noted.
								MW06 0.2-0.3 PID = 3.5 ppm	No odours, staining or ACM noted.
				0.30		Fill	Silty SAND - brown, heterogeneous, dry, fine grained, poorly graded.	MW06 0.5-0.6 PID = 3.7 ppm	No odours, staining or ACM noted.
			1	0.80		Fill	Clayey SILT - brown, heterogeneous, dry, non plastic, firm with inclusions of crushed concrete and sandstone.	MW06 1.0-1.1 PID = 6.6 ppm	No odours, staining or ACM noted.
				1.50		Fill	Silty CLAY - grey, reworked, heterogeneous, dry, low plasticity.		
	▶		2	2.00		CL-ML-SM	Sandy Silty CLAY - dark brown/black, heterogeneous, medium to high plasticity, moist to wet with finer sands at 3 m bgs.	MW06 2.0-2.1 PID = 7.9 ppm	Wet. Organic odour. No staining or ACM noted.
			3					MW06 3.0-3.1 PID = 8.6 ppm	No odours, staining or ACM noted.
								MW06 3.4-3.5 PID = 9.2 ppm	No odours, staining or ACM noted.
				3.50			Borehole MW06 terminated at 3.5m		End of hole upon sandstone refusal.
			4						
			5						
			6						
			7						

MW07

Project Number: 58037
Client: Aliro Management Pty Ltd
Project Name: Caringbah Due Dilligence
Site Address: Captain Cook Drive, Caringbah

Date: 20-Jan-20
Logged By: CK
Contractor: Terratest
Total Hole Depth (mbgs): 4.1
Bore Diameter (mm): 150

Eastings (GDA 94): -
Northings (GDA 94): -
Zone/Area/Permit#: -
Reference Level: Ground Surface
Elevation (m): -

Water Level Initial (mbgs): 2.5
Surface Finish: Roadbox
Casing / Screen Type: Class 18 PVC - 50mm
Casing Bottom Depth (mbgs): 1
Screen Bottom Depth (mbgs): 4.1

Method	Water (mbgs)	Well Details	Depth (mbgs)	Contact (mbgs)	Graphic Log	Lithological Class	Lithological Description	Samples Tests Remarks	Additional Observations
Solid Flight Auger / Diamond Core						Fill	CONCRETE.		
				0.25		Fill	ROAD BASE - black/grey, heterogeneous, well sorted, angular with inclusions of silt, brick and igeneous gravels.	MW07 0.35-0.45 PID = 3 ppm	No odours, staining or ACM noted.
				0.40		Fill	Clayey Silty SAND - grey, heterogeneous, damp, poorly sorted with inclusions of roots, igneous road base, crushed concrete and brick.	MW07 0.5-0.6 PID = 2.5 ppm	Organic odour. No staining or ACM noted.
			1					MW07 1.0-1.1 PID = 3.4 ppm	No odours, staining or ACM noted.
				1.30		Fill	Silty SAND - grey, heterogeneous, wet at 2.5 m bgs, medium grained, well sorted with inclusions of organic matter and sandstone gravels.		
			2					MW07 2.0-2.1 PID = 7.9 ppm	No odours, staining or ACM noted.
	▼								Wet.
			3					MW07 3.0-3.1 PID = 8.3 ppm	Organic odour. No staining or ACM noted.
				3.70		CL-ML-SM	Sandy Silty CLAY - dark brown/black, heterogeneous, medium plasticity, moist.		
			4					MW07 4.0-4.1 PID = 9.6 ppm	Strong organic odour. No staining or ACM noted.
				4.10			Borehole MW07 terminated at 4.1m		
			5						
			6						
			7						

Appendix C sPOCAS Laboratory Analysis Results

CHAIN OF CUSTODY

24249

JBS&G

PROJECT NO.: 62048
PROJECT NAME: Caringbah
DATE NEEDED BY: 5 day TAT

LABORATORY BATCH NO.: 836170, 836172, 836173, 836174, 836175, 836176, 836177, 836178
SAMPLERS: CK + IL
QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) ckauffman@jbsg.com.au; (3) Ilee@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:
AB = Asbestos Bag
PB = ENM Suite Bag
SB = SPOCAS Bag
*NB all SPOCAS frozen immediately after sampling until transport to laboratory

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
WC01 0.02-0.12	Soil	21.10.21		J + BB + AB + SB				
0.15-0.45								
WC01 0.02-0.12								
0.15-0.45								
WC03 0.02-0.12								
0.2-0.45								
WC04 0.02-0.12								
0.2-0.45								
1-1.1								
2.1-2.2				SB				
WC05 0.02-0.12				J + BB + AB + JD				
0.2-0.3								
1-1.1								
1.5-1.6				J + AB + JD				
WC06 0.02-0.12				J + BD + AB + SB				
0.25-0.35								
WC07 0.02-0.12								
0.25-0.35								

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: CK DATE: 26.10.21 OF: JBS&G	CONSIGNMENT NOTE NO. TRANSPORT CO.	NAME: NC DATE: 26/10/21 4:45PM OF: Eurofins	COOLER SEAL – Yes..... No ..... Intact ..... Broken ..... 24.5 COOLER TEMP ..... deg C
NAME: DATE: OF:	CONSIGNMENT NOTE NO. TRANSPORT CO	NAME: DATE: OF:	COOLER SEAL – Yes..... No ..... Intact ..... Broken ..... COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

2/4

CHAIN OF CUSTODY

24250

JBS&G

PROJECT NO.: 62048
PROJECT NAME: Caringbah
DATE NEEDED BY: Std

LABORATORY BATCH NO.: 836170, 836172, 836173, 836174, 836175, 836176, 836177, 836178
SAMPLERS: CK + IL
QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) ckauffman@jbsg.com.au; (3) Ilee@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
WC08 0.02-0.1	Soil	21.10.21		J+BB+AB+SB				
0.2-0.4				↓				
1-1.1				SB				
1.4-1.5				SB				
WC09 0.02-0.12				J+BB+AB+SB				
0.45-0.5				↓				
0.8-0.9				SB				
WC10 0-0.02				J				
0.02-0.17				J+BB+AB+SB				
0.9-1.0				SB				
1.9-2.0				SB				
0.2-0.3				J+BB+AB+SB				
WC11 0.15-0.2								
0.2-0.4								
WC12 0.3-0.45		22.10.21		J+BB+AB+SB				
WC13 0-0.2								
0.2-0.45								
~~WC14~~								

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: CK DATE: 25.10.21	CONSIGNMENT NOTE NO.	NAME: NC	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	DATE: 26/10/21 4:45pm	24.5
		OF: ENVIROWS	COOLER TEMP ..... deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

5/4

CHAIN OF CUSTODY

21824

JBS&G

PROJECT NO.: 62048	LABORATORY BATCH NO.: 836170, 836172, 836173, 836174, 836175, 836176, 836177, 836178
PROJECT NAME: Caringbah	SAMPLERS: CK & IL
DATE NEEDED BY: 5 day TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) ckauffman@jbsg.com.au; (3) lee@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
WC14 0-0.2	Soil	22.10.21		J+BO+AB				
0.3-0.4				J+BO+SB+AB				
1-1.1				↓				
2-2.1				↓				
2.3-2.4				J+SB				
WC15 0-0.2				J+AO+SB				
0.2-0.3				J+SB+AB+BO				
1-1.1				↓				
1.7-1.8				↓				
1.8-1.9				SB				
2.4-2.5				J+SB				
-0-0.2FRAG				AB				
WC16 0-0.2				J+BO+SB+AB				
0.2-0.4				↓				
0.9-1.0	↓			SB				
WC17 0-0.02	Rock/Asphalt			J+AO				
0.02-0.12	Soil			J+BO+AB				
0.3-0.4	↓			J+BO+AB+SO				

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: CK DATE: 25.10.21	CONSIGNMENT NOTE NO.	NAME: NC	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	DATE: 26/10/21 4:45pm	2x5
		OF: EUROFINS	COOLER TEMP ..... deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

IMSO FormsO13 – Chain of Custody - Generic

CHAIN OF CUSTODY

21825

JBS&G

PROJECT NO.: 62048
PROJECT NAME: Carinchan
DATE NEEDED BY: 5 day TAT

LABORATORY BATCH NO.: 836170, 836172, 836173, 836174, 836175, 836176, 836177, 836178
SAMPLERS: CK + IL
QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) ckawlinson@jbsg.com.au; (3) ilee@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
WC18 0.02-0.12 + 0.2-0.45	21.10.21	50:1		J + BD → AB + SD				
WC18A 0-0.2	22.10.21							
0.3-0.7				AB				
0.3-0.4 FRAG								
WC19 0.02-0.12	21.10.21			J + BD + SB + AB				
0.2-0.45								
1-1.1								
2-2.1								
2.5-2.6				SB				
WC20 0.1-0.4				J + BD + AB				
TS/TB	H2O	22.10.21		2x vial.				

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: CK DATE: 25.10.21	CONSIGNMENT NOTE NO.	NAME: NC	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF: JBS&G	TRANSPORT CO.	DATE: EUROFINS 26/10/21 4:45PM	COOLER TEMP 24.5 deg C
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

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IANZ # 1290

Sample Receipt Advice

Company name:	JBS & G Australia (NSW) P/L
Contact name:	Chris Kauffman
Project name:	CARINGBAH
Project ID:	62048
Turnaround time:	5 Day
Date/Time received	Oct 26, 2021 4:45 PM
Eurofins reference	836177

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	Sample Temperature of chilled sample on the batch as recorded by Eurofins Sample Receipt : 24.5 degrees Celsius.
✓	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.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Missing foreign material sample WC01 0.15-0.45. Received extra foreign material bags across reports 836178, 836173 and 836177. One labelled WC01, 2x unlabeled foreign material bags, samples have been put on hold.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Ursula Long on phone : or by email: UrsulaLong@eurofins.com

Results will be delivered electronically via email to Chris Kauffman - ckauffman@jbsg.com.au.

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

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IANZ # 1290

Company Name: JBS & G Australia (NSW) P/L
Address: Level 1, 50 Margaret St
Sydney
NSW 2000

Project Name: CARINGBAH
Project ID: 62048

Order No.:
Report #: 836177
Phone: 02 8245 0300
Fax:

Received: Oct 26, 2021 4:45 PM
Due: Nov 2, 2021
Priority: 5 Day
Contact Name: Chris Kauffman

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	SPOCAS Suite	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254								
Sydney Laboratory - NATA # 1261 Site # 18217						X		
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X
Mayfield Laboratory - NATA # 1261 Site # 25079								
Perth Laboratory - NATA # 2377 Site # 2370								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	WC01 0.15-0.45	Oct 21, 2021		Soil	S21-Oc62551		X	X
2	WC08 1.4-1.5	Oct 21, 2021		Soil	S21-Oc62552		X	X
3	WC10 0.2-0.3	Oct 21, 2021		Soil	S21-Oc62553		X	X
4	WC11 0.2-0.4	Oct 21, 2021		Soil	S21-Oc62554		X	X
5	WC14 2.3-2.5	Oct 22, 2021		Soil	S21-Oc62555		X	X
6	WC19 2.5-2.6	Oct 21, 2021		Soil	S21-Oc62556		X	X
7	WC19 2-2.1	Oct 21, 2021		Soil	S21-Oc62557		X	X
8	WC01	Oct 21, 2021		Soil	S21-Oc63427	X		

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

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

Company Name: JBS & G Australia (NSW) P/L
Address: Level 1, 50 Margaret St
Sydney
NSW 2000

Project Name: CARINGBAH
Project ID: 62048

Order No.:
Report #: 836177
Phone: 02 8245 0300
Fax:

Received: Oct 26, 2021 4:45 PM
Due: Nov 2, 2021
Priority: 5 Day
Contact Name: Chris Kauffman

Eurofins Analytical Services Manager : Ursula Long

Sample Detail	HOLD	SPOCAS Suite	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254			
Sydney Laboratory - NATA # 1261 Site # 18217	X		
Brisbane Laboratory - NATA # 1261 Site # 20794		X	X
Mayfield Laboratory - NATA # 1261 Site # 25079			
Perth Laboratory - NATA # 2377 Site # 2370			
External Laboratory			
Test Counts	1	7	7

JBS & G Australia (NSW) P/L
Level 1, 50 Margaret St
Sydney
NSW 2000

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.

Attention: **Chris Kauffman**

Report **836177-S**
Project name CARINGBAH
Project ID 62048
Received Date Oct 26, 2021

Client Sample ID			**WC01 0.15-0.45**	**WC08 1.4-1.5**	**WC10 0.2-0.3**	**WC11 0.2-0.4**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Oc62551**	**S21-Oc62552**	**S21-Oc62553**	**S21-Oc62554**
Date Sampled			**Oct 21, 2021**	**Oct 21, 2021**	**Oct 21, 2021**	**Oct 21, 2021**
Test/Reference	LOR	Unit				
SPOCAS Suite						
pH-KCL	0.1	pH Units	7.3	9.4	9.4	9.4
pH-OX	0.1	pH Units	6.6	8.2	8.0	8.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	< 2	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	< 0.02	< 0.02	< 0.02
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Sulfur - Peroxide	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	< 10	< 10	< 10	< 10
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur - acidity units	10	mol H+/t	N/A	N/A	N/A	N/A
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	N/A	N/A	N/A	N/A
Calcium - KCl Extractable	0.02	% Ca	0.14	0.14	0.14	0.11
Calcium - Peroxide	0.02	% Ca	0.16	0.75	0.82	0.19
Acid Reacted Calcium	0.02	% Ca	< 0.02	0.61	0.69	0.08
acidity - Acid Reacted Calcium	10	mol H+/t	< 10	310	340	37
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	< 0.02	0.49	0.55	0.06
Magnesium - KCl Extractable	0.02	% Mg	0.02	< 0.02	< 0.02	< 0.02
Magnesium - Peroxide	0.02	% Mg	0.03	0.02	0.02	0.02
Acid Reacted Magnesium	0.02	% Mg	< 0.02	0.02	0.02	0.02
acidity - Acid Reacted Magnesium	10	mol H+/t	< 10	17	19	17
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	< 0.02	0.03	0.03	0.03
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	0.18	1.6	1.8	0.37
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	36	330	370	73
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	0.06	0.53	0.59	0.12
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	< 1	< 1	< 1

Client Sample ID			WC01 0.15-0.45	WC08 1.4-1.5	WC10 0.2-0.3	WC11 0.2-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Oc62551	S21-Oc62552	S21-Oc62553	S21-Oc62554
Date Sampled			Oct 21, 2021	Oct 21, 2021	Oct 21, 2021	Oct 21, 2021
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	200	160	130	110
>2mm Fraction	0.005	g	10	22	12	120
Analysed Material	0.1	%	95	88	92	50
Extraneous Material	0.1	%	4.9	12	8.0	50
% Moisture	1	%	13	6.7	7.8	8.9

Client Sample ID			WC14 2.3-2.5	WC19 2.5-2.6	WC19 2-2.1
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			S21-Oc62555	S21-Oc62556	S21-Oc62557
Date Sampled			Oct 22, 2021	Oct 21, 2021	Oct 21, 2021
Test/Reference	LOR	Unit			
SPOCAS Suite					
pH-KCL	0.1	pH Units	9.4	8.3	9.6
pH-OX	0.1	pH Units	8.1	3.5	7.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	< 2
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	< 2	200	< 2
Acid trail - Titratable Sulfidic Acidity	2	mol H+/t	< 2	200	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	< 0.003
sulfidic - TPA equiv. S% pyrite	0.02	% pyrite S	< 0.02	0.32	< 0.02
sulfidic - TSA equiv. S% pyrite	0.02	% pyrite S	< 0.02	0.32	< 0.02
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	< 0.02
Sulfur - Peroxide	0.02	% S	0.06	0.30	< 0.02
Sulfur - Peroxide Oxidisable Sulfur	0.02	% S	0.06	0.30	< 0.02
acidity - Peroxide Oxidisable Sulfur	10	mol H+/t	38	190	< 10
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	N/A	N/A	N/A
Net Acid soluble sulfur	0.02	% S	N/A	N/A	N/A
Net Acid soluble sulfur - acidity units	10	mol H+/t	N/A	N/A	N/A
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	N/A	N/A	N/A
Calcium - KCl Extractable	0.02	% Ca	0.15	0.43	0.11
Calcium - Peroxide	0.02	% Ca	1.5	0.59	0.68
Acid Reacted Calcium	0.02	% Ca	1.4	0.16	0.56
acidity - Acid Reacted Calcium	10	mol H+/t	680	79	280
sulfidic - Acid Reacted Ca equiv. S% pyrite	0.02	% S	1.1	0.13	0.45
Magnesium - KCl Extractable	0.02	% Mg	< 0.02	0.03	< 0.02
Magnesium - Peroxide	0.02	% Mg	0.06	0.04	0.03
Acid Reacted Magnesium	0.02	% Mg	0.06	< 0.02	0.03
acidity - Acid Reacted Magnesium	10	mol H+/t	48	11	22
sulfidic - Acid Reacted Mg equiv. S% pyrite	0.02	% S	0.08	< 0.02	0.04
Acid Neutralising Capacity (ANCE)	0.02	% CaCO3	3.6	N/A	1.5
Acid Neutralising Capacity - Acidity units (a-ANCE)	10	mol H+/t	710	n/a	300
Acid Neutralising Capacity - equivalent S% pyrite(s-ANCE)	0.02	% S	1.1	N/A	0.47
ANC Fineness Factor		factor	1.5	1.5	1.5
SPOCAS - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	0.31	< 0.02
SPOCAS - Net Acidity (Acidity Units)	10	mol H+/t	< 10	190	< 10
SPOCAS - Liming rate	1	kg CaCO3/t	< 1	15	< 1

Client Sample ID			WC14 2.3-2.5	WC19 2.5-2.6	WC19 2-2.1
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S21-Oc62555**	**S21-Oc62556**	**S21-Oc62557**
Date Sampled			**Oct 22, 2021**	**Oct 21, 2021**	**Oct 21, 2021**
Test/Reference	LOR	Unit			
Extraneous Material					
<2mm Fraction	0.005	g	150	39	190
>2mm Fraction	0.005	g	14	< 0.005	1.3
Analysed Material	0.1	%	91	100	99
Extraneous Material	0.1	%	8.6	< 0.1	0.7
% Moisture	1	%	14	37	4.7

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
SPOCAS Suite			
SPOCAS Suite	Brisbane	Nov 04, 2021	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	Nov 04, 2021	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Brisbane	Oct 29, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

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NATA # 1261 Site # 18217

Brisbane
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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Newcastle
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Mayfield East NSW 2304
PO Box 60 Wickham 2293
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NATA # 1261 Site # 25079

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NSW 2000

Project Name: CARINGBAH
Project ID: 62048

Order No.:
Report #: 836177
Phone: 02 8245 0300
Fax:

Received: Oct 26, 2021 4:45 PM
Due: Nov 2, 2021
Priority: 5 Day
Contact Name: Chris Kauffman

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	SPOCAS Suite	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254								
Sydney Laboratory - NATA # 1261 Site # 18217						X		
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X
Mayfield Laboratory - NATA # 1261 Site # 25079								
Perth Laboratory - NATA # 2377 Site # 2370								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	WC01 0.15-0.45	Oct 21, 2021		Soil	S21-Oc62551		X	X
2	WC08 1.4-1.5	Oct 21, 2021		Soil	S21-Oc62552		X	X
3	WC10 0.2-0.3	Oct 21, 2021		Soil	S21-Oc62553		X	X
4	WC11 0.2-0.4	Oct 21, 2021		Soil	S21-Oc62554		X	X
5	WC14 2.3-2.5	Oct 22, 2021		Soil	S21-Oc62555		X	X
6	WC19 2.5-2.6	Oct 21, 2021		Soil	S21-Oc62556		X	X
7	WC19 2-2.1	Oct 21, 2021		Soil	S21-Oc62557		X	X
8	WC01	Oct 21, 2021		Soil	S21-Oc63427	X		

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Received: Oct 26, 2021 4:45 PM
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Contact Name: Chris Kauffman

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Sample Detail	HOLD	SPOCAS Suite	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254			
Sydney Laboratory - NATA # 1261 Site # 18217	X		
Brisbane Laboratory - NATA # 1261 Site # 20794		X	X
Mayfield Laboratory - NATA # 1261 Site # 25079			
Perth Laboratory - NATA # 2377 Site # 2370			
External Laboratory			
Test Counts	1	7	7

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient
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% Phenols & 50-150% PFASs..

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 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
LCS - % Recovery									
SPOCAS Suite									
pH-KCL			%	99			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	97			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
SPOCAS Suite				Result 1	Result 2	RPD			
pH-KCL	M21-Oc57566	NCP	pH Units	9.5	9.5	<1	30%	Pass	
pH-OX	M21-Oc57566	NCP	pH Units	8.4	8.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	M21-Oc57566	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
Acid trail - Titratable Peroxide Acidity	M21-Oc57566	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
Acid trail - Titratable Sulfidic Acidity	M21-Oc57566	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	M21-Oc57566	NCP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
sulfidic - TPA equiv. S% pyrite	M21-Oc57566	NCP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
sulfidic - TSA equiv. S% pyrite	M21-Oc57566	NCP	% pyrite S	< 0.02	< 0.02	<1	30%	Pass	
Sulfur - KCl Extractable	M21-Oc57566	NCP	% S	0.04	0.04	2.0	30%	Pass	
Sulfur - Peroxide	M21-Oc57566	NCP	% S	0.13	0.13	2.0	30%	Pass	
Sulfur - Peroxide Oxidisable Sulfur	M21-Oc57566	NCP	% S	0.09	0.09	1.0	30%	Pass	
acidity - Peroxide Oxidisable Sulfur	M21-Oc57566	NCP	mol H+/t	55	54	1.0	30%	Pass	
HCl Extractable Sulfur	M21-Oc57566	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur	M21-Oc57566	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur - acidity units	M21-Oc57566	NCP	mol H+/t	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	M21-Oc57566	NCP	% S	N/A	N/A	N/A	30%	Pass	
Calcium - KCl Extractable	M21-Oc57566	NCP	% Ca	0.16	0.16	1.0	30%	Pass	
Calcium - Peroxide	M21-Oc57566	NCP	% Ca	9.6	9.8	2.0	30%	Pass	
Acid Reacted Calcium	M21-Oc57566	NCP	% Ca	9.4	9.6	2.0	30%	Pass	
acidity - Acid Reacted Calcium	M21-Oc57566	NCP	mol H+/t	4700	4800	2.0	30%	Pass	
sulfidic - Acid Reacted Ca equiv. S% pyrite	M21-Oc57566	NCP	% S	7.6	7.7	2.0	30%	Pass	
Magnesium - KCl Extractable	M21-Oc57566	NCP	% Mg	0.03	0.03	1.0	30%	Pass	
Magnesium - Peroxide	M21-Oc57566	NCP	% Mg	0.44	0.43	2.0	30%	Pass	
Acid Reacted Magnesium	M21-Oc57566	NCP	% Mg	0.40	0.39	2.0	30%	Pass	
acidity - Acid Reacted Magnesium	M21-Oc57566	NCP	mol H+/t	330	320	2.0	30%	Pass	
sulfidic - Acid Reacted Mg equiv. S% pyrite	M21-Oc57566	NCP	% S	0.53	0.52	2.0	30%	Pass	
Acid Neutralising Capacity (ANCE)	M21-Oc57566	NCP	% CaCO3	25	25	<1	30%	Pass	
Acid Neutralising Capacity - Acidity units (a-ANCE)	M21-Oc57566	NCP	mol H+/t	5100	5100	<1	30%	Pass	
ANC Fineness Factor	M21-Oc57566	NCP	factor	1.5	1.5	<1	30%	Pass	
SPOCAS - Net Acidity (Sulfur Units)	M21-Oc57566	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
SPOCAS - Net Acidity (Acidity Units)	M21-Oc57566	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
SPOCAS - Liming rate	M21-Oc57566	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Oc62551	CP	%	13	11	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

Qualifier Codes/Comments

Code	Description
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5

Authorised by:

Ursula Long	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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CERTIFICATE OF ANALYSIS 235156

Client Details

Client	JBS & G (NSW & WA) Pty Ltd
Attention	C Kauffman
Address	Level 1, 50 Margaret St, Sydney, NSW, 2000

Sample Details

Your Reference	**58037, Caringbah**
Number of Samples	35 Soil
Date samples received	21/01/2020
Date completed instructions received	23/01/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

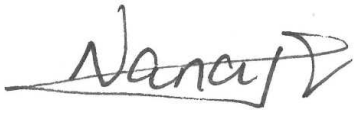
Date results requested by	29/01/2020
Date of Issue	29/01/2020

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Results Approved By
Nick Sarlamis, Inorganics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

sPOCAS + %S w/w						
Our Reference		235156-4	235156-6	235156-12	235156-21	235156-23
Your Reference	UNITS	BH26_4-4.1	BH26_6.7-6.8	BH28_5-5.1	BH30_1-1.1	BH30_3-3.1
Date Sampled		20/01/2020	20/01/2020	21/01/2020	21/01/2020	21/01/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/01/2020	28/01/2020	28/01/2020	28/01/2020	28/01/2020
Date analysed	-	28/01/2020	28/01/2020	28/01/2020	28/01/2020	28/01/2020
pH $_{kcl}$	pH units	8.7	9.4	9.5	9.4	9.4
TAA pH 6.5	moles H^+ /t	<5	<5	<5	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
pH $_{Ox}$	pH units	3.4	6.8	7.8	8.5	5.0
TPA pH 6.5	moles H^+ /t	98	<5	<5	<5	<5
s-TPA pH 6.5	%w/w S	0.16	<0.01	<0.01	<0.01	<0.01
TSA pH 6.5	moles H^+ /t	98	<5	<5	<5	<5
s-TSA pH 6.5	%w/w S	0.16	<0.01	<0.01	<0.01	<0.01
ANC_E	% $CaCO_3$	[NT]	0.19	0.44	0.81	[NT]
a-ANC_E	moles H^+ /t	[NT]	38	88	160	[NT]
s-ANC_E	%w/w S	[NT]	0.06	0.14	0.26	[NT]
S_{KCl}	%w/w S	0.03	0.04	0.04	0.009	0.03
S_P	%w/w	0.49	0.15	0.26	0.02	0.23
S_{POS}	%w/w	0.46	0.12	0.22	0.01	0.20
a-S_{POS}	moles H^+ /t	290	73	130	7	120
Ca_{KCl}	%w/w	0.17	0.12	0.11	0.15	0.14
Ca_P	%w/w	0.40	0.32	0.59	0.49	0.31
Ca_A	%w/w	0.23	0.20	0.48	0.34	0.17
Mg_{KCl}	%w/w	0.030	0.008	0.018	0.008	0.023
Mg_P	%w/w	0.046	0.027	0.053	0.036	0.048
Mg_A	%w/w	0.015	0.019	0.035	0.028	0.024
S_{HCl}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
S_{NAS}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{NAS}	moles H^+ /t	[NT]	[NT]	[NT]	[NT]	[NT]
s-S_{NAS}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
Fineness Factor	-	1.5	1.5	1.5	1.5	1.5
a-Net Acidity	moles H^+ /t	160	<5	<5	<5	120
s-Net Acidity	%w/w S	0.26	<0.01	<0.01	<0.01	0.20
Liming rate	kg $CaCO_3$ /t	12	<0.75	<0.75	<0.75	9.4
s-Net Acidity without -ANCE	%w/w S	0.26	0.12	0.22	0.011	0.20
a-Net Acidity without ANCE	moles H^+ /t	160	73	130	6.6	120
Liming rate without ANCE	kg $CaCO_3$ /t	12	5.5	10	<0.75	9.4

sPOCAS + %S w/w			
Our Reference		235156-25	235156-33
Your Reference	UNITS	MW06_0.5-0.6	MW07_4-4.1
Date Sampled		20/01/2020	20/01/2020
Type of sample		Soil	Soil
Date prepared	-	28/01/2020	28/01/2020
Date analysed	-	28/01/2020	28/01/2020
pH $_{kcl}$	pH units	9.2	8.8
TAA pH 6.5	moles H^+ /t	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01
pH $_{Ox}$	pH units	7.7	2.7
TPA pH 6.5	moles H^+ /t	<5	280
s-TPA pH 6.5	%w/w S	<0.01	0.44
TSA pH 6.5	moles H^+ /t	<5	280
s-TSA pH 6.5	%w/w S	<0.01	0.44
ANC_E	% $CaCO_3$	0.50	[NT]
a-ANC_E	moles H^+ /t	100	[NT]
s-ANC_E	%w/w S	0.16	[NT]
S_{KCl}	%w/w S	<0.005	0.06
S_P	%w/w	0.007	0.76
S_{POS}	%w/w	<0.005	0.71
a-S_{POS}	moles H^+ /t	<5	440
Ca_{KCl}	%w/w	0.13	0.14
Ca_P	%w/w	0.28	0.45
Ca_A	%w/w	0.16	0.31
Mg_{KCl}	%w/w	0.006	0.042
Mg_P	%w/w	0.019	0.063
Mg_A	%w/w	0.014	0.021
S_{HCl}	%w/w S	[NT]	[NT]
S_{NAS}	%w/w S	[NT]	[NT]
a-S_{NAS}	moles H^+ /t	[NT]	[NT]
s-S_{NAS}	%w/w S	[NT]	[NT]
Fineness Factor	-	1.5	1.5
a-Net Acidity	moles H^+ /t	<5	330
s-Net Acidity	%w/w S	<0.01	0.53
Liming rate	kg $CaCO_3$ /t	<0.75	25
s-Net Acidity without -ANCE	%w/w S	<0.01	0.53
a-Net Acidity without ANCE	moles H^+ /t	<5	330
Liming rate without ANCE	kg $CaCO_3$ /t	<0.75	25

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			28/01/2020	4	28/01/2020	28/01/2020		28/01/2020	[NT]
Date analysed	-			28/01/2020	4	28/01/2020	28/01/2020		28/01/2020	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	4	8.7	8.6	1	92	[NT]
TAA pH 6.5	moles H^+ /t	5	Inorg-064	<5	4	<5	<5	0	85	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	4	<0.01	<0.01	0	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	4	3.4	3.4	0	97	[NT]
TPA pH 6.5	moles H^+ /t	5	Inorg-064	<5	4	98	90	9	109	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	4	0.16	0.14	13	[NT]	[NT]
TSA pH 6.5	moles H^+ /t	5	Inorg-064	<5	4	98	90	9	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	4	0.16	0.14	13	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	4	[NT]	[NT]		[NT]	[NT]
a-ANC_E	moles H^+ /t	5	Inorg-064	<5	4	[NT]	[NT]		[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	4	[NT]	[NT]		[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	4	0.03	0.03	0	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	<0.005	4	0.49	0.48	2	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	<0.005	4	0.46	0.45	2	[NT]	[NT]
a-S_{POS}	moles H^+ /t	5	Inorg-064	<5	4	290	280	4	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	4	0.17	0.17	0	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	<0.005	4	0.40	0.39	3	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	<0.005	4	0.23	0.22	4	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	4	0.030	0.031	3	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	<0.005	4	0.046	0.049	6	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	<0.005	4	0.015	0.018	18	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	4	[NT]	[NT]		[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	4	[NT]	[NT]		[NT]	[NT]
a-S_{NAS}	moles H^+ /t	5	Inorg-064	<5	4	[NT]	[NT]		[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	4	[NT]	[NT]		[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	<1.5	4	1.5	1.5	0	[NT]	[NT]
a-Net Acidity	moles H^+ /t	5	Inorg-064	<5	4	160	150	6	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	4	0.26	0.24	8	[NT]	[NT]
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-064	<0.75	4	12	12	0	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	<0.01	4	0.26	0.24	8	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
a-Net Acidity without ANCE	moles H^+/t	5	Inorg-064	<5	4	160	150	6	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	4	12	12	0	[NT]	[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.

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.

COC 23/1, 3:18pm

20306

CHAIN OF CUSTODY

JBS&G

PROJECT NO.: 58037	LABORATORY BATCH NO.:
PROJECT NAME: Caringbah	SAMPLERS: CK + MR
DATE NEEDED BY: 3 day TAT	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) ckaulfmann@jbsg.com.au; (3) .....@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Samples frozen (ie within Holding time)

SAMPLE ID			MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	SPOCAS	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
BH25	2-2.1	1	Soil	20.1.20		1x Bag					
↓	3-3.1	2									
↓	4-4.1	3									
BH26	3-3.1	NR									
↓	4-4.1	4						X			
↓	5-5.1	5		↓							
↓	6.7-6.8	6		↓				X			
BH27	3-3.1	7		21.1.20							
↓	4-4.1	8									
BH28	2-2.1	9									
↓	3-3.1	10									
↓	4-4.1	11									
↓	5-5.1	12						X			
↓	6-6.1	13									
↓	7-7.1	14									
BH29	1-1.1	15									
↓	2-2.1	16									
↓	3-3.1	17									
↓	4-4.1	18	↓	↓		↓					

ENVIROLAB GROUP

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 235150

Date Received: 21/01/20
Time Received: 1538
Received by: SP
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

SBal

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: CK DATE: 23.1.20	CONSIGNMENT NOTE NO.	NAME: S. Bolton	COOLER SEAL – Yes... No ..... Intact ✓ Broken .....
OF: JBS&G	TRANSPORT CO.	DATE: 21/01/20	COOLER TEMP 3.3 deg C
		OF: ELS Syd.	
NAME: DATE:	CONSIGNMENT NOTE NO.	NAME: DATE:	COOLER SEAL – Yes..... No ..... Intact ..... Broken .....
OF:	TRANSPORT CO	OF:	COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

IMSO Forms013 – Chain of Custody - Generic

20306

CHAIN OF CUSTODY

PROJECT NO.: S8037	LABORATORY BATCH NO.:
PROJECT NAME: Caringbah	SAMPLERS:
DATE NEEDED BY: 3 day	QC LEVEL: NEPM (2013)

PHONE: Sydney: 02 8245 0300 | Perth: 08 9488 0100 | Brisbane: 07 3112 2688

SEND REPORT & INVOICE TO: (1) adminnsw@jbsg.com.au; (2) cmaltinen@jbsg.com.au; (3) .....@jbsg.com.au

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:
Samples Frozen (ie within holding times)

SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	pH	SPOCAS	TYPE OF ASBESTOS ANALYSIS: IDENTIFICATION	TYPE OF ASBESTOS ANALYSIS: NEPM/WA	NOTES:
BH29 5-5.1 19	Soil	21.1.20		1x Bag					
6-6.1 20									
BH30 0.5-0.6 NR									
1-1.1 21						X			
2-2.1 22									
3-3.1 23						X			
4-4.1 24									
MW06 0.5-0.6 25		20.1.20				X			
1-1.1 26									
2-2.1 27									
3-3.1. 28									
3.4-3.5 29									
MW07 2-2.1 30									
1-1.1 31									
3-3.1 32									
4-4.1 33						X			
BH28 1.0-1.1	34	extra samples							
Unlabelled bag.	35								

RELINQUISHED BY:	METHOD OF SHIPMENT:	RECEIVED BY:	FOR RECEIVING LAB USE ONLY:
NAME: CK DATE: 22.1.20 OF: JBS&G	CONSIGNMENT NOTE NO. TRANSPORT CO.	NAME: S. Bolton DATE: 21/01/20 OF: ELS Syd.	COOLER SEAL – Yes..... No ..... Intact ..... Broken ..... COOLER TEMP ..... deg C
NAME: DATE: OF:	CONSIGNMENT NOTE NO. TRANSPORT CO	NAME: DATE: OF:	COOLER SEAL – Yes..... No ..... Intact ..... Broken ..... COOLER TEMP ..... deg C

Container & Preservative Codes: P = Plastic; J = Soil Jar; B = Glass Bottle; N = Nitric Acid Prsvd.; C = Sodium Hydroxide Prsvd; VC = Hydrochloric Acid Prsvd Vial; VS = Sulfuric Acid Prsvd Vial; S = Sulfuric Acid Prsvd; Z = Zinc Prsvd; E = EDTA Prsvd; ST = Sterile Bottle; O = Other

IMSO FormsO13 – Chain of Custody - Generic

235156.

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Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Chris Kauffman	Matthew Bennett, CenvP-SC	Draft for Review	Draft for Review	2/08/2023
0	Chris Kauffman	Matthew Bennett, CenvP-SC	Matthew Bennett		1/09/2023
1	Chris Kauffman	Matthew Bennett, CenvP-SC	Matthew Bennett		27/09/2023



Appendix B Biodiversity Assessment Report

Construction Environmental Management Plan (CEMP)

TripleTwoNine Endeavour Road, Caringbah

Aliro Group Pty Ltd

SLR Project No.: 630.031866.00001

31 October 2024

TripleTwoNine
13 Endeavour Road Caringbah

Biodiversity Assessment Report

prepared for

Aliro Group

TripleTwoNine, 13 Endeavour Road Caringbah – Biodiversity Assessment Report

prepared for

Aliro Group

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Statement of Authorship

The author of the report is Kathryn Duchatel with over 25 years' experience and the following relevant qualifications:

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- BAM Assessor Accreditation no: BAAS17054
- EIANZ Certified Environmental Practitioner
- Ecological Consultants Association of NSW Practicing member

Revision Schedule

Rev No	Date	Description	Issued to
0	25/09/2023	Biodiversity Assessment Report_Draft	Aliro Group
1	04/10/2023	Biodiversity Assessment Report_for Review	Aliro Group
2	06/10/2023	Biodiversity Assessment Report_for Submission	Aliro Group

écologique

12 Wanganella Street, Balgowlah NSW 2093

0437 821 110 | kat@ecologique.com.au

Summary

Aliro Group Pty Ltd (the Applicant) is seeking development consent from Sutherland Shire Council (Council) for the construction and operation of warehouse buildings and construction and operation staging at 13 Endeavour Road, Caringbah (**the Site**).

The Site is located adjacent to Woolooware Bay to the northeast, physically separated from the bay by a shared public pathway and an undeveloped landscaped area within the Site.

Woolooware Bay comprises several environmentally sensitive aspects, which include:

+ Towra Point Aquatic Reserve listed under the *Marine Parks Act 1997*
+ Taren Point Shorebird Reserve located approximately 1.2km to the north along the foreshore
+ 'Coastal Wetlands' under the State Environmental Planning Policy (Resilience and Hazards) 2021
+ Key Fish Habitat mapped by DPI Fisheries – Woolooware Bay to the highest astronomical tides (HAT)
+ Land mapped as Biodiversity Values under the BC Reg. to the northeast of the Site, associated with the mangrove community immediately adjacent to the Site
+ The Ramsar listed Towra Point Nature Reserve approximately 1.1km to the east along the foreshore and approximately 2km to the north on the opposite foreshore of the bay

Within the Site itself, the following mapped environmental layers occur:

+ 'Proximity Area for 'Coastal Wetlands' under State Environmental Planning Policy (Resilience and Hazards) 2021
+ 'Environmentally Sensitive Land – terrestrial biodiversity under the Sutherland Shire LEP.
+ 'Restoration' under Sutherland Shire Council's Greenweb Strategy
+ 'Threatened species buffer' under the Sutherland Shire DCP

Pre-lodgement consultation with the Council (held on 16 May 2023) identified a range of biodiversity issues that must be addressed in the DA submission. These are identified in the following summary table along with where the issue is addressed within this report.

Pre-Application Discussion No. PAD23/0007 – Summary of biodiversity issues

Issue / considerations	Assessment reference
a) Terrestrial Ecology	
The subject site is identified as being environmentally sensitive and is within close proximity of wetlands and the waterway. SSLEP 2015, SSDCP 2015, the Resilience and Hazards SEPP and Biodiversity and Conservation SEPP contain environmental considerations which must be addressed within documentation submitted with a future DA. Of key importance to Council is that the development maximise the buffer distance provided to the waterway, wetland and high conservation value vegetation and to ensure that offsite impacts are avoided and/ or that suitable mitigation measures be implemented where these impacts cannot be avoided.	Reference to the relevant controls of SSLEP 2015, SSDCP 2015, are provided in Table 2-1 (Section 2 Relevant legislation)
b) Endangered Ecological Communities	
Parts of the subject site contain the Endangered Ecological Community 'Swamp Oak Floodplain Forest' and land to the north-east of the site is mapped as Coastal Saltmarsh (both listed under the Biodiversity Conservation Act, 2016) as well as containing potential habitat for several threatened species. As such, a biodiversity assessment will be required along with any application for redevelopment on this land.	The project arborist has identified one tree requiring removal, which is located within a stand of *Casuarina glauca* external to the development site between Endeavour Road and the road crossing into Solander playing fields. This area has been mapped by ELA (2022) as Swamp Oak Floodplain Forest, although this assessment has determined that this vegetation is of planted origin. The identified tree is dead and requires removal for safety reasons. Further consideration of this tree is not required. The proposal will not impact on any threatened ecological communities (TECs) and is unlikely to significantly impact on any threatened species listed under the BC Act
Under clause 7.2 of the Biodiversity Conservation Act 2016, a development that is likely to significantly affect threatened species must be accompanied by a biodiversity assessment development report (BDAR). If a development is considered likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3 of the Biodiversity Conservation Act 2016 (BC Act) - this is referred to as the test of significance.	

Issue / considerations	Assessment reference
If a development application were to be pursued, it must be accompanied by this test of significance (for both the EEC and threatened species) and BDAR if required. Both direct and indirect impacts of the development must be considered.	A BDAR is not required. A test of significance is provided in Appendix D.
Where the consent authority determines that a significant impact is likely, the biodiversity offset scheme (BOS) applies to the proposed development. Where the BOS applies and a BDAR is required, prescribed actions as described under cl 6.10 of the Biodiversity Conservation Regulation 2017 are required to be assessed as part of the biodiversity assessment method. These assessments must be carried out by an accredited assessor.	The proposal has not triggered entry into the BOS. This assessment has applied the streamlined BAM module for planted native vegetation. Justification for the application of this module and the assessment using the module is provided in Section 3.
Council expects to see the retention of areas of these communities as well as revegetation and restoration of the foreshore area in accordance with clause 6.9 of the SSLEP 2015.	Compliant. This vegetation is being retained as shown in Figure 6-1. Revegetation of the foreshore buffer zone is provided for. A Vegetation Management Plan is provided as a technical document for DA submission.
c) Taren Point Shore Bird EEC	
The proposed development is located nearby to an area mapped as the endangered Ecological Community (EEC) known as 'The shorebird community occurring on the relict tidal delta sands at Taren Point'. This is a community of shorebirds that uniquely occurs on the relict marginal shoal of the Georges River that occurs between Taren Point and Shell Point in Botany Bay. Whilst the development will not be located directly within the mapped extent of this community, there is potential for the proposed development to indirectly impact on this nearby community as well as the migratory and threatened birds in the vicinity of the development. As outlined above, this community must be considered within the BDAR Assessment, with specific consideration given to indirect impacts on this community and its habitat. Specific mitigation measures to protect this community and its habitat must be included in a Construction Environmental Management Plan.	The proposed development is not anticipated to have any indirect impacts on this EEC. Consideration has been paid to the Towra Point Nature Reserve, within which this EEC occurs. Refer to Appendix C and Appendix D. Specific mitigation measures to protect all migratory and other protected species within the Reserve will be provided for in the Project's CEMP.

Issue / considerations	Assessment reference
d) Wetland	
The subject site directly adjoins an area mapped as a wetland under the Resilience and Hazards SEPP and parts of the site are mapped as a wetland proximity area. In accordance with the SEPP, the development should not adversely impact on these wetlands. Protection of these wetlands must include appropriate stormwater management and implementation of a vegetation buffer as outlined below.	Refer below and Sections 5.1.3 and 7 for discussion stormwater mitigation measures.
e) Aquatic Reserve	
The foreshore of Woolooware Bay, adjacent the subject site is mapped as an aquatic reserve and 'key fish habitat'. It is understood that a buffer area of between 50-100m may be required. Please refer to the NSW Department of Primary Industries document Policy and Guidelines for Fish Habitat Conservation and Management (2013) (Section 3.2.3.2) regarding required buffers and required protection to these sensitive areas. It is recommended that this issue be discussed directly with NSW DPI Fisheries, and addressed within submitted documentation, as any application would be referred to them as Integrated Development.	See Table 2-1 (Section 2 Relevant legislation), which references the Fisheries Management Act and Marine Estate Management Act and consultation undertaken with NSW DPI Fisheries was undertaken on 21 July 2023.
f) Vegetation Buffer	
Insufficient vegetation has been retained and/or proposed for revegetation on this site. It is Council's expectation and long-term outcome for the site that land along the foreshore boundary will form part of a vegetative buffer along the entirety of the foreshore area. Therefore, a detailed landscape management plan (LMP) that details the creation of the vegetation buffer adjacent to this portion of the site must be provided with any future DA. The LMP must be prepared by a suitably qualified, experienced and accredited ecologist to ensure an appropriate buffer is implemented and important vegetation is retained and protected.	Revegetation of the foreshore buffer zone is provided for. A Vegetation Management Plan is provided as a technical document for DA submission. The VMP has been prepared in tandem with the Landscape masterplan, which has addressed social, cultural, recreational, and educational opportunities within natural landscapes.
g) Water Management Act	
The development is to identify whether any works (including facilitative work) is proposed within 40m of the top of the bank of the adjacent waterway. Should any works be required within this area, the development will be considered integrated	Clause 36 of Schedule 4 of the Water Management (General) Regulation 2018 specifies that certain waterfront land that has been identified on a map published on the Department of

Issue / considerations	Assessment reference
development and the application forwarded for review by the Natural Resources Access Regulator for issuance of general terms of approval. Note: It is acknowledged that Schedule 4, Clause 36 of the Water Management (General) Regulation 2018 provides an exemption for any activity on waterfront land, on a map approved by the Department, before commencement of the regulation. It is Council's interpretation that this exemption does not apply to the subject works on the basis that the proposed activity will be new work, a new use and will occur after commencement of the regulation.	Industry website as 'exempt waterfront land' does not require controlled activity approval if it has been granted development consent. If consent is granted for the proposed development, a controlled activity approval under the WM Act will not be required because the foreshore of Woolooware Bay is mapped as exempt waterfront land.

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Shortened forms

BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	NSW *Biodiversity Security Act 2015*
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DA	Development Application
DCP	Development Control Plan
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
EHG	Environment and Heritage Group of the DPE
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPBC Act	Commonwealth *Environment Protection Biodiversity and Conservation Act 1999*
IBRA	Interim Biogeographic Regionalisation of Australia
LEP	Local Environment Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SAII	Serious and Irreversible Impact
SEPP	NSW State Environment Protection Policy
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection

Declarations

i. Certification under clause 6.15 Biodiversity Conservation Act 2016

The following signatories certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Name: KATHRYN DUCHATEL

Signature: KDuchatel

Date: 06.10.2023

BAM Assessor Accreditation no: BAAS17054

ii. Details and experience of author/s and contributors

Authors and contributors

Name	BAM Assessor Accreditation no. (if relevant)	Position/Role	Tasks performed	Relevant qualifications
Kathryn Duchatel	BAAS17054	Director, écologique	BAM field surveys PCT analysis Report preparation	BSc. Env. (Macq) EIANZ CEnvP #601
Harry Engyl	N/A	Ecologist	Microbat habitat survey	BSc. (Wollongong) #SL100484 #ARA 19/2067

iii. Conflict of interest

I, KATHRYN DUCHATEL, declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature: KDuchatel

Date: 06.10.2023

BAM Assessor Accreditation no: BAAS17054

1. Introduction

1.1 Proposed development

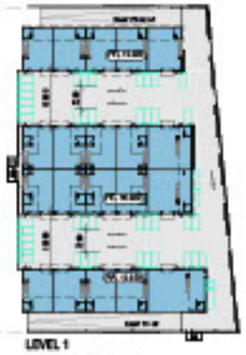
This Biodiversity Assessment Report has been prepared by écologique on behalf of Aliro Group, to support a Development Application (DA) at 13 Endeavour Road, Caringbah.

This DA seeks approval for a mixed use warehouse and distribution, light industrial, commercial, child care and café development known as TripleTwoNine, 13 Endeavour Road, Caringbah, operating 24 hours 7 days a week. The works involve demolition of some existing buildings and propose construction of eight new buildings in a staged manner. Specifically, this development proposes the following:

- Retention of existing Buildings 1 and 2 at the northern portion of the site
- Staged early works for each proposed new building, including:
  - Demolition of existing structures, buildings, and hardstand including removal of trees
  - Site establishment and preparation including earthworks, construction of stormwater and services infrastructure, and augmentation of utilities as required
- Staged construction and occupation of 8 new buildings for warehouse and distribution and light industrial uses, with ancillary supporting office, 68-place child care centre and food and drink premises.
- Provision of car parking.
- Operation of the site 24 hours per day, 7 days a week.
- Landscaping works and estate domain works including estate roads and footpaths
- Estate wayfinding signage
- Dedication of land relating to the Captain Cook Drive roundabout, and a right of way for the access road linking the Solander Fields Car Park to Captain Cook Drive

The proposed masterplan is provided in Figure 1-1.





NOTES

ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARDS AS2890

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum) LEVELS SHOWN ARE INDICATIVE ONLY AND SUBJECT TO FURTHER CIVIL DETAIL DESIGN. THERE MIGHT EXIST +/- 500mm

EXTENT OF RETAINING WALLS SHOWN AS INDICATIVE ONLY SUBJECT TO CIVIL REVIEW

GROSS LETTABLE AREA (GLA) OF THE TOTAL PLOT AREA IS OF A BUILDING MEASURED FROM THE OUTSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL FLOORED AREAS

0% OF CARPARKING SPACES PROVIDED TO BE DESIGNED AS GAS GUZZLING BAYS

0% OF CARPARKING SPACES PROVIDED TO BE DESIGNED AS ELECTRICAL VEHICLE BAYS

DEVELOPMENT ANALYSIS

USE		GFA
BUILDING 3		
WAREHOUSE	3A	849 m²
WAREHOUSE	3B	679 m²
WAREHOUSE	3C	677 m²
WAREHOUSE	3D	677 m²
WAREHOUSE	3E	669 m²
WAREHOUSE	3F	865 m²
OFFICE	3A	135 m²
OFFICE	3B	127 m²
OFFICE	3C	127 m²
OFFICE	3D	127 m²
OFFICE	3E	127 m²
OFFICE	3F	135 m²
TOTAL AREA		4,942 m²
BUILDING 4		
WAREHOUSE	GROUND LEVEL	4,132 m²
WAREHOUSE	LEVEL 1	3,828 m²
OFFICE MEZZANINE	GROUND LEVEL	841 m²
OFFICE MEZZANINE	LEVEL 1	834 m²
TOTAL AREA		9,635 m²
BUILDING 5		
WAREHOUSE	5A	1,671 m²
WAREHOUSE	5B	3,047 m²
WAREHOUSE	5C	2,193 m²
WAREHOUSE	5D	2,732 m²
WAREHOUSE	5E	2,623 m²
OFFICE	5A	333 m²
OFFICE	5B	432 m²
OFFICE	5C	400 m²
OFFICE	5D	424 m²
OFFICE	5E	391 m²
TOTAL AREA		13,018 m²
BUILDING 5 COMMERCIAL		
CAFE		30 m²
CHILDCARE		640 m²
CHILDCARE OUTDOOR		571 m²
COMMERCIAL		554 m²
COMMON AREAS		13 m²
ESTATE OFFICE		22 m²
TOTAL AREA		1,984 m²
BUILDING 6		
WAREHOUSE	6A	354 m²
WAREHOUSE	6B	587 m²
WAREHOUSE	6C	584 m²
WAREHOUSE	6D	926 m²
OFFICE	6A	89 m²
OFFICE	6B	118 m²
OFFICE	6C	117 m²
OFFICE	6D	171 m²
TOTAL AREA		2,966 m²
BUILDING 7		
WAREHOUSE	7A	990 m²
WAREHOUSE	7B	947 m²
WAREHOUSE	7C	944 m²
WAREHOUSE	7D	954 m²
WAREHOUSE	7E	947 m²
WAREHOUSE	7F	944 m²
OFFICE	7A	117 m²
OFFICE	7B	110 m²
OFFICE	7C	117 m²
OFFICE	7D	110 m²
OFFICE	7E	110 m²
OFFICE	7F	117 m²
TOTAL AREA		4,671 m²
BUILDING 8		
WAREHOUSE	8A	738 m²
WAREHOUSE	8B	842 m²
OFFICE	8A	139 m²
OFFICE	8B	130 m²
TOTAL AREA		1,847 m²
GRAND TOTAL GFA		39,048 m²

SITE COVERAGE	
TOTAL SITE AREA	123,696.129 m²
BUILDING 3 - 8 FOOTPRINT	31,900 m²
BUILDING 1 & 2 FOOTPRINT approx.	27,678 m²
SITE COVERAGE approx.	48.20%
LANDSCAPING	14.02%

LEGEND

- ESTATE BOUNDARY
- FORESHORE LINE BOUNDARY
- TRANSMISSION EASEMENT
- LANDSCAPE SETBACK
- BUILDING SETBACK
- 2.5 m BICYCLE & PEDESTRIAN SHARED PATH
- PEDESTRIAN CONCRETE FOOTPATH
- PERMEABLE HARD SURFACE
- PYLON SIGN
- RW RETAINING WALL
- OA OUTDOOR AREA
- RWT RAIN WATER TANK
- W WASTE AREA
- MSB MAIN SWITCH BOARD
- PL PARCEL LOCKERS
- BG BOOM GATE
- RPC RAISED PEDESTRIAN CROSSING
- DP DELIVERY PARKING BAY
- SP SHARED PARKING BAY (5%)
- EV ELECTRICAL VEHICLE BAY (5%)
- EXISTING TREE PROTECTION ZONE
- PROPOSED TREE
- BIORETENTION BASIN / RAIN GARDEN

PARKING PROVISION

PARKING ALLOCATION SHOWN AS INDICATIVE ONLY

		CARS	BICYCLES
Building 1A		51	-
Building 1B		81	-
Building 1C		12	-
Building 1D		35	-
Building 1E		10	-
Building 2		12	-
Building 3		19	12
Building 4		131	64
Building 5	Block 1	48	12
Building 5	Block 2	19	8
Building 5	Childcare	17	4
Building 5	Commercial	15	8
Building 6		29	8
Building 7		62	12
Building 8		22	4
TOTAL		563	132
MOTORBIKES			26

No.	DATE	REVISION	BY	CHK
P02	12.09.2023	FOR CONSIDERATION	AS	JF
P01	30.08.2023	SPACE	AS	JF
P.A	08.08.2023	ISSUE FOR APPROVAL	AS	JF
P#2	03.08.2023	ISSUE FOR APPROVAL	AS	JF
A	31.07.2023	FOR ASSESSMENT	AS	JF

PROJECT
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE
ESTATE MASTERPLAN

CLIENT Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: AS
SCALE: 1:1000 @ A1
SCALE: 1:2000 @ A3

JOB NO. 22366
DRAWING NO. 005
REVISION A

watson young

Figure 1-1.

1.2 Site details

The Site is shown in Figure 1-2 and relevant site details are summarised herein.

Street address	13 Endeavour Road, Caringbah
Legal identification	Lot 2 in Deposited Plan 714965
Local Government Area (LGA)	Sutherland Shire Council
Local Environmental Plan (LEP)	Sutherland Shire LEP 2015
Zoning	SP4 Enterprise
Development Control Plan (DCP)	Sutherland Shire DCP 2015
Site area	12.39 hectares

The Site is irregular in shape and features a frontage to Captain Cook Drive to the southwest, Endeavour Road and more broadly the Taren Point/ Caringbah industrial precinct to the northwest, Solander Playing Fields to the southeast and Woolooware Bay to the northeast. A shared public pathway exists between the site and Woolooware Bay.

A transmission easement traverses the northern portion of the Site, with the support structure located in the north-eastern corner. This easement consumes some 9,000 m^2 of the Site, which generally restricts some development from occurring in this location and also the structure of landscaping and foreshore revegetation.

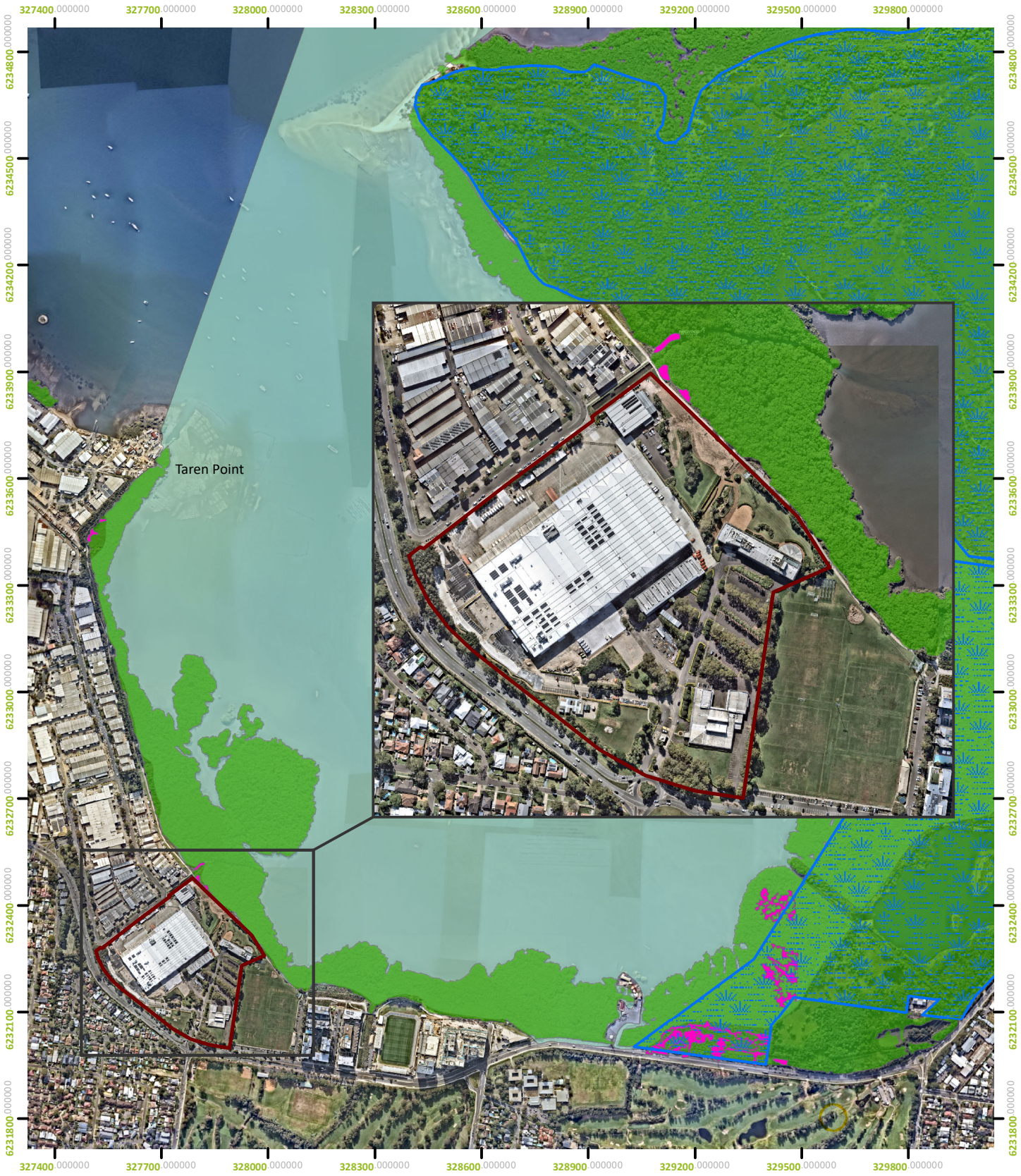
Woolooware Bay comprises several environmentally sensitive aspects, which include:

+ Towra Point Aquatic Reserve listed under the *Marine Parks Act 1997*
+ Taren Point Shorebird Reserve located approximately 1.2km to the north along the foreshore
+ 'Coastal Wetlands' under the State Environmental Planning Policy (Resilience and Hazards) 2021
+ Key Fish Habitat mapped by DPI Fisheries – Woolooware Bay to the highest astronomical tides (HAT)
+ Land mapped as Biodiversity Values under the BC Reg. to the northeast of the Site, associated with the mangrove community immediately adjacent to the Site
+ The Ramsar listed Towra Point Nature Reserve approximately 1.1km to the east along the foreshore and approximately 2km to the north on the opposite foreshore of the bay

Within the Site itself, the following mapped environmental layers occur:

+ 'Proximity Area for 'Coastal Wetlands' under State Environmental Planning Policy (Resilience and Hazards) 2021
+ 'Environmentally Sensitive Land – terrestrial biodiversity under the Sutherland Shire LEP.
+ 'Restoration' under Sutherland Shire Council's Greenweb Strategy
+ 'Threatened species buffer' under the Sutherland Shire DCP

Figure 1-2 illustrates the Site's location in the context of Towra Point Aquatic Reserve, Taren Point, Towra Point Nature Reserve and Biodiversity Value Mapping and Figure 1-3 illustrates State Environmental Planning Policy (Resilience and Hazards) 2021 mapping.



0 280 560 1,120

m

Legend

- Site boundary
- Ramsar Wetland (Towra Point NR)
- Estuarine Saltmarsh
- High Biodiversity Value mapping
- Towra Point Aquatic Reserve

Coordinate system: MGA Zone 56 (GDA 2020)
Image source: Nearmap 31 May 2023

TripleTwoNine, Caringbah

Figure 1-2. Site context

N

écologique



Figure 1-3. SEPP Resilience and Hazard - Coastal Wetland mapping

1.3 Information sources

The following information sources were used in the preparation of this BDAR:

Data and Imagery

+ Aerial imagery: NearMap 1 May 2023
+ Australian Government Department of Climate Change, Energy, Environment and Water
  - Species Profiles and Threats Database (SPRAT) http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
  - Interim Biogeographic Regionalisation for Australia (IBRA) version 7.0
+ NSW Department of Planning and Environment (DPE)
  - NSW (Mitchell) Landscapes – version 3.1
  - BVMap_BV152_Web.gdb
  - NSW State Vegetation Type Mapping (SVTM) (DPE, 2022)
  - BioNet Vegetation Classification Database and Threatened Biodiversity Data Collection
  - EstuaryMacrophytes (DECCW, 2010)
+ NSW Department of Primary Industries
  - Fisheries_Portal_KeyFishHabitat
+ NSW Department of Mineral Resources, Geological Survey of NSW (DMR 1983) Wollongong – Port Hacking Geological Series Sheet 9029-9129 (Edition 1) 1983.

Reports

+ Australian Government Department of Climate Change, Energy, Environment and Water
  - Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (Department of the Environment, Water, Heritage, and the Arts, 2013 EPBC Act Policy Statement)
+ Eco Logical Australia (2022). 13 Endeavour Rd Caringbah, Vegetation Management Plan. Prepared for Aliro Group Pty Ltd.
+ Green Tree Consultancy (2023) Arboricultural impact assessment TripleTwoNine Project V2. prepared for Aliro Group. 9 September 2023
+ Habit8 (2023) Landscape Concept Plans. Triple Two Nine Estate, 13 Endeavour Road, Caringbah NSW. Drawings prepared for Aliro Group. 27 September 2023
+ JBS&G Australia Pty Ltd (2023a) Acid Sulfate Soil Management Plan. Masterplan Area - 13 Endeavour Road, Caringbah, NSW. Report prepared for Aliro Trusco 1 Pty Ltd - Rev A. 2 August 2023
+ JBS&G Australia Pty Ltd (2023b) Detailed Site Investigation. Masterplan Area - 13 Endeavour Road, Caringbah NSW. Report prepared for Aliro Trusco 1 Pty Ltd - Rev A. 10 August 2023
+ PSM (2023) 13 Endeavour Road Caringbah – Proposed Industrial Development Geotechnical Advice. Rev 1. Report prepared for Aliro Group. 27 July 2023
+ Sparks and Partners (2023a) 13 Endeavour Road Caringbah – Stormwater Management Report Rev. A. Prepared for Aliro. 26 September 2023
+ Sparks and Partners (2023b) 13 Endeavour Road Caringbah – Flood Management Report Rev. A. Prepared for Aliro. 21 September 2023

2. Relevant legislation

Table 2-1 summarises legislation as relevant to biodiversity and the Site.

Table 2-1. Summary of relevant legislation

Legislative mechanism	Relevance to proposal
Federal	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act aims to protect Matters of National Environmental Significance (MNES). If a development will have a significant impact on MNES, it is considered a 'Controlled Action' by the Commonwealth and requires assessment and approval by the Commonwealth in order to proceed. Search of the EPBC Act Protected Matters online tool indicates the following entities to occur or potentially occur within 10km of the Site: + A Ramsar Wetland – Towra Point Nature Reserve + 11 threatened ecological communities (TECs) – three TECs in close proximity to the site: ▪ *Posidonia australis* seagrass meadows ▪ Subtropical and Temperate Coastal Saltmarsh ▪ Coastal Swamp Oak (*Casuarina glauca*) Forest + 105 threatened species – 45 bird, 6 fish species, 3 frog, 1 insect, 12 mammal, 6 reptile, 5 shark, 1 snail and 26 flora species + 79 migratory species – 60 bird, 8 mammal, 5 reptile and 6 shark species, many included in threatened species (above) Most of these species are associated with the adjacent estuarine and marine environment and will not be directly affected by the proposal. This assessment has determined the following: + The Site does not contain any MNES or provide habitat of any importance to any MNES + The proposal is unlikely to indirectly result in a significant impact on any MNES + A referral to the Commonwealth under the EPBC Act is not required.
State	
Biodiversity Conservation Act 2016 (BC Act)	The BC Act outlines the assessment requirements to determine whether a proposed development is likely to significantly affect threatened species or ecological communities, or their habitats, and whether the Biodiversity Offsets Scheme (BOS) will be triggered. Works that exceed the BOS thresholds, as set out in Part 7 of the BC Act and Part 7 of the BC Regulation, are required to undertake the ecological assessment in accordance with the Biodiversity Assessment Method (BAM), including the preparation of a Biodiversity Development Assessment Report (BDAR).

Legislative mechanism	Relevance to proposal
	The proposal does not trigger the BOS and is considered unlikely to adversely impact on any threatened communities, species or populations.
Biodiversity Conservation Regulation 2017 (BC Reg.)	The Biodiversity Values Map identifies land with high biodiversity value, as defined by the BC Reg. The area of mangroves adjacent to the subject site are on the Biodiversity Values Map but there are no Biodiversity Values mapped within the boundaries of the Site (see Figure 1-2).
Biosecurity Act 2015 (Biosecurity Act)	Biosecurity is the protection of the economy, environment and community from the negative impacts of pests and diseases, weeds and contaminants. The Biosecurity Act introduces the premise that biosecurity is a shared community responsibility and introduces the legally enforceable concept of a General Biosecurity Duty (GBD). The GBD means that any person dealing with a biosecurity risk must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable). Biosecurity risks relevant to the proposal may include the introduction and spread of priority weeds, pathogens and disease, on vehicles and plant entering the site during the construction phase.
Fisheries Management Act 1994 (FM Act)	The objectives of the FM Act are to conserve, develop and share the fishery resources of the State for the benefits of present and future generations. The FM Act provides protection and approval processes for activities which may impact on threatened species, protected marine vegetation, or involve dredging, reclamation, or obstruction of fish passage. The proposal does not involve dredging and reclamation on water land, will not obstruct fish passage and is not anticipated to cause any negative impact to any threatened species, populations, or communities under the FM Act. Part of Site is mapped as containing key fish habitat (KFH). KFH is defined in sections 3.2.1 and 3.2.2 of the Policy and Guidelines for Fish Conservation and Management (P&Gs). Towra Point Aquatic Reserve is a Class 1 waterway that supports a diverse range of KFH including highly sensitive coastal wetlands and coastal saltmarsh (classified as TYPE 1 KFH). Pre-lodgement consultation advice with the Department of Primary Industries (DPI) Fisheries was undertaken on 21 July 2023, at which time the partial mapping of KFH was discussed given the following issues: + terrestrial nature of this land and its elevation above the mean high water tide (MHWM) + the preference of Fisheries for a 50-100m setback from TYPE 1 KFH, which conflicts with Councils foreshore setback and coincides with existing developed land along most of the bay's foreshore.

Legislative mechanism	Relevance to proposal
	A drawing illustrating the proposed foreshore buffer in relation to the MHWM was provided to Fisheries on 7 September 2023, which is shown in Figure 2-1. In summary DPI Fisheries has no objections to the lodgement of a DA for this proposal and provided recommendations that include: + Consultation during the DA assessment relevant to development in the locality of aquatic reserves (as set out in s56 of the *Marine Estate Management Act 2014*). + Staging of land forming and development of the area and implementation of best practice erosion and sedimentation controls to reduce erosion and sedimentation risks to key fish habitat (KFH) values. + The use of best practice water sensitive urban design to manage stormwater and maintenance of stormwater treatment measures in accordance with the manufacturers and best practice maintenance requirements over time to ensure there are no downstream impacts to highly sensitive KFH + The use of local native riparian vegetation species across the foreshore buffer zone to improve riparian habitat values. Refer to DPI Fisheries letter in Appendix E.
Marine Estate Management Act 2014 (MEM Act)	The Site is adjacent to the Towra Point Aquatic Reserve (see Figure 1-2). Application of the EP&A Act for development affecting / in the locality of aquatic reserves is set out in s56 of the MEM Act. Under s56, a consent authority must take into consideration: + the objects of the MEM Act, + the permissible uses of the area concerned under the regulations or the management rules, and + any advice given to it by the relevant Ministers about the impact on the marine park or aquatic reserve of development in the locality. Relevant objects of the MEM Act are: (a) to provide for the management of the marine estate of NSW consistent with the principles of ecologically sustainable development in a manner that— (i) promotes a biologically diverse, healthy and productive marine estate, and (ii) facilitates the maintenance of ecosystem integrity The proposal is not considered to conflict with these objects. The proposal will be referred for assessment and concurrence if appropriate when the DA is referred by Council through the NSW Planning Portal.
Water Management Act 2000 (WM Act)	A controlled activity approval under the WM Act is required for certain types of developments and activities that are carried out in or near a river, lake or estuary. The WM Act defines waterfront land as the bed of any river, lake or estuary and any land within 40 meters of the riverbanks, lake shore or estuary mean high water mark.

Legislative mechanism	Relevance to proposal
	Clause 36 of Schedule 4 of the Water Management (General) Regulation 2018 specifies that certain waterfront land that has been identified on a map published on the Department of Industry website as 'exempt waterfront land' does not require controlled activity approval if it has been granted development consent. If consent is granted for the proposed development, a controlled activity approval under the WM Act will not be required because the foreshore of Woolooware Bay is mapped as exempt waterfront land.
State Environmental Protection Policy (SEPP) Resilience and Hazards 2021	The Site is located on land mapped in proximity to coastal wetlands (see Figure 1-3). Under s2.8 development consent must not be granted to development on land identified as "proximity area for coastal wetlands" or "proximity area for littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map unless the consent authority is satisfied that the proposed development will not significantly impact on— a. the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or b. the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest. The Site is fenced and physically separated from the adjacent Coastal Wetland by a public shared pathway. The proposal does not require any offsite works that would directly impact on the external environmental. The proposal will result in a substantial improvement to the water quality currently discharging into Woolooware Bay from the Site and mitigation measures will be implemented to minimise the risk of impacting on water quality associated with the proposal's construction activities.
SEPP Biodiversity and Conservation 2021 (SEPP B&C)	SEPP B&C contains the transferred provisions of a range of former SEPPs dealing with topics such as vegetation removal, koala habitat protection and water catchments. The aims of the SEPP B&C are: a. to protect the biodiversity values of trees and other vegetation in non-rural areas of the State, and b. to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation. The Site is located in a non-rural area and the proposal, wherever possible, has avoided clearing of vegetation during the design phase.
Local	
Sutherland Shire Local Environmental Plan (SSLEP) 2015	The Site is identified as 'environmentally sensitive land' on the SSLEP 'terrestrial biodiversity map'. Section 6.5 of the SSLEP states the following: + Terrestrial biodiversity is to be maintained by - a. protecting native fauna and flora, and b. protecting the ecological processes necessary for their continued existence, and

Legislative mechanism	Relevance to proposal
	c. encouraging the conservation and recovery of native fauna and flora and their habitats. + In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must consider: a. whether the development is likely to have: (i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and (ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and (iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and (iv) any adverse impact on the habitat elements providing connectivity on the land, and b. any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development. + Development consent must not be granted for development on land to which this clause applies unless the consent authority is satisfied that: a. the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or b. if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or c. if that impact cannot be minimised—the development will be managed to mitigate that impact. The Site is not considered to contain ecological processes necessary for the continued existence of native fauna and flora. The Site's native vegetation is of planted origin and comprises both local and non-locally occurring species, which are confined to planting beds and landscaped areas in an artificially constructed environment. The proposed development has been sited to avoid areas of established peripheral vegetation and includes native landscaping and creation of a vegetated foreshore buffer zone along the northeast of the Site. The VMP aims to enhance the ecological values of the foreshore buffer zone through a combination of bush regeneration and planting of native species in tandem with the Site's landscape design. The landscape plan for the foreshore buffer area addresses how the landscape is to be managed within the constraints of the electricity easement within the Site, and provides for endemic canopy tree planting, promotion of social, cultural, recreational, and educational opportunities within natural landscapes throughout the Site.
Sutherland Shire Development Control Plan (SSDCP) 2015	The Site is mapped as 'Restoration' under Council's Greenweb map and the adjacent mangroves are mapped as 'Core'. The overall aim of the Greenweb Strategy is to identify and manage significant vegetation and

Legislative mechanism	Relevance to proposal
	vegetated links through the Shire, to ensure the long-term conservation of the biodiversity of the Shire and surrounds. Controls for development in Greenweb 'Restoration' areas (relevant to the Site) include: + Development should contribute to a long-term strategy of establishing connectivity between bushland remnants through its siting, design and landscape treatment. + For development in employment zones connectivity can be achieved through the planting of species indigenous to the Sutherland Shire. The proposal aims to meet the objectives of the Greenweb Strategy through the provision of a foreshore buffer zone that will provide connectivity with, and an extension of, the adjacent estuarine environment. Native landscaping and the VMP have used Council's web based native plant selector based on the street address of the Site.
	Threatened species controls under section 3.1 of the DCP requires special consideration under the BC Act, FM Act, EPBC Act and EP&A Act for development in areas which contain threatened species, populations or ecological communities or in adjoining buffer areas which may impact on these species, populations or ecological communities. The northeastern site portion is located within the DCPs denoted threatened species buffer zone. In particular, the Site is in close proximity to areas of Saltmarsh (a TEC under the BC and EPBC Acts) and mangrove forest (protected marine vegetation under the FM Act). These Acts have been paid careful consideration and the significance of potential impacts have been assessed in accordance with the EP&A Act.



TripleTwoNine, Caringbah

Figure 2-1. Indicative 50-100m setback areas

Legend

Subject_site | 50m setback | 100m setback | Key_Fish_Habitat___Sydney_Metro

Coordinate system: MGA Zone 56 (GDA 2020)
Image source: Nearmap 31 May 2023

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3. Native Vegetation

Native vegetation within the Site was assessed with reference to the following resources:

- Arboricultural assessment;
- Native vegetation mapping;
- Historical imagery;
- Site survey; and
- The BAM streamlined assessment module for planted native vegetation.

3.1 Arboricultural assessment

Arborist (2023) assessed 882 individual tree and shrub specimens, which are summarised in Table 3-1 and further identified in Table 3-2.

Table 3-1. Tree origins

Origin	No of Species	Total specimens
Local native species	20	360
Non-local native	10	44
Exotic	18	203
	48	**882**

Table 3-2. Tree specimens identified within the Site

Botanical name	Common name	Qty	Habitat
Local native			
Acacia decurrens	Green wattle	1	Grows in dry sclerophyll forest, woodland or heath, often on riverbanks and on rises. Common in the Sydney region. Widely cultivated and occasionally naturalised.
Acmena smithii	Lilly pilly	5	Widespread in rainforest, from the coast to ranges, often along watercourses. Widely cultivated
Angophora costata	Smooth-barked Apple Myrtle	10	Locally abundant, on deep sandy soils or sandy soils on sandstone; often coastal.
Banksia integrifolia	Coastal banksia	13	Widespread, chiefly from coastal sites to the ranges
Banksia serrata	Saw-toothed banksia	1	Usually in dry sclerophyll forest or woodland on sandstone or consolidated sand dunes, on the coast and in the Blue Mtns.
Casuarina cunninghamiana	River she-oak	18	Along permanent freshwater streams.
Casuarina glauca	Swamp oak	138	Found in brackish situations along coastal streams, often forming pure stands
Corymbia maculata	Spotted gum	46	Community dominant, in open forest on somewhat infertile and drier sites on shales and slates
Cupaniopsis anacardioides	Tuckaroo	90	In littoral rainforest and scrub near the sea and along estuaries, north from Gerroa (Illawarra region).

Botanical name	Common name	Qty	Habitat
Cyathea sp.	Tree Fern	3	Generally, in rainforest or open forest, in gullies or on hillsides in moist, shady situations.
Eucalyptus botryoides	Southern mahogany	1	Locally abundant, in dry sclerophyll forest or woodland on alluvial flats or old beach dunes; south from Hunter R.
Eucalyptus longifolia	Woollybutt	1	Locally frequent, in dry sclerophyll forest or woodland on soils of medium fertility, often on alluvial flats
Eucalyptus paniculata	Grey ironbark	2	Grows in high rainfall coastal areas from Bermagui to Bulahdelah.
Eucalyptus saligna x botryoides	Hybrid Sydney blue gum	4	All populations of E.saligna south of Port Jackson show some genetic influence from E. botryoides, widespread and abundant, in wet forest on soils of moderate fertility, often on slopes
Eucalyptus sp.		5	
Glochidion ferdinandi	Cheese tree	1	Widespread in coastal districts
Livistona australis	Cabbage fan palm	8	Grows in moist sclerophyll forest, often in swampy sites, and on margins of rainforest.
Melaleuca styphelioides	Prickly-leaved paperbark	1	Grows in moist situations, often along stream banks; mainly on the coast north from Nowra district.
Pittosporum undulatum	Sweet pittosporum	1	Grows in rainforest and wet sclerophyll forest and sheltered situations in dry sclerophyll forest or woodland. In the Sydney district it can be a troublesome invader in disturbed sclerophyll forest.
Syzygium sp.	Lilly pilly	11	Native range that extends from Africa and Madagascar through southern Asia east through the Pacific, incl. Australia. S.australe grows in all types of warmer rainforest, often along streams. S.paniculatum grows in subtropical and littoral rainforest on sandy soils or stabilized dunes, S.oleosum in littoral, subtropical and warm-temperate rainforest all out not local to Sydney Basin
Non-local native			
Archontophoenix cunninghamiana	Bangalow palm	2	Grows in or near rainforest in coastal districts, mostly in moist sites beside creeks and on alluvial flats; north from Batemans Bay.
Callistemon viminalis	Weeping bottlebrush	83	North from the Gloucester area. Mostly grows along watercourses; chiefly in sandstone or granite areas.
Corymbia citriodora	Lemon-scented gum	174	A tall tree from temperate and tropical eastern Australia, distributed from the Cooktown area to south of Gladstone in Queensland. Sparingly naturalised in NSW. It prefers lighter loamy soils or skeletal soils and occurs as a component of dry sclerophyll forest and woodlands in hilly country.

Botanical name	Common name	Qty	Habitat
Eucalyptus microcorys	Tallowwood	3	NSW and Queensland coastal divisions, north from about the Gosford area, to Hervey Bay in Qld and including Fraser Island. Forms a dominant component of many vegetation types in these areas, mainly wet and dry sclerophyll forest up to rainforest edges, on higher-fertility soils.
Howea forsteriana	Kentia palm	12	Endemic to Lord Howe Island
Melaleuca bracteata	Black tea tree	6	Widespread, along watercourses or on heavier inland soils in depressions; north from the Macleay R.
Melaleuca quinquenervia	Broad-leave paperbark	36	Widespread in coastal swamps and around lake margins, north from Botany Bay.
Melia azedarach	White cedar	1	Grows in subtropical and dry rainforest, mostly on margins and in regrowth, north from Milton and west to and inland to the upper Hunter Valley; widely cultivated, especially in inland districts, occasionally naturalized
Schefflera actinophylla	Umbrella tree	1	Native to tropical rainforests and gallery forests in northern and north-eastern Queensland coasts and the Northern Territory of Australia
Stenocarpus sinuatus	Fire wheel tree	1	Grows in warmer types of rainforest in coastal areas north from the Nambucca R.
Exotic			
Araucaria columnaris	Cook Araucaria	1	Endemic to New Caledonia in the Melanesia region of the Pacific.
Alnus jorullensis	Mexican alder	3	Native to eastern and southern Mexico, Guatemala and Honduras.
Archontophoenix alexandrea	Alexandrea palm	19	Grows across southern Queensland and northern New South Wales.
Beaucarnea recurvata	Ponytail palm	2	The species was native to numerous states of eastern Mexico but is now confined to the state of Veracruz.
Cotoneaster sp		1	Cotoneaster is a genus of flowering plants in the rose family, Rosaceae, native to the Palaearctic region, with a strong concentration of diversity in the genus in the mountains of southwestern China and the Himalayas.
Dracena sp.		2	The majority of the species are native to Africa, southern Asia through to northern Australia, with two species in tropical Central America.
Dypsis decaryi	Triangle palm	1	Indigenous to the Madagascan rainforest
Dypsis leutescens	Golden cane palm	3	Native to Madagascar
Ficus benjamina	Weeping fig	11	Tropical and subtropical climates, but it is more often grown as a houseplant in homes, offices, and featured in interior commercial landscaping.
Gleditsia triacanthos	Honey locust	1	Native to central North America where it is mostly found in the moist soil of river valleys.

Botanical name	Common name	Qty	Habitat
Jacaranda mimosifolia	Blue jacaranda	1	Sub-tropical tree native to south-central South America, widely planted ornamental
Magnolia grandiflora	Bull bay	38	Native to the Southeastern United States
Phoenix canariensis	Canary Island date palm	12	Native to the Canary Islands off the coast of Northwestern Africa
Phoenix dactylifera	Date palm	1	Probably originated in south-western Asia and the drier parts of northern Africa, but because of its widespread cultivation since ancient times its native distribution is obscure.
Phoenix roebelenii	Dwarf date palm	3	Native to southeastern Asia, from southwestern China, northern Laos and northern Vietnam.
Plumeria sp.	Frangipani	1	Endemic to the Neotropical realm, but are sometimes grown as cosmopolitan ornamentals in warm regions
Syagrus romanzoffiana	Cocos palm	15	Native to South America, introduced throughout the world as a popular ornamental garden tree
Washingtonia robusta	Washington palm	88	Native to the Baja California peninsula and a small part of Sonora in northwestern Mexico

3.2 Native vegetation mapping

Available mapping by DPE (2022) and OEH (2016) do not map the Site as containing any native plant community types (PCTs). State Vegetation Type Mapping (SVTM) by DPE (2022) identifies the following PCTs as occurring within the locality:

- Estuarine Swamp Oak Twig-rush Forest (PCT 4028);
- Sporobolus virginicus Saltmarsh (PCT 4103);
- Samphire Saltmarsh (PCT 4097);
- Grey Mangrove-River Mangroves Forest (PCT 4091)
- Sydney Coastal Enriched Sandstone Forest (PCT 3592); and
- Sydney Turpentine Ironbark Forest (PCT 3262).

SydneyMetroArea_v3_2016_E_4489 mapping (OEH 2016) indicates similar PCTs (although identified under PCT names and IDs prior to a systematic ecological review of PCTs).

The only significant difference between 2016 and 2022 mapping is an area of Saltmarsh proximal to the Site (see Figure 3-1).



TripleTwoNine, Caringbah

Figure 3.1. SVTM vegetation mapping

- Site boundary
- Estuarine Reedland
- Estuarine Swamp Oak Twig-rush Forest
- Sporobolus virginicus Saltmarsh
- Samphire Saltmarsh
- Sydney Coastal Enriched Sandstone Forest
- Grey Mangrove-River Mangrove Forest
- Sydney Turpentine Ironbark Forest
- Inset showing OEH (2016) saltmarsh mapping

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Coordinate system: MGA Zone 56 (GDA 2020)

Image source: Nearmap 31 May 2023

Data source: SVTM_NSW_Extant_PCT (DPE, 2022)
SydneyMetroArea_v3_1_2016_E_4489 (OEH, 2016)

3.3 Historical assessment

Historical imagery provides insight into land-use changes over time. This method of assessment is particularly useful when an area of interest (such as the Site) contains numerous non-local native and exotic planted species.

Imagery from 1950 to 2004 was sourced from the NSW Spatial Services – Historical imagery viewer and clipped to the subject land and the estimated subject land boundary overlain to each image. The following summarises the assessment findings:

+ A naturally occurring estuarine (tidally influenced) environment is evident on the Site up until 1969 photography.
+ A road was constructed on the current alignment of Captain Cook Drive by 1955, which would have initiated change to the tidal regime (i.e., through freshwater runoff from the road and potential damming effects from the road itself).
+ The Site was reclaimed by 1969 and remained vacant until 1979 and sometime between 1979 and 1989 the Toyota building was constructed (as evident in 1989 photography).
+ The Site's pre-reclamation native vegetation comprises mangrove forest and extensive tidal flats that would have supported equally extensive saltmarsh meadows.
+ The existing *Casuarina glauca* (swamp oak) on the Site are evident as landscape plantings in 1989 photography, associated with the Toyota building development and the existing roundabout and internal road construction.
+ Additional landscaping is evident as further buildings were constructed on the Site (shown on 1993 photography) with the current extent of landscaped vegetation is evident by 2004.

The available historical imagery (provided in Appendix A) provides evidence that the Site does not contain any remnant native vegetation.

3.4 Site survey

Ground truthing of desktop-based assessment of the Site was conducted by écologique, 17 July 2023.

Climate conditions on 17 July 2023 were as follows:

General observation	9am temp C°	3pm temp C°	9am wind direction	9am wind speed (km/h)	3pm wind direction	3pm wind speed (km/h)
Fine, nil rain	13.1	17.9	WNW	11	NE	22

All vegetated areas were able to be comprehensively inspected without the need for random meanders or parallel transect or other representative sampling methods.

Additional survey information was provided by the following:

+ Arborist surveys – conducted by Green Tree Consultancy (Joe Floyd) and Truth about Trees (Tom Hare), 14-20 June 2023
+ Ecological site assessments including BAM plot data collection – conducted by Eco Logical Australia, 2 March 2022

3.5 Planted native vegetation assessment

3.5.1 D.1 Decision-making key

The Planted Native Vegetation Module includes a decision-making key to identify whether a streamlined assessment can be applied to part or all of the Site.

The first 3 questions of the decision-making key are used to evaluate if the proposed impacts to the vegetation require assessment under the standard BAM. A 'yes' to any of these questions requires the vegetation to be assigned to a plant community type (PCT) and assessed using the standard BAM.

If all responses are 'no', the remainder of the questions apply, with Questions 4–6 used to evaluate the reasons for application of D.2. Under D.2, the planted native vegetation is assessed for threatened species habitat only and biodiversity credits are not calculated.

Table 3-3 outlines how the decision-making key has been applied,

Table 3-3. DI Decision making key

Key	Decision
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	No, the Site does not contain remnant native vegetation.
i. Yes .... The planted native vegetation must be allocated to the best fit PCT and the BAM must be applied.	
ii. No..... **Go to 2.**	
2. Is the planted native vegetation:	No
Planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.)[1], and	
The primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	
i. Yes .... The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM.	
ii. No..... **Go to 3.**	

[1] BAM Section 11.9(2.) 'Existing conservation obligation' means any measure or action required to be carried out under:

a. a restriction on use or public positive covenant under the *Crown Lands Act 1989* or *Crown Land Management Act 2016*
b. a conservation agreement entered into under the *National Parks and Wildlife Act 1974*
c. a trust agreement entered into under the *Nature Conservation Trust Act 2001*
d. a conservation agreement under Part 5 of the *Biodiversity Conservation Act 2016*
e. any agreement entered into with a public authority under which the owner of the land received, or is entitled to receive, funding for biodiversity conservation purposes
f. in the case of publicly owned land, any legislative requirements to manage the land for biodiversity conservation purposes
g. a biobanking agreement entered into under the *Threatened Species Conservation Act 1995*
h. a biodiversity stewardship agreement entered into under Part 5 of the BC Act
i. a legal obligation imposed by a statutory body or officer where that officer or body (or the Minister to whom the officer or body is responsible) has advised in writing that the legal obligation was imposed for biodiversity offset purposes
j. a property vegetation plan (PVP) under the Native Vegetation Act 2003 that is described as a Conservation PVP (and relates to land that is required to be conserved or in respect of which public funding was provided to improve biodiversity).

Key	Decision
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following:	
A species recovery project	No
Saving our Species project	No
Other types of government funded restoration project	No
Condition of consent for a DA that required those species to be planted or translocated for the purpose of providing threatened species habitat	No
Legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings	No
Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan	No
Approved vegetation management plan (e.g., as required as part of a Controlled Activity Approval for works on waterfront land ?)	No
i. Yes .... The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM.	
ii. No..... **Go to 4.**	
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	No
i. Yes..... Go to D.2 Assessment of planted native vegetation for threatened species habitat Chapters 4 and 5 of the BAM are not required to be applied).	
ii. No..... **Go to 5.**	
5. Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or tea-tree farms?	Yes
i. Yes .... **Go to D.2 Assessment** of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are *not* required to be applied).	
6. Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)?	See Table 3-4 below

Table 3-4. Species on the approved widely cultivated native planted list

Botanical name	Common name
Banksia integrifolia	Coastal banksia
Casuarina glauca	Swamp oak
Cupaniopsis anacardioides	Tuckaroo
Cynodon dactylon	common couch
Livistona australis	Cabbage fan palm
Lomandra longifolia	Spiny-headed mat-rush
Pittosporum undulatum	Sweet pittosporum
Syzygium sp.	Lilly pilly
Archontophoenix cunninghamiana	Bangalow palm
Melia azedarach	White cedar

Photographic plates provided in Appendix B illustrate the planted native vegetation across the Site and Figure 3-2 shows the extent of planted vegetation within the Site.

3.5.2 D.2 Assessment of planted native vegetation for threatened species habitat

An assessment of the potential for the planted native vegetation to provide habitat for threatened species is required. If there is evidence that threatened species are using the planted native vegetation as habitat, the assessor must apply Section 8.4 of the BAM to mitigate and manage impacts on these species. Species credits are not required to offset the proposed impacts.

Section 4 discusses the potential for threatened species to occur within the Site.



TripleTwoNine, Caringbah

Figure 3-2. Site vegetation

Legend

- Subject_site
- Local native
- Local non-local native mix
- Non-local native
- Planted mix
- VMP - existing
- Turf
- Exotic

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Coordinate system: MGA Zone 56 (GDA 2020)
Image source: Nearmap 31 May 2023

4. Habitat suitability for threatened species

4.1 Methods

Under the application of the planted native vegetation streamlined assessment module, the planted native vegetation is not required to be assessed under the standard BAM. However, the vegetation may still provide habitat for threatened flora and fauna species.

While it is not required to survey these areas strictly in accordance with the BAM, it is expected that a reasonable understanding of habitat suitability for threatened species is provided.

The following methods were employed to determine the Site's potential to provide habitat for threatened species.

4.1.1 Existing information

Searches of the following sources were undertaken to profile a potential list of threatened species that may occur within or proximal to the Site:

+ NSW Bionet Atlas database (10km search radius from site)
+ EPBC Protected Matters search tool (10km search radius from site)

Threatened species' habitat were informed from the Threatened Biodiversity Data Collection (TBDC), EPBC species profiles (SPRAT), NSW and Commonwealth conservation advice and final determinations.

Additional information reviewed included arboricultural impact assessments, previous ecological surveys conducted on the Site and proximal to the Site.

4.1.2 Habitat assessment

A habitat assessment was undertaken by two ecologists on 17 July 2023.

All vegetated areas were able to be comprehensively inspected without the need for random meanders or parallel transect or other representative sampling methods.

Any opportunistic fauna sightings were noted during the survey and identified habitat features were measured using GPS.

Surveys included assessment of buildings for daytime microbat roost habitat. This entailed looking for bats or signs of bats in suitable roost habitat. Where accessible, potential roost habitat were inspected using a torch.

Bat detection (echolocation) was not employed as target species would not be using daytime roosts until later in the year when warmer.

Reference was also made to previous surveys undertaken at the Site by Eco Logical Australia (24 June 2020) and proximal to the Site (Eco Logical Australia, 2013 and Lesryk Environmental, 2021).

4.2 Threatened flora species

Four threatened flora species records were found within the search area.

The Site is located on reclaimed land and has not historically provided habitat for these species.

The subject land does not contain any drainage lines and was not found to contain any hollow-bearing trees or evidence of nesting or breeding habitat for threatened species.

Other identified habitat constraints include the network of access roads and associated car and pedestrian traffic, noise and light pollution.

The existing and artificially created environment does not provide the habitat requirements for each of these species, which are summarised in Table 4-1.

None of the species listed in Table 4-1 were detected during various surveys undertaken in the Site, which have included:

+ Ecological ground truthing of desktop assessment – conducted by écologique, 17 July 2023
+ Arborist surveys – conducted by Green Tree Consultancy (Joe Floyd) and Truth about Trees (Tom Hare), 14-20 June 2023
+ Ecological site assessments including BAM plot data collection – conducted by Eco Logical Australia, 2 March 2022

Table 4-1. Threatened flora species records

Species name	Common name	Status		Habitat requirements
		BC Act	EPBC Act	
Callistemon linearifolius	Netted Bottle Brush	V		Shrub is up to 3-4 m tall, grows in dry sclerophyll forest. Recorded from the Georges River to Hawkesbury River in the Sydney area, where recent records are limited to the Hornsby Plateau area.
Prostanthera densa	Villous Mint-bush	V	V	Erect mint-smelling shrub to 2 m tall, generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea.
Senecio spathulatus	Coast Groundsel	E1		A low-growing smooth-stemmed daisy, often forming hummocks to 30 cm tall that grows on frontal dunes.
Syzygium paniculatum	Magenta Lilly Pilly	E	V	Small to medium sized rainforest tree that grows to 8m. On the south coast occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities

All species returned in protected matters searches for the locality and their habitat requirements are provided in Appendix C.

4.2 Threatened fauna species

4.2.1 Overview

Due to the Site's location adjacent Woolooware Bay, a large proportion of threatened fauna species records from the search area are associated with the marine and estuarine environment.

- 4 marine mammals (dugong, 3 x whale species)
- 5 marine reptiles (sea turtles)
- 6 shark species
- 43 bird species, including:
  - 27 migratory wader and/or marine species
  - 8 wetland species
  - 3 raptor species
  - 5 woodland species
- 8 mammals (including 5 x bat species)

No threatened fauna species were observed during site inspections.

The Site lacks suitable breeding habitat for threatened species observed in the form of hollow-bearing trees or raptor nests. This is consistent with the immature age of the vegetation, as there are no large emergent trees for nesting raptors and tree hollows have not had time to form.

Species returned in searches for the locality and their habitat requirements are provided in Appendix C (marine mammals, reptiles and sharks not included).

4.2.2 Fauna habitat

As evidenced in the historical imagery analysis, the Site is an artificial construct with vegetation planted between 1989 and 2004. Arboricultural surveys undertaken also confirm that planted trees are not old enough to have formed tree hollows, any substantial decorticating bark or large emergent trees (for nesting raptor species).

Planted vegetation is also located in a managed curtilage, which means that leaf litter, twigs, small branches are regularly cleared from roads and garden beds and dead or dying tree limbs are removed prior to natural felling. Subsequently the Site provides very limited habitat for ground dwelling fauna.

Notwithstanding, foraging habitat for mobile species (birds, bats, possums) is provided by both native and exotic planted trees, palms and understorey species in the form of nectar, seeds and fruit (e.g., lilly pilly and palms).

The various palm species on the Site are likely to provide foraging habitat for the threatened Grey-headed Flying-fox and the Site in general may be visited by microbats and bird species (indicated in Appendix C as species that could forage in the site).

Fauna species observed during site survey conducted on 17 July 2023 are listed in Table 4-2.

Table 4-2. Fauna species observed

Species name	Common name	Observation
Aves		
Anthochaera carunculata	Red wattle bird	Observed in Site
Corvus coronoides	Australian raven	Flying over
Egretta novaehollandiae	White-faced heron	Observed in adjacent field

Species name	Common name	Observation
Gymnorhina tibicen	Magpie	Observed in Site
Hirundo neoxena	Welcome swallow	Observed in Site
Malurus cyaneus	Superb fairy-wren	Observed in Site
Manorina melanocephala	Noisy miner	Observed in Site
Ocyphaps lophotes	Crested pigeon	Observed in Site
Pelecanus conspicillatus	Australian pelican	Flying over
Strepera graculina	Pied currawong	Heard
Threskiornis moluccus	Australian white ibis	Observed in adjacent field
Trichoglossus moluccanus	Rainbow lorikeet	Flying over
Vanellus miles	Masked lapwing	Observed in adjacent field
Mammals		
Trichosurus vulpecula	Brush-tail possum	Scats in car park

4.2.3 Microbats

A targeted survey was undertaken for potential microbat roosting habitat. No direct observations of microbats or signs of microbat occupancy was identified during this assessment.

Several entry and exit points were observed, which included small openings and gaps in building facades and an external gazebo style conference area. Potential roost sites were primarily associated with a vacant building located in the northeast site portion. Most buildings were found to be in good condition with two recently renovated.

Photo plates in Appendix B illustrate potential access points into buildings. These potential habitats are considered unlikely to provide habitat of any importance to non-threatened or threatened bats. Particularly as the adjacent and extensive mangrove system would provide high quality foraging and roosting habitat.

Previous surveys undertaken by Eco Logical Australia (24 June 2020), also concluded that no evidence of microbat use was detected and that potential microbat roosting habitat within the Site was of low quality and unlikely to support non-threatened or threatened bats.

Surveys conducted proximal to the Site include an assessment for the Woolooware Bay Town Centre by Eco Logical Australia (ELA) in 2013 and an assessment for the demolition and replacement of structures at the Oyster Farm in Woolooware Bay (Lesryk Environmental, 2021). ELA specifically targeted the presence of the threatened *Myotis macropus* (Southern Myotis) and found suitable foraging, roosting and potential maternity habitat within the mangrove community (approximately 150m east of the Site). This survey confirmed microbat use of hollows in *Avicennia marina* subsp. *australasica* (Grey Mangrove). Only one other non-threatened microbat species was detected by ELA, this being *Chalinolobus gouldii* (Gould's Wattle Bat). Gould's Wattle Bat is not listed as a threatened species.

Lesryk Environmental detected several microbat species at the Oyster Farm approximately one kilometre to the east of the Site. Of these only one is listed as threatened, *Miniopterus orianae oceanensis* (Large Bent-winged Bat) (pers.comm D.Engyl, 2023). The Large Bent-winged Bat is a cave dwelling species and was recorded at least 2.5 hours after sunset, which indicated the species to be visiting the location and not using any structures for roosting habitat (pers.comm D.Engyl, 2023).

5. Prescribed impacts

Prescribed impacts include those impacts on the habitat of threatened species or ecological communities from development that is not directly caused by vegetation clearing.

Application of the streamlined BAM module for planted native vegetation does not preclude the requirement to consider efforts to avoid and minimise and assess prescribed impacts which are identified in Clause 6.1 of the BC Reg.

Table 5-1 lists the prescribed impacts, and the relevance of each prescribed impact in relation to the proposal.

Table 5-1. Prescribed impacts summary table

Feature	Present	Description of feature characteristics and location
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒No	Not relevant. Features are not present within or proximal to the Site.
Human-made structures	☒Yes / ☐No	Relevant. Human made structures will be demolished during the construction phase of the proposal. Several access points for microchiropteran bats were identified in buildings that will be demolished.
Non-native vegetation	☒Yes / ☐No	Relevant. Non-native vegetation occurring within the Site may provide some low-value habitat for native fauna species, including threatened birds and bats, on occasion. Impacts to non-native vegetation would occur during the construction phase of the project.
Habitat connectivity	☒Yes / ☐No	Relevant. The Site is located adjacent to estuarine habitat within Woolooware Bay. Limited connectivity is provided to the east, west and south of the Site. Native and non-native landscape vegetation will be cleared during the construction phase of the project.
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	Relevant. The Site is located within the catchment of Woolooware Bay, has a relatively shallow water table, and the proposal includes construction and operation of a new stormwater outlet.
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	Not relevant. The proposal does not involve wind farming.

Feature	Present	Description of feature characteristics and location
Vehicle strikes	☐Yes / ☒No	Not relevant. The potential for vehicle strike is unlikely to increase above that which currently exists.

5.1.1 Human-made structures

5.1.1.1 Nature

All microbats require roost sites for both day and night-time resting, predator protection, social contact and breeding. Individual species are very specific in their choice of roost sites ranging from hollows and cavities in trees to rock overhangs, caves and subterranean tunnels. They may also use stormwater culverts, flood mitigation structures and the underside of timber and concrete bridges and buildings. These sites often alternate due to different weather, seasons or even on a daily basis (ELA 2022).

Results from microbat roost surveys conducted by both ELA (2022) and écologique have indicated that potential roosting habitat in the Site's buildings are of low quality.

Results from microbat surveys proximal to the Site indicate that higher quality roosting habitat is provided in. It is more likely that microbats would preference naturally occurring habitat than that provided by a built substitute.

5.1.1.2 Extent

Buildings inspected by ELA have since been demolished with new buildings constructed that do not provide roosting habitat. Impacts to these human-made structures are not able to be avoided as part of the project.

5.1.1.3 Duration

Should there be any roosting habitat in buildings being demolished, the development would thereby represent a permanent residual impact.

5.1.1.4 Threatened Entities Affected

Due to the availability of higher quality and naturally occurring habitat for microbats in hollow bearing mangroves surrounding the bay, it is unlikely that threatened entities will be affected by the demolition of these structures.

5.1.1.5 Consequences

Impacts from the demolition of the buildings on potential microbat roost habitat is anticipated to be a very low risk. Notwithstanding, the potential to disturb roosting habitat will be minimised through the implementation of pre-demolition surveys that would coincide with ecologist pre-clearance surveys (see Section 7).

5.1.2 Non-native vegetation

5.1.2.1 Nature

The Site contains 2.3 ha of exotic vegetation, which is largely made up of mown lawn (1 ha), garden beds and landscaping surrounding buildings and car parks. Exotic trees are dominated by a range of palms (such as Cocos, Washington, Alexandrea and Canary Island Date Palms) and lesser widespread ornamentals such as Magnolia. A large number of Washington Palms and a smaller number of Canary Island Date Palms and occasional native trees are exhibiting dieback suspected to be Fusarium wilt.

This vegetation may provide foraging habitat for threatened birds and bats, on occasion (i.e., when palms are fruiting).

5.1.2.2 Extent

The proposal will result in the removal of up to 1.3 ha of exotic vegetation, which is largely made up of the palm species discussed above. An additional 1.0 ha of turfed areas would also be removed.

5.1.2.3 Duration

Impacts to non-native vegetation would occur during the construction phase of the project. The removal of the non-native vegetation is a long-term impact.

5.1.2.4 Threatened Entities Affected

The habitat provided by non-native vegetation may provide some foraging habitat for ecosystem species, such as microchiropteran bats, birds and the Grey-headed flying-fox, which may forage on palms when fruiting.

5.1.2.5 Consequences

The proposal will result in a reduction in non-native vegetation by 1.3 ha and an additional 1.0 ha of turf., which is not considered to significantly impact upon any potentially affected threatened entities. The non-native vegetation comprises marginal to sub-optimal foraging habitat and other areas of suitable habitat, in the form of extensive vegetated foreshore areas and nature reserves associated with the Bay.

Fusarium wilt is a soil born pathogen known as '*Fusarium oxysporum*', which affects species of palms and is fatal. The only known way to prevent spread is by removing diseased palms and other palms which are susceptible to the disease.

The proposed landscape plan for the development will replace diseased palms with a diverse range of trees providing greater protection to trees from pathogen attacks in the future.

5.1.3 Waterbodies, water quality and hydrological processes

5.1.3.1 Nature

The Site does not contain any surface drainage channels or natural watercourses. Currently stormwater runoff from the Site enters Woolooware Bay via three (3) stormwater outlets that discharge to a concrete channel immediately adjacent the northwestern boundary of the Site.

The existing stormwater system is outdated and does not comply with current hydraulic design standards required by the local Council.

Geotechnical investigations conducted by PSM (2023) found groundwater located between 1-4m below surface levels at the Site. While groundwater levels are likely to fluctuate and are largely controlled by water levels in the Bay, it is likely that higher groundwater levels associated with periods of wet weather could occur (PSM, 2023).

The proposal involves the installation of a new stormwater connection to an existing concrete channel that drains to Woolooware Bay. The new stormwater connection is required to upgrade the current outdated system to one that complies with current hydraulic design standards.

Excavation and installation of a box culvert would be located within the Site's boundaries before connection to the channel. This new connection will require minor disturbance of the channel wall where the connection is made. This has the potential to impact the water quality for a short period and may result in sedimentation of the downstream ecological communities, key fish habitat and aquatic reserve.

There will be no basement in the proposed development. Piles may be installed to provide support for the column loads in the proposed multi-storey warehouse.

5.1.3.2 Extent

When the Site is developed, there will be increased hard surfaces and stormwater runoff, however there will be a reduction in pollutant load exported from the Site when compared to existing conditions. This is resulting in the Neutral or Beneficial Effect (NorBE) principle being applied to the development. The increased flow is considered to be negligible in its effects as the discharge is to a concrete lined channel

resulting in no scour or erosion of natural water course banks/beds. There is a net decrease in pollutant load from between 11% to 57% for nutrients, gross pollutants and total suspended solids, resulting in an increase in water quality to the Bay. Due to the nature of the activities on the Site, no sources that may detrimentally affect salinity and pH levels are present so these water quality parameters will not be impacted above which currently exists.

The proposed development will have negligible impact on the groundwater system as the potential for alteration of the groundwater system is envisioned to be relatively minor (PSM, 2003).

5.1.3.3 Duration

If not mitigated appropriately disturbance to groundwater and water quality may occur during the construction phase.

Changes to hydrology will be permanent if the development is constructed.

5.1.3.4 Threatened Entities Affected

The potential for threatened entities to be affected is considered a very low risk given the following aspects:

+ The high degree of construction control, provided by way of:
  - The existing developed nature of the site,
  - the defined excavation area for the culvert and ultimate receiving environment being an existing concrete channel, and
  - existing fenced and landscape buffer zone and adjacent pathway that separates the development from the bay and marine vegetation.
+ Proposed stormwater management measures (such as treatment devices, bio-retention basins and filters), which will result in a significant improvement in water quality above the current discharge.

5.1.3.5 Consequences

The proposal aims to result in a positive or beneficial impact through improved quality of stormwater discharging from the Site to the Bay.

To satisfy DCP water quality controls, the proposed development incorporates a treatment train approach to treat stormwater runoff prior to discharging into existing stormwater infrastructure. The proposed development area is approximately 60,000m^2 and will consist of treatment measures such as bio-retention basin, pit filter baskets, filter cartridge treatment chambers and rainwater tanks located throughout the development.

Additionally, the proposed development is aiming to achieve green star recognition through the implementation of potable water re-use and specific reduction targets in pollutants. By incorporating green star requirements, the reduction targets are higher than Council requirements, resulting in greater reduction in pollutant loads leaving the proposed development.

Section 6.2 of the DCP identifies that all developments must achieve a total of litter and organic matter greater than 50mm. According to the MUSICX modelling for the proposal, the proposed treatment train combination provides a significant reduction in gross pollutants, capturing litter and organic matter greater than 50mm and satisfying council's requirements.

6. Impact assessment

6.1 Avoid and minimise impacts

Application of the streamlined module for planted native vegetation does not preclude the requirement to consider efforts to avoid and minimise impacts in accordance with Section 7 of the BAM. In accordance with the Section 7.1.1 of the BAM, the impacts from clearing native vegetation and potential habitat have been avoided and / or minimised by clearing vegetation that lacks biodiversity values, is in the poorest condition and does not provide habitat of any importance for threatened species.

Through an iterative design process the proposed development footprint has, as far as practical, avoided clearing of native vegetation. Approximately 0.78 ha of native vegetation has been avoided, which equates to 60% of the total extent of native vegetation within the Site (at 1.29 ha).
Vegetation being retained comprises peripheral native trees along the eastern boundary and northeastern boundaries as well as native vegetation within the southwest and southeast corners of the Site (see Figure 6-1).

6.2 Direct impacts

Approximately 3.08 ha of vegetation will be cleared, which comprises approximately 74% exotic vegetation (see Figure 6-2).

As shown in Table 6-1, a large proportion (66%) of the impacted exotic vegetation comprises turf and hedges (se. A further 16% comprises palm species that should be removed to inhibit the spread of Fusarium wilt. The remaining 18% of the total exotic vegetation to be cleared comprises ornamental trees and shrubs.

Table 6-1. Vegetation to be cleared

Vegetation type	Area (ha)
Native	
Local native	0.07
Local non-local native mix	0.10
Non-local native	0.35
Subtotal native vegetation cleared	**0.51**
Planted tubestock (existing VMP area potentially impacted)	0.28
Total all potential native vegetation cleared	**0.79**
Exotic	
Hedge dominant	0.41
Palm dominant	0.35
Mixed trees/shrubs	0.20
Ornamental trees	0.23
Total exotic vegetation cleared	**1.19**
Turf	1.10
Total vegetation clearing	**3.08**



TripleTwoNine, Caringbah

Figure 6-1. Avoidance & minimisation

Site boundary

Vegetation avoided

Foreshore revegetation zone

Development footprint

N

écologique

Coordinate system: MGA Zone 56 (GDA 2020)

Image source: Nearmap 31 May 2023



TripleTwoNine, Caringbah

Figure 6-2. Vegetation clearing

écologique

7. Indirect impacts

7.1 Overview

Indirect impacts are those that do not directly affect the habitat or species within the Site but have the potential to interfere through indirect actions.

The potential for indirect impacts on the adjacent Towra Point Aquatic Reserve has been identified as a key area of concern by Council and the Department of Primary Industries (DPI Fisheries).

In the absence of adequate construction controls, and design consideration of operational impacts, the following indirect impacts could eventuate:

+ Construction (short term)
  - Decreased water quality through:
    - Sedimentation
    - Pollution from other contaminants (including accidental spills)
  - Introduction and spread of biosecurity risks
+ Operation (long term)
  - Changes in hydrology (see also Section 5.1.3)
  - Decreased water quality through:
    - Pollution from other contaminants
    - Accidental spills
  - Noise and light spill

7.2 Construction

7.2.1 Potential water quality impacts

7.2.1.1 Sedimentation

Sedimentation increases turbidity, which decreases light penetration and sediments can later settle back onto the waterbody bed potentially smothering aquatic flora and immobile fauna. Both decreased light penetration and smothering may affect photosynthesis and respiration of aquatic flora and fauna, therein potentially impacting on aquatic biota health.

Sediment is the most common water quality pollution associated with construction. Potential short term construction impacts are typically associated with earthworks and other activities that result in transport of sediments.

7.2.1.2 Contaminants

Another way that construction contamination can easily occur is if wastewater isn't appropriately managed or disposed of during activities such as painting; wet cutting, drilling and grinding of brick and stone; mixing concrete and grout; and cleaning worksites and equipment.

Operational impacts are more likely to be associated with accidental spills of contaminants that are soluble and not easily captured in the proposed stormwater treatment chains.

7.2.2 Water quality mitigation measures

7.2.2.1 Sedimentation

An Erosion, Sediment and Control Plan (ESCP) has been prepared by Sparks & Partners (15/09/2023), which details the proposed construction mitigation measures to prevent impacts to receiving waters. Drawings E0-CV-DA2101_Concept Sediment & Erosion Control Plan Sheets 1 to 3 illustrate the locations of

where stabilised site access, site stockpiles, mesh and gravel inlet filters and geotextile inlet filters will be located.

Providing the ESCP is implemented compliantly, and its efficacy monitored, it is considered that the risk of impacts from sedimentation would be low.

7.2.1.2 Contaminants

All works must be undertaken by competent contractors who have demonstrated experience and participated in relevant site inductions.

Sediment curtains and waste capture nets are to be installed around the location of the new stormwater outlet (prior to construction) within the concrete channel adjacent the Site.

Netting shall be of an appropriate pore size to enable the capture of fine particulate matter during the breakthrough works that involve breaching the concrete wall of the channel to connect the new outlet.

Hazchem and Marine spill kits must be made available for use in the control, containment and clean-up of chemical spills and any hydrophobic (water repelling) contaminant spills.

Should any visual signs i.e., spillages increased turbidity, fish kills, etc become evident, then works must cease and not recommence until the problem is identified and rectified.

Timing of works must avoid spring and larger king tides as well as periods of heavy rainfall to ensure that the works are able to be carried out within optimal conditions.

7.2.3 Potential biosecurity impacts

Biosecurity is the protection of the economy, environment and community from the negative impacts of pests and diseases, weeds and contaminants.

The Biosecurity Act introduces the premise that biosecurity is a shared community responsibility and introduces the legally enforceable concept of a General Biosecurity Duty (GBD). The GBD means that any person dealing with a biosecurity risk must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable).

Biosecurity risks relevant to the Project may include priority weeds and the potential introduction and spread of pathogens and disease.

The Greater Sydney Regional Strategic Weed Management Plan 2017-2022 (LLS 2019) identifies both State level and regionally determined priority weeds and high-risk activities. No listed priority weeds were observed within the Site.

Fusarium wilt is the most likely cause of death and decline occurring in palms and other species at the Site.

There is no commercially viable way to eradicate this pathogen from infested soil. Spores are effectively spread over long distances in infected soil attached to boots, vehicles and equipment, and in water. It can also be transferred in infected plant material, including seed.

There are numerous Fusarium species. *Fusarium oxysporum* f.sp. *canariensis* is associated with infection of Canary Island Date Palms, Washington Palm and also ginger[2]. This species is not listed as a prohibited matter under the Biosecurity Act but is a biosecurity matter that causes a biosecurity impact (by definition under the Biosecurity Act).

7.2.4 Biosecurity mitigation measures

The following mitigation measures should be implemented to ensure that the contractor's biosecurity duty is fulfilled and introduction of new weed infestations is prevented.

[2] Ginger growing beneath infected Washington Palms appears to be infected

- Hygiene protocols should be implemented to ensure that plant and machinery enter / leave the site clean to prevent the spread of weed species.
- Monitoring of the site and general surrounds for weed infestations should be undertaken by landscape contractors for the duration of the Project.
- Plants and landscape materials must be free of disease

7.2.4.1 Site inductions

Management, contractors and employees are required to fulfil their general biosecurity duty (GBD), which may simply be to ensure that their vehicles, boots and equipment are clean of any potential biosecurity risks.

It is expected that management, contractors and employees should know all biosecurity risks associated with the industry, business and relevant day-to-day work activities.

The presence or potential for biosecurity risks within the Site will be addressed at a project level during site inductions, and the biosecurity protocol below is to be presented to all contractors and its requirements made clear.

7.2.4.2 Biosecurity hygiene protocol

All contractors are to follow the hygiene protocol detailed below in Table 7-1 prior to clearing, during construction and post-construction.

Table 7-1. Hygiene protocols

Protocol	Timing
Pre-start site inductions:	
Relevant biosecurity risks are to be discussed during toolbox talks.	Pre-start
In general:	
+ Minimise work during wet/rainy periods. + Vehicle/machine hygiene inspections are to be undertaken prior to works starting to determine if vehicles are free from soil and plant material. + Tools to be cleaned free of soil and plant material prior to bringing tools to site or moving between works areas. + Permanent or semi-permanent vehicle wash-down facilities may be constructed where machinery and vehicles require routine cleaning for fixed activities + Truck wash down, rumble grids to be installed and operated to ensure mud, weeds or pathogens are not transported around the region or onto roads. + Mud spilt on roads to be immediately removed by a road sweeper.	At all times
Landscaping:	
Any soil, plants or other materials entering the site should conform to Australian Standards—for example, AS3743–2003 Potting mixes or AS4454–2012 Composts, soil conditioners and mulches.	At all times

7.3 Operation

7.3.1 Potential changes in hydrology

Impacts from changes in hydrology would be those associated with increased water quantity leaving the Site and / or interference with groundwater.

7.3.1.1 Water quantity

The proposed development is anticipated to inconsequentially increase the quantity of water leaving the Site. The negligible increase in Site runoff is considered unlikely to adversely affect the ecosystems and biota of Woolooware Bay.

Under Sections 1.3 & 5.3 of Chapter 38 of the SSCDCP 2015, development is to provide onsite stormwater detention (OSD) so that the post development rate of runoff from the Ste does not exceed the rate of runoff prior to the subject development occurring.

In this instance implementation of OSD is not proposed due to the surrounding flood extents within Woolooware Bay. As the site directly adjoins and discharges to Woolooware Bay, it is affected by tidal currents and flood waters, causing inundation to any OSD storage provided, and restriction of stormwater discharge due to existing tailwater conditions. Council has also been engaged prior to submission and expressed their support in the consideration to exclude OSD from the proposed development due to the site's surrounding conditions (Sparks & Partners 2003).

7.3.1.2 Groundwater

As discussed in Section 5 .1.3, groundwater is located between 1-4m below surface levels and likely to fluctuate under the influence of water levels in the Bay.

There will be no basement in the proposed development. Piles may be installed to provide support for the column loads in the proposed multi-storey warehouse. Excavation and installation of the proposes new box culvert may require management of groundwater during construction. However no long term changes in groundwater are anticipated from operation of the proposal.

7.3.2 Potential changes in water quality

The proposal aims to result in a positive or beneficial impact through improved quality of stormwater discharging from the Site to the Bay.

To satisfy DCP water quality controls, the proposed development incorporates a treatment train approach to treat stormwater runoff prior to discharging into existing stormwater infrastructure. The proposed development area is approximately 60,000m^2 and will consist of treatment measures such as bio-retention basin, pit filter baskets, filter cartridge treatment chambers and rainwater tanks located throughout the development.

Additionally, the proposed development is aiming to achieve green star recognition through the implementation of potable water re-use and specific reduction targets in pollutants. By incorporating green star requirements, the reduction targets are higher than Council requirements, resulting in greater reduction in pollutant loads leaving the proposed development.

Section 6.2 of the DCP identifies that all developments must achieve a total of litter and organic matter greater than 50mm. According to the MUSICX modelling for the proposal, the proposed treatment train combination provides a significant reduction in gross pollutants, capturing litter and organic matter greater than 50mm and satisfying council's requirements.

7.3.3 Potential impacts from noise & light spill

7.3.3.1 Noise

Animals rely on meaningful sounds for communication, navigation, avoiding danger and finding food against a background of noise. The effects of noise on most species are poorly understood and fauna will perceive noise impacts differently. Some fauna become stressed by noise, which can affect foraging or

breeding, or they may leave an area, whereas other species or populations do not seem to be affected or may adjust to noise over time (ELA 2013).

ELA assessed potential noise impacts on the mangrove system adjacent to the Woolooware Bay Town Centre in 2013 and concluded that the greatest risk of adverse impacts would be associated with the construction phase.

The Site does not require demolition or loud construction activities within the foreshore buffer zone. Providing construction noise is limited to daylight hours (avoiding peak fauna foraging periods at dawn, dusk and night-time are avoided) the risk of significantly impacting on adjacent fauna is considered low.

7.3.3.2 Light spill

Lighting required for the proposal where proximal to retained native vegetation and especially that located adjacent to the foreshore buffer zone shall be designed in accordance with available standards and guidelines for mitigating impacts on fauna habitat, which include but may not be limited to the following:

+ Commonwealth of Australia (2020) National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds; and
+ AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting recognises the impact of artificial light on biota.

The above guidelines provide a range of measures to minimise light spill impacts on fauna and fauna habitat. Examples include:

+ The use of recent advances in smart control technology options for better controlled and targeted artificial light management;
+ Ensuring that lighting is shielded and directed only to the intended object or area;
+ Ensuring that light intensity is appropriate for the target area using only the minimum number and intensity of lights needed to provide safe and secure illumination for the area at the time required to meet the lighting objectives; and
+ Consideration of the following lighting aspects:
    - high quality, low glare lighting, which enhances visibility for the user at night, reduces eye fatigue, improves night vision and delivers light where it is needed,
    - non-reflective, dark coloured surfaces,
    - reduced or filtered out blue, violet and ultraviolet wavelengths, which wildlife are sensitive to.

The potential impacts of light spill into the adjacent mangrove community are not anticipated to result in significant adverse effects above that which already exists.

Providing the final design of the proposal's lighting installations[3] incorporate the above and current best practice measures, the likelihood of light spill impacts on fauna and fauna habitat will be minimised as far as practical.

[3] the proposal's current lighting design ensures that all lighting shall be downward facing distribution type to comply with zero upward lighting requirements, and subsequently reduce light glare when viewed from above by nocturnal fauna in flight. The guidelines discussed should be incorporated into the final full lighting design submitted for compliance

Appendix A. Historical imagery



1950

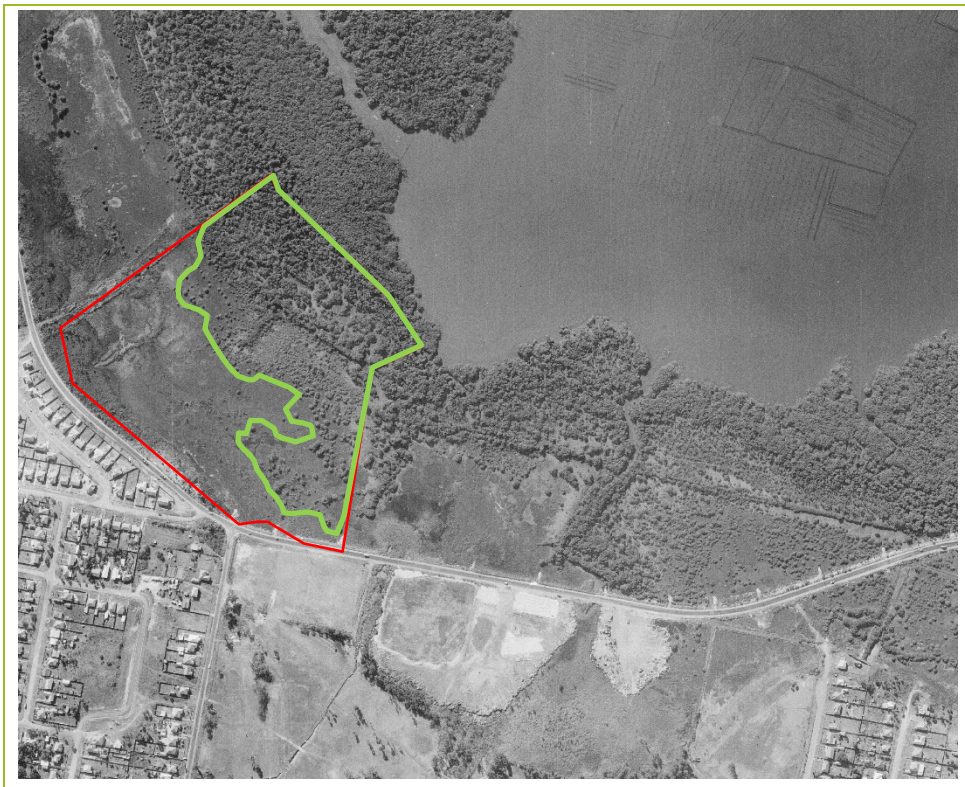
Pre-estuarine reclamation.



1955

Pre-estuarine reclamation

Road construction evident along southern boundary of Site



1960

Pre-estuarine reclamation

Development evident to south of Site.

Estuarine habitat south of road reclaimed



1969

Estuarine reclamation completed with mangroves in Bay substantially decreased.

Extent on Site shown green outline.



1979

Captain Cook Drive upgraded.

Site still vacant.



1989

Toyota building evident.

Planted *Casuarina glauca* evident in southwest and southeast corners of Site.

Solander Playing Field established



1993

Additional building in southeast site portion evident and further planting evident.



2004

Extent of existing buildings, car parks and landscaping evident.

Formal foreshore pathway along Bay established.

Appendix B. Photo plates

Bat roost – potential entry points

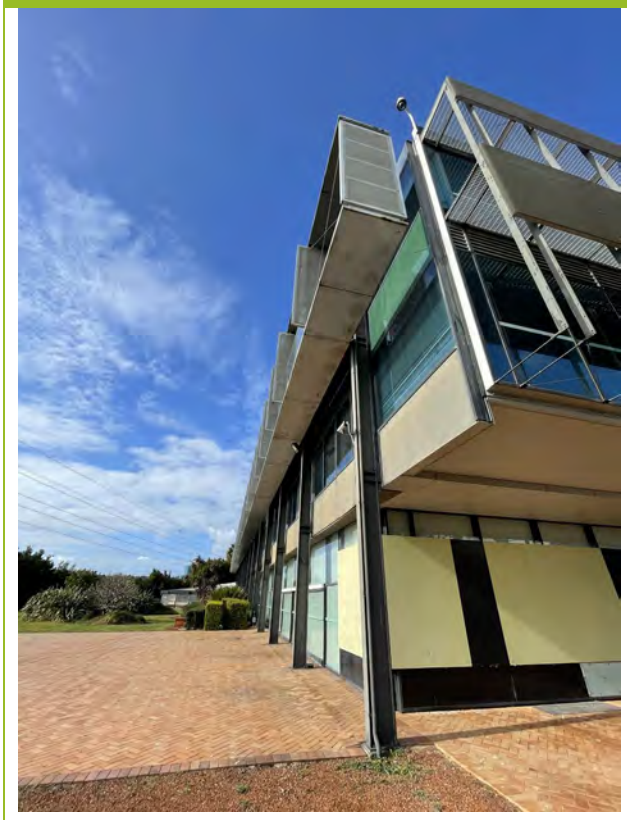


Photo plate 1: Existing building in northwestern site portion



Photo plate 2: Close up of gap (in bldg photo plate 1) providing potential access to building cavity

Bat roost – potential entry points



Photo plate 3: Gap in panelling (building in photo plate 1)



Photo plate 4: Example of entry into brick wall cavities



Photo plate 5: various gaps available in building marqui (attached to building in photo plate 1)

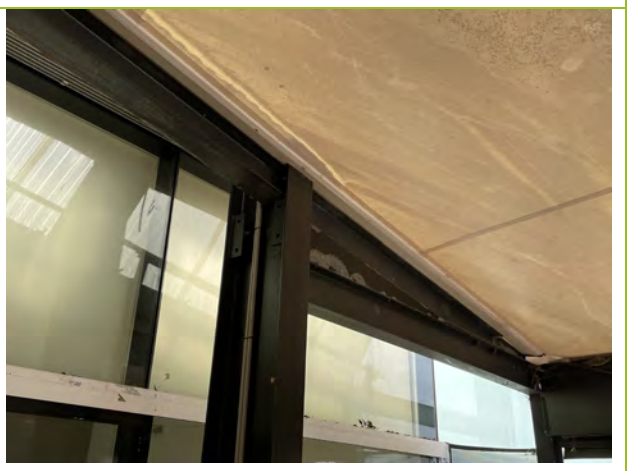


Photo plate 6: various gaps available in building marqui (attached to building in photo plate 1)

Site vegetation



Photo plate 7: Stand of Washington palms exhibiting dieback most likely attributed to Fusarium wilt.



Photo plate 8: Stand of Washington palms exhibiting dieback most likely attributed to Fusarium wilt.



Photo plate 9: Car park vegetation showing planted eucalypts in high densities surrounding by hedging



Photo plate 10: Building carpark vegetation showing planted eucalypts in high densities in garden bed

Site vegetation



Photo plate 11: Car park vegetation along eastern boundary of Site, dominated by non-local *Callistemon viminalis*



Photo plate 12: Planted *C.viminalis* in foreground, larger native tree in background located in Solander Park.



Photo plate 13: Eastern boundary to site showing planted native spotted gums (Corymbia maculata) being retained



Photo plate 14: Southeastern corner of Site at junction of southern boundary. Patch of Casuarina glauca in background on right

Site vegetation



Photo plate 16: Southeastern corner of Site



Photo plate 17: Entrance to Site



Photo plate 18: Entrance to building in southeastern site portion

Site vegetation



Photo plate 19: Mixed native and exotic plantings in southern site portion



Photo plate 20: Mixed native and exotic plantings in southern site portion



Photo plate 21: Phoenix palm dieback along Endeavour Rd frontage



Photo plate 22: Extensive turf and hedging in southern site portion

Site vegetation



Photo plate 23: Electricity staunchion, native vegetation in background to be retained



Photo plate 24: Area adjacent electricity staunchion to be cleared and become foreshore buffer zone



Photo plate 25: Mid-northern site portion to be cleared and foreshore buffer zone created



Photo plate 26: Native planted vegetation on left being retained, turf and palms to be cleared and foreshore buffer zone created

Site vegetation



Photo plate 27: Northeastern most extent of existing VMP zone



Photo plate 28: Northwestern most extent of existing VMP zone



Photo plate 29: VMP zone showing shared pedestrian path and mangroves in background



Photo plate 30: VMP zone showing electricity easement overhead

Site vegetation



Photo plate 31: Canal adjacent to Site (looking upstream)



Photo plate 32: Canal adjacent to Site (looking downstream)

Appendix C. Habitat summary tables

Threatened species habitat summary table

ScientificName	CommonName	BC Act	EPBC Act	Habitat requirements at subject site
Amphibia				
Pseudophryne australis	Red-crowned Toadlet	V		**Habitat absent: i.e.**, inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings, mostly on Hawkesbury and Narrabeen Sandstones. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter.
Litoria aurea	Green and Golden Bell Frog	E	V	**Habitat absent: i.e.,** inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum habitat includes waterbodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available.
Aves				
Botaurus poiciloptilus	Australasian Bittern	E	E	**Habitat absent:** i.e., favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.
Circus assimilis	Spotted Harrier	V		**Habitat absent:** i.e., occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.
Daphoenositta chrysoptera	Varied Sittella	V		**Habitat absent**: i.e., inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.
Epthianura albifrons	White-fronted Chat	V		**Habitat absent:** i.e., usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation. Nests in the Sydney region have also been seen in low isolated mangroves.

Threatened species habitat summary table

ScientificName	CommonName	BC Act	EPBC Act	Habitat requirements at subject site
Esacus magnirostris	Beach Stone-curlew	E		**Limited distribution:** i.e., occupies coastlines from about Point Cloates in Western Australia, across northern and north-eastern Australia south to north-eastern NSW, with occasional vagrants to south-eastern NSW and Victoria. In NSW, the species occurs regularly to about the Manning River, but recent records show a breeding pair is known from the Port Stephens area (Dowadee Island and Soldiers Point [mid-north coast]) and more recently the species has been recorded at Whale Beach in Twofold Bay near Eden. These new records extend the known limit of the normal range of the species in Australia to the far south coast of NSW. Surveys in 2000 put the NSW population at a minimum of 13 adult birds. **Habitat absent: i.e.,** found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves.
Glossopsitta pusilla	Little Lorikeet	V		**Marginal foraging habitat**: i.e., forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited.
Haematopus fuliginosus	Sooty Oystercatcher	V		**Habitat absent:** i.e., favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories.
Haematopus longirostris	Pied Oystercatcher	E		**Habitat absent:** i.e., favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.

Threatened species habitat summary table

ScientificName	CommonName	BC Act	EPBC Act	Habitat requirements at subject site
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		**Habitat absent:** i.e., occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead
Ixobrychus flavicollis	Black Bittern	V		**Habitat absent**: i.e., inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds.
Lathamus discolor	Swift Parrot	E	CE	**Marginal foraging habitat**: i.e., summer visitor from Tasmania, favoured food trees include Corymbia maculata, which is present on the Site. Site not mapped as important habitat area for the species.
Ninox strenua	Powerful Owl	V		**Habitat absent:** i.e., a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation. Requires tree hollows for breeding
Onychoprion fuscata	Sooty Tern	V		**Habitat absent:** i.e., found over tropical and sub-tropical seas and on associated islands and cays around Northern Australia. In NSW only known to breed at Lord Howe Island. Occasionally seen along coastal NSW, especially after cyclones. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands.
Pandion cristatus	Eastern Osprey	V		**Habitat absent:** i.e., favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.

Threatened species habitat summary table

ScientificName	CommonName	BC Act	EPBC Act	Habitat requirements at subject site
Rostratula australis	Australian Painted Snipe	E	E	**Habitat absent:** i.e., prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.
Tyto novaehollandiae	Masked Owl	V		**Habitat absent :** i.e., dry eucalypt forests and woodlands from sea level to 1100 m. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.
Mammalia				
Cercartetus nanus	Eastern Pygmy-possum	V		**Habitat absent / degraded: i.e.,** found in a broad range of habitats, but in most areas woodlands and heath appear to be preferred. Shelter in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Such habitat is either absent or highly degraded due to the managed curtilage within the subject land.
Miniopterus australis	Little Bent-winged Bat	V		**Breeding habitat absent:** i.e., caves, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature. Roosting habitat identified as marginal, low quality and unlikely
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		**Breeding habitat absent:** i.e., caves, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature. Roosting habitat identified as marginal, low quality and unlikely
Myotis macropus	Southern Myotis	V		**Habitat absent:** i.e., generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.
Phascolarctos cinereus	Koala	E	E	**Habitat degraded:** i.e., urbanised area unsuitable for sustaining the species
Pseudomys novaehollandiae	New Holland Mouse		V	**Habitat absent:** i.e., known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes

Threatened species habitat summary table

ScientificName	CommonName	BC Act	EPBC Act	Habitat requirements at subject site
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	**Potential (marginal) foraging habitat:** i.e., palm trees when in fruit
Scoteanax rueppellii	Greater Broad-nosed Bat	V		**Potential (marginal) roosting habitat:** i.e., utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.

Migratory species habitat summary table

Species name	Common name	Habitat	Likelihood of occurrence
Actitis hypoleucos	Common Sandpiper	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	Unlikely
Apus pacificus	Fork-tailed Swift	Recorded in all regions of NSW. Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	Unlikely
Ardenna carneipes	Flesh-footed Shearwater	Recorded in NSW coastal waters. Breeds on Lord Howe Island. Marine.	Unlikely
Ardenna grisea	Sooty Shearwater	Breeds on islands off NSW from Montague Island to Broughton Island. Present off eastern NSW mainly October-February. Islands, offshore.	Unlikely
Ardenna pacificus	Wedge-tailed Shearwater	On eastern coast of Australia, breeds on islands including Montague Island, Lord Howe Island and Norfolk Island. Observed coastal NSW. Islands, offshore.	None
Ardenna tenuirostris	Short-tailed Shearwater	Breeds on islands north to Broughton Island off NSW. Commonly observed south of coastal northern NSW during summer. Islands, offshore.	None
Arenaria interpres	Ruddy Turnstone	Summer migrant to most coastal regions, with occasional records inland, including in NSW. Tidal reefs and pools; pebbly, shelly and sandy shores; mudflats; inland shallow waters; sewage ponds, saltfields; ploughed ground.	Unlikely
Calidris acuminata	Sharp-tailed Sandpiper	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	Unlikely
Calidris alba	Sanderling	Occur along the NSW coast, with occasional inland sightings. Arrives from September and leaves by May (some may overwinter in Australia). Coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and lagoons; rarely recorded in near-coastal wetlands.	None

Migratory species habitat summary table

Species name	Common name	Habitat	Likelihood of occurrence
Calidris canutus	Red Knot	Summer migrant to Australia. In NSW, widespread in suitable habitat along the coast. Occasionally recorded inland in all regions. Intertidal mudflats, sandflats sheltered sandy beaches, estuaries, bays, inlets, lagoons, harbours, sandy ocean beaches, rock platforms, coral reefs, terrestrial saline wetlands near the coast, sewage ponds and saltworks. Rarely inland lakes or swamps.	Unlikely
Calidris ferruginea	Curlew Sandpiper	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Unlikely
Calidris melanotos	Pectoral Sandpiper	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and Lower Western regions. Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Unlikely
Calidris ruficollis	Red-necked Stint	Summer migrant to Australia, widespread coastal and inland NSW. Tidal mudflats, saltmarshes, sandy and shelly beaches, saline and freshwater wetlands, saltfields, sewage ponds.	Unlikely
Calidris subminuta	Long-toed Stint	Summer migrant to Australia. Widely scattered irregular records in NSW: the estuary of the Richmond River, Kooragang Island, Pitts Town Lagoon, McGrath's Hill, Bushell's Lagoon, the Hawkesbury River, Shell Point, Botany Bay, Parkes, Fivebough Swamp, Tullakool Saltworks, Dareton, Mortanally Billabong, Wentworth and Cobar. Coastal and inland shallow wetlands, sewage ponds, tidelines, tidal mudflats.	Unlikely
Calidris tenuirostris	Great Knot	In NSW, recorded at scattered sites along the coast down to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith. Intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons.	Unlikely
Caretta caretta	Loggerhead Turtle	In NSW, seen in coastal waters as far south as Jervis Bay and have been recorded nesting on the NSW north coast and feeding around Sydney. Marine. Nesting occurs on beaches.	None

Migratory species habitat summary table

Species name	Common name	Habitat	Likelihood of occurrence
Charadrius leschenaultii	Greater Sand- plover	In NSW, recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	Unlikely
Charadrius mongolus	Lesser Sand- plover	Summer migrant to Australia. Found around the entire coast but in NSW most common on north coast. Rarely recorded south of the Shoalhaven estuary, and there are few inland records. Almost entirely coastal in NSW, using sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats, sandy beaches, coral reefs and rock platforms.	Unlikely
Diomedea antipodensis	Antipodean Albatross	Regularly occurs off the NSW south coast from Green Cape to Newcastle during winter. Marine.	None
Diomedea exulans	Wandering Albatross	Has been recorded along the length of the NSW coast. Marine.	None
Diomedea gibsoni	Gibson's Albatross	Regularly occurs off the NSW coast usually between Green Cape and Newcastle. Marine.	None
Egretta sacra	Eastern Reef Egret	Coast and islands of most of Australia, including NSW. Beaches, rocky shores, tidal rivers and inlets, mangroves, and exposed coral reefs.	Unlikely
Fregetta grallaria grallaria	White-bellied Storm-Petrel	Vagrant birds occur in coastal NSW waters, particularly after storm events. Marine.	Unlikely
Gallinago hardwickii	Latham's Snipe	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	Unlikely
Hydroprogne caspia	Caspian Tern	Widespread in coastal and inland NSW. Coastal offshore waters, beaches, mudflats, estuaries, rivers, lakes.	Unlikely

Species name	Common name	Habitat	Likelihood of occurrence
Limicola falcinellus	Broad-billed Sandpiper	Occur occasionally on the southern Australian coast. In NSW, mainly recorded in Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary. There are few records for inland NSW. Sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs.	Unlikely
Limosa lapponica	Bar-tailed Godwit	Summer migrant to Australia. Widespread along the coast of NSW, including the offshore islands. Also numerous scattered inland records. Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	Unlikely
Limosa limosa	Black-tailed Godwit	Arrives in August and leaves in March. In NSW, most frequently recorded at Kooragang Island, with occasional records elsewhere along the coast, and inland in the Murray-Darling Basin, on the western slopes of the Northern Tablelands and in the far north-western corner of the state. Usually sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found around muddy lakes and swamps.	Unlikely
Macronectes giganteus	Southern Giant Petrel	Common visitor off the coast of NSW. Marine.	Unlikely
Macronectes halli	Northern Giant-Petrel	Common visitor in NSW waters, predominantly along the south-east coast during winter and autumn. Marine.	Unlikely
Numenius madagascariensis	Eastern Curlew	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	Unlikely
Numenius minutus	Little Curlew	Summer migrant to Australia. In NSW, most records scattered east of the Great Dividing Range, from Casino, south to Greenwell Point with a few scattered records west of the Great Dividing Range. Dry grasslands, open woodlands, floodplains, margins of drying swamps, tidal mudflats, airfields, playing fields, crops, saltfields, sewage ponds.	Unlikely

Migratory species habitat summary table

Species name	Common name	Habitat	Likelihood of occurrence
Numenius phaeopus	Whimbrel	Summer migrant to Australia. Found along almost the entire coast of NSW; scattered inland records. Estuaries, mangroves, tidal flats, coral cays, exposed reefs, flooded paddocks, sewage ponds, grasslands, sports fields, lawns.	Unlikely
Plegadis falcinellus	Glossy Ibis	Recorded over much of NSW. Spring/summer breeding migrant to southern Murray-Darling region and Macquarie Marshes. Edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. Occasionally estuaries, deltas, saltmarshes and coastal lagoons.	Unlikely
Pluvialis fulva	Pacific Golden Plover	Regular widespread summer migrant to Australia, including coastal NSW, Lord Howe and Norfolk Island. Estuaries, mudflats, saltmarshes, mangroves, rocky reefs, inland swamps, ocean shores, paddocks, sewage ponds, ploughed land, airfields, playing fields.	Unlikely
Pluvialis squatarola	Grey Plover	Regular summer migrant to coastal Australia, including NSW. Rarely inland, on passage. Mudflats, saltmarsh, tidal reefs and estuaries.	Unlikely
Sterna hirundo	Common Tern	Regular summer migrant to northern and eastern coastal Australia, including coastal NSW. Also scattered inland records. Offshore waters, ocean beaches, estuaries, large lakes. Less commonly freshwater swamps, floodwaters, sewage farms and brackish and saline lakes.	Unlikely
Sternula albifrons	Little Tern	In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria. Sheltered coastal environments, harbours, inlets and rivers.	Unlikely
Tringa nebularia	Common Greenshank	Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	Unlikely

Appendix D. Test of Significance

Appendix D. Test of Significance

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The proposed development will not result in an adverse effect on any threatened species. The Site at best may provide marginal foraging habitat for mobile bat and bird species but does not provide breeding habitat for any threatened species. As such the proposed redevelopment is considered highly unlikely to significantly impact on any species life cycle.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable, the proposal does not involve any adverse effects on an endangered ecological community.

c. in relation to the habitat of a threatened species or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

The proposal will not remove any vegetation that is part of an endangered ecological community or remove habitat that would be of importance to any threatened species.

It is considered highly unlikely that any threatened or migratory species would preferentially forage on the marginal and limited resources provided by the Site's landscaping over the extensive estuary and nature reserves proximal to the Site.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

Not applicable. There are no declared areas of outstanding biodiversity value in the locality.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process (KTP).

The proposal does involve clearing of native vegetation which is a listed KTP, however this is within the context of a highly developed and modified environment and will not impact on naturally occurring communities or significantly impact on wildlife habitat.

Appendix E. Fisheries letter

Department of Primary Industries
Department of Regional NSW

C23/524
28 August 2023

Kat Duchatel
12 Wanganella Street
Balgowlah NSW 2093

Re: Consultation TripleTwoNine Caringbah Masterplan – 13 Endeavour Road, Caringbah – Lot 2 DP 714965

Dear Kat,

Thank you for seeking pre-lodgement consultation advice with Fisheries on 21 July 2023 on the abovementioned proposal, a division of NSW Department of Primary Industries on the proposed works stated above.

DPI Fisheries is responsible for ensuring that fish stocks are conserved and that there is no net loss of key fish habitats upon which they depend. To achieve this, DPI Fisheries ensures that developments comply with the requirements of the FM Act (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act, respectively), and the associated *Policy and Guidelines for Fish Habitat Conservation and Management (2013)*. DPI Fisheries is also responsible for ensuring the sustainable management of commercial, recreational and Aboriginal cultural fishing, aquaculture, marine parks and aquatic reserves in NSW.

Key fish habitat (KFH) is defined in sections 3.2.1 and 3.2.2 of the Policy and Guidelines for Fish Conservation and Management (P&Gs). Towra Point Aquatic Reserve is a Class 1 waterway that supports a diverse range of KFH including highly sensitive coastal wetlands and coastal saltmarsh (classified as TYPE 1 KFH). Best practice development of this site should ensure the maintenance and improvement of key fish habitat by:

- protection and improvement of riparian habitat values;
- protection of aquatic habitat; and
- protection or improvement of water quality through water sensitive urban design, adequate stormwater treatment and best practice erosion and sediment control measures during construction.

DPI Fisheries has met with representatives from Aliro Group and Ecologique and reviewed the "Project Introduction" information provided in light of those provisions. DPI Fisheries has no objections to the lodgement of a DA for this proposal and provides the following recommendations based on the discussion at the meeting 21/07/2023:

1. Towra Point Aquatic Reserve is adjacent to the proposed site. Application of the *Environmental Planning & Assessment Act 1979* for development affecting / in the locality of

aquatic reserves is set out in s56 of the *Marine Estate Management Act 2014* including obligations for consent authorities and determining authorities. DPI Fisheries should be consulted during the DA assessment.

2. Erosion and sedimentation impacts during the land forming and development of the area presents a significant risk to key fish habitat values. DPI Fisheries recommends that these works are staged to minimise the area of exposed earth in forming these areas and that best practice erosion and sedimentation controls are implemented during each stage of the development of this site.
3. The proposed site interface with Towra Point Aquatic reserve includes a landscaped buffer zone. Generally, it is recommended that buffer zone widths be maintained as outlined in DPI Fisheries P&Gs s.3.2.4.2, for TYPE 1 marine vegetation a buffer zones of between 50- 100m is preferred. It is understood that the buffer zone for this proposal is aligned with Sutherland Shire Council's foreshore building line.
4. Local native riparian vegetation species should be used across the buffer zone to improve riparian habitat values.
5. Towra Point Aquatic Reserve is mapped coastal wetland under the SEPP (resilience and Hazards). Parts of the proposed site are mapped coastal wetland proximity area. It is important that the proposed development does not impact the biophysical, hydrological or ecological integrity of the adjacent habitats. DPI Fisheries strongly encourages the use of best practice water sensitive urban design to manage stormwater. Stormwater treatment measures used are to be maintained according to manufacturers and best practice maintenance requirements over time to ensure there are no downstream impacts to highly sensitive KFH.

This letter may be forwarded to Sutherland Shire Council for their consideration in assessing your development application. DPI Fisheries will consider final consent status for the proposal when Council sends us the Integrated Development Application. If you require any further information, please contact me on jess.hyland@dpi.nsw.gov.au.

Yours sincerely,



Jess Hyland

Fisheries Manager, Coastal Systems

DPI Fisheries



Appendix C Aboricultural Impact Assessment

Construction Environmental Management Plan (CEMP)

TripleTwoNine Endeavour Road, Caringbah

Aliro Group Pty Ltd

SLR Project No.: 630.031866.00001

31 October 2024

GREEN TREE
CONSULTANCY

Arboricultural Consultancy Professionals

Arboricultural Impact Assessment

TripleTwoNine Project

Site Details:

Lot 2 / DP 714965

13 Endeavour Road,
Caringbah
NSW 2229

Client:

Aliro Group Pty Ltd
C/- Andrew Whiteman

Level 38
Gateway
1 Macquarie Place
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Date: 10 October 2023
Version: 2.1
Document Ref: AIA-P107-V2.0

1 Summary

1.1.1 Green Tree Consultancy (GTC) have been engaged by Andrew Whiteman of Aliro Group Pty. Ltd. to prepare an Arboricultural Impact Assessment (AIA) report associated with the development proposal known as the "TripleTwoNine" project.

1.1.2 This report forms version 2.0 of the AIA subsequent to a preliminary AIA report based off of the concept masterplan design.

1.1.3 This report has been compiled to provide assessment and determination of the development impacts upon the site trees based off the final design provided to GTC by the client.

1.1.4 The subject site is legally classified as Lot 2 / DP 714965 located at 13 Endeavour Road, Caringbah NSW 2229.

1.1.5 Assessment of the trees was undertaken on 14, 15, 19 and 20 June 2023 by Joe Floyd & Tom Hare.

1.1.6 Arboricultural assessment of the tree(s) was undertaken utilising elements of the *Visual Tree Assessment procedure* (VTA) framework (Claus Mattheck, 1994), by qualified and experienced consulting arborists employing industry best practice methodologies.

1.1.7 A total of eight-hundred and forty-four (844) trees were subject to assessment for the purposes of compiling this report.

1.1.8 A detailed Tree Inspection Schedule has been included within this report and can be found in section - **Appendix 3: Tree Schedule**.

1.1.9 The inspection schedule documents all arboricultural observations and data for the subject trees obtained at the time of assessment.

1.1.10 The tree population consists of an extensive mix of species, inclusive of both Australian native and introduced species. Tree health and condition evidently varies throughout the site, however the overall rating for the tree population was fair-good health and fair structural condition.

1.1.11 The current proposal has been subject to ongoing consultation and revision since the initial concept design. The process has aimed to mitigate impacts to the site trees where practicable with a focus on the concerns raised by Council at the Pre-DA stage.

1.1.12 The review process has resulted in a significantly improved design, demonstrating feasibility for far greater tree retention numbers than originally proposed, particularly with respect to the perimeter trees.

1.1.13 Tree mapping has been developed to show the location, retention value, TPZ's and SRZ's of the subject trees in relation to the site.

1.1.14 Additional plans have been compiled to overlay this data onto the site plans to enable assessment and oversight of the proposed development impacts upon the trees.

1.1.15 A detailed Impact Assessment was compiled as part of this report to assess the impacts imposed upon the subject trees from the proposal.

1.1.16 The assessment looked at each tree or tree group at an individual level, and considered the type, level and severity of impact(s) upon the tree(s) to determine the feasibility of available mitigation measures.

1.1.17 The assessment results determined the following tree retention and removal outcomes should the development proceed:

- Four-hundred and fifty-nine (459) trees will require removal should the current proposal proceed.
- One (1) tree should be removed regardless of the development due to its hazardous form (Tree 35).
- Three-hundred and eighty-four (384) trees are viable for retention under the current design.

1.1.18 Detailed recommendations have been included within the report to guide tree removal, retention and protection requirements.

1.1.19 This report does not in any part count as consent for the recommendations contained within. Any tree pruning or removal works must only be undertaken following approval from the consent authority.

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3 Introduction

3.1 Background

3.1.1 Green Tree Consultancy (GTC) have been engaged by Andrew Whiteman of Aliro Group Pty. Ltd. to prepare an Arboricultural Impact Assessment (AIA) report associated with the development proposal known as the "TripleTwoNine" project.

3.1.2 This report forms version 2.0 of the AIA subsequent to a preliminary AIA report based off of the concept masterplan design.

3.1.3 Consultation between the design team and GTC has been undertaken since the development of the concept design, with the aim of achieving an outcome that results in the retention of the most appropriate trees where practicable within the constraints of the project objectives.

3.1.4 This report has been compiled to provide assessment and determination of the development impacts upon the site trees, based off the final design that has been provided to GTC by the client.

3.2 The Proposal

3.2.1 This DA seeks approval for a mixed-use warehouse and distribution, light industrial, commercial, child care and café development known as TripleTwoNine, 13 Endeavour Road, Caringbah, operating 24 hours 7 days a week.

3.2.2 The works involve demolition of some existing buildings and propose construction of eight new buildings in a staged manner. Specifically, this development proposes the following:

- Retention of existing Buildings 1 and 2 at the northern portion of the site
- Staged early works for each proposed new building, including:
- Demolition of existing structures, buildings, and hardstand including removal of trees
- Site establishment and preparation including earthworks, construction of stormwater and services infrastructure, and augmentation of utilities as required
- Staged construction and occupation of 8 new buildings for warehouse and distribution and light industrial uses, with ancillary supporting office, 68-place child care centre and food and drink premises.
- Provision of car parking.
- Operation of the site 24 hours per day, 7 days a week.
- Landscaping works and estate domain works including estate roads and footpaths
- Estate wayfinding signage
- Dedication of land relating to the Captain Cook Drive roundabout, and a right of way for the access road linking the Solander Fields Car Park to Captain Cook Drive

Further detail of the proposal can be acquired by review of the project designs as detailed within Table 1 below.

3.3 Scope

3.3.1 The scope of the report was to inspect and assess all trees located within and adjacent to the subject site that had the potential to be impacted by the proposed development. Assessment was to include quantitative and qualitative arboricultural information for the subject trees to determine tree significance and retention value(s).

3.3.2 This information was to be utilised in the preparation of the Impact Assessment, which aims to identify the impacts of the proposed development upon the subject trees and determine appropriate mitigation measures to enable the retention of significant trees where feasible.

3.3.3 The report aims to provide accurate recommendations for the resulting tree removal, retention and protection requirements.

3.3.4 The report has been prepared in accordance with the requirements of AS4970-2009: *Protection of Trees on Development Sites* (Standards Australia, 2009).

3.3.5 The following planning and legislative guidelines have been considered in the preparation of this report.

- State Environmental Planning Policy 2021 (SEPP) Biodiversity & Conservation; Chapter 2- Vegetation in non-rural areas
- Sutherland Shire Local Environmental Plan (LEP) 2015
- Sutherland Shire Development Control Plan (DCP) 2015
- Sutherland Shire Council Urban Tree & Bushland Policy 2021
- Australian Standard AS4970-2009 'Protection of trees on development sites' (AS4970)
- Australian Standard AS4373-2007 'Pruning of amenity trees' (AS4373)

3.4 Document Schedule

3.4.1 The documents listed below were provided to GTC by the client and have been relied upon for the preparation of this report.

Ref. No.	Document / Drawing Title	Author	Date
PAD23/0007	Pre-DA Discussion Minutes	Sutherland Shire Council	28/06/2023
SY074865.000.1.4	Site Survey – Sheets: 1-12	Land Partners	19/8/2020
E0-AR-004	DEMOLITION PLAN - Rev. A	Watson Young	28/9/2023
EO-AR-005	Estate Masterplan – Rev. A	Watson Young	28/9/2023
E0-CV-DA3101	CONCEPT BULK EARTHWORKS CUT TO FILL PLAN – Rev. A	Sparks & Partners	15/9/2023
E0-CV-DA4101	CONCEPT STORMWATER & GRADING PLAN ESTATE – Rev. A	Sparks & Partners	15/9/2023

Table 1 – Document Register

4 Methodology

4.1.1 Assessment of the trees was undertaken on 14, 15, 19 and 20 June 2023 by Joe Floyd & Tom Hare.

4.1.2 Arboricultural assessment of the tree(s) was undertaken utilising elements of the *Visual Tree Assessment procedure* (VTA) framework (Claus Mattheck, 1994), by qualified and experienced consulting arborists employing industry best practice methodologies.

4.1.3 Trees within the survey area were geo-located and data collected utilising a hand-held data collector and TRIMBLE TerraFlex software. The device is fitted with an external DA2 aerial capable of 30cm accuracy when used in optimal conditions.

4.1.4 Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) were calculated in accordance with Australian Standard *AS4970-2009: Protection of Trees on Development Sites* (Standards Australia, 2009).

4.1.5 Tree Retention Values were determined using the Institute of Australian Consulting Arborists (IACA) *'Significance of a Tree, Assessment Rating System'* (STARS) (IACA©, 2010).

4.1.6 Tree mapping has been compiled utilising QGIS, CAD and Bluebeam software to overlay the obtained tree data onto the plans provided by the client, TPZ encroachments were then calculated in QGIS.

Further detail regarding Arboricultural assessment considerations can be found in **Appendix 1** of this report.

4.2 Limitations

4.2.1 This report has been compiled based only the observations made at the time of the site assessment(s) and from the information provided by the client as detailed in Table 1. All observations were made from within the subject site and from ground-level where access was reasonably available.

4.2.2 Unless specified otherwise, tree dimensions have been estimated. No internal diagnostic testing, sub-surface root testing or soil analysis has been completed.

4.2.3 Only trees located within or directly adjacent to the subject site(s) boundaries that had the potential to be impacted were captured.

4.2.4 Site trees that did not comply with the definition criteria of a 'tree' in accordance with Councils Development Control Plan (DCP) may have been excluded from the assessment. Similarly, trees within neighbouring properties that were quarantined within the TPZ(s) of larger, more significant trees may not have been individually captured or detailed within this report.

4.2.5 Assessment of tree health and condition has been included to guide assessment of tree retention aspects only and is based on a basic visual assessment using elements of the VTA method.

Structural features, potential defects and hazards may be discussed briefly within this report for the purposes of providing context; however, this report is not designed to be, nor does it satisfy the requirements of a detailed Arboricultural Risk Assessment report.

4.2.6 This report has been prepared considering the plans made available to GTC at the time of writing the report only. Where detail has subsequently changed or was unavailable to GTC, there may be areas that require further assessment and revision of the recommendations within this report upon finalisation of the approved plans.

5 The Site

5.1 Overview

5.1.1 The subject site is legally classified as Lot 2 / DP 714965 located at 13 Endeavour Road, Caringbah NSW 2229. For the purposes of this report it will be further referenced as “the site”.

5.1.2 The site is located within the Sutherland Shire Council (SSC) Local Government Area (LGA) area and is subject to the conditions detailed within Councils Development Control Plan (DCP).

5.2 Site Specific Environmental & Planning Controls

5.2.1 The site is detailed within the DPE eSpatial mapping system as zone SP4 - Enterprise.

5.2.2 The site is not mapped on the NSW Department of Planning & Environment Biodiversity Values Map (BVM), as an area of Biodiversity Value (Environment, Biodiversity Values Map, 2023).

5.2.3 The site is not mapped on the SEED database as containing a Threatened Ecological Community (TEC), (DPIE, 2023).

5.2.4 The site is mapped on the Terrestrial Biodiversity Map (DPE, 2023).

5.2.5 The site is not mapped as Bushfire Prone Lands.



Figure 1 - Showing the subject site highlighted by the yellow dashed line, with the BVM and bushfire prone lands overlay - (Environment, ePlanning Spatial Viewer, 2023)

6 The Trees

6.1 Tree Schedule

6.1.1 A detailed Tree Inspection Schedule has been included within this report and can be found in section - **Appendix 3: Tree Schedule**.

6.1.2 The inspection schedule documents all arboricultural observations and data for the subject trees obtained at the time of assessment.

6.2 Tree Population

6.2.1 The tree population consists of an extensive mix of species, inclusive of both Australian native and introduced species. Tree health and condition evidently varies throughout the site, however the overall rating for the tree population was fair-good health and fair structural condition.

6.2.2 The site contains a number of species commonly referred to as Palm trees. The site contains approximately nineteen (19) different species of palms. With the most abundant species being *Washingtonia robusta* (Washingtonia Palm). Washingtonia Palms account for over 50% of the total number of palm species on site.

6.3 Palm Tree Health

6.3.1 Several of the Palms on site displayed symptoms indicating the trees are likely infected with the disease commonly known as “Fusarium Wilt”. Fusarium Wilt is a highly transmittable fungal pathogen that affects the trees vascular system and ultimately results in the death of the tree. (Laurence, Summerell , & Liew, 2015). Species observed to be most affected were predominantly; *Washingtonia robusta* (Washingtonia Palm) & *Phoenix canariensis* (Date Palm).

6.3.2 Laboratory testing would be required for a confirmed identification; however the trees demonstrated the characteristic wilting form and associated poor health/condition typically associated with the disease.

6.3.3 As such, many of these trees were allocated a reduced retention value and have been determined to be a lower priority for retention than would generally be expected.

6.3.4 Palm trees are often considered to be suitable species for transplanting; however, it is suggested that the associated species should be considered as a potential transmitter of the pathogen and are therefore deemed inappropriate for transplanting.

6.4 Internal Tree Stands & Avenues

6.4.1 Existing trees located internally within the site predominantly consist of stands/avenues of single-species tree groups. The majority of these trees were observed to have grown in “forest form” due to the nature of their tightly packed growing environment, causing unbalanced asymmetrical canopies, and below average stem taper for the size/age-class of the tree(s).

6.4.2 When assessing these trees as a group, they demonstrate a reasonable contribution to the surrounding landscape. However, when considering the trees at an individual level, the trees were determined to be of far lower significance due to their undesirable form. Therefore, unless the tree groups can be retained as a whole, it greatly reduces the individual trees viability for retention when assessing their location against the proposed development.

6.4.3 As such, the trees within groups were allocated a lower retention value than may typically be considered. Trees determined to be capable of retention as a single-standing specimen were allocated a higher retention value as they were considered to be more suitable for retention as part of the proposed development.

6.5 Biodiversity

6.5.1 The proposal currently indicates that a substantial loss of established vegetation throughout the site is likely, potential impacts to biodiversity may require review by an Ecologist due to the site being mapped on the Terrestrial Biodiversity map. However, it is noted that at the time of assessment, the site itself is not subject to any BVM or TEC listings.

6.5.2 Assessments relating to biodiversity impacts fall outside of the scope of this report.

7 Impact Assessment

7.1 Design Review Process

7.1.1 The current proposal has been subject to ongoing consultation and revision since the initial concept design. The process has aimed to mitigate impacts to the site trees where practicable with a focus on the concerns raised by Council at the Pre-DA stage.

7.1.2 The review process has resulted in a significantly improved design, demonstrating feasibility for far greater tree retention numbers than originally proposed, particularly with respect to the perimeter trees.

7.1.3 Nevertheless, it is noted that despite the revisions, a significant number of trees are likely to require removal within the internal areas of the site due to the complex planning and construction requirements associated with the proposal.

7.1.4 The following Impact Assessment has been based off of the final, client provided design.

7.2 Tree Mapping

7.2.1 Tree mapping has been developed to show the location, retention value, TPZ's and SRZ's of the subject trees in relation to the site.

7.2.2 Additional plans have been compiled to overlay this data onto the site plans to enable assessment and oversight of the proposed development impacts upon the trees.

7.2.3 The plans visually demonstrate the factors considered when undertaking the impact assessment and assist in demonstrating and evaluating the impacts and associated encroachment calculations.

7.2.4 All arboricultural plans have been included in this report and can be found in - **Appendix 4: Tree mapping.**

7.3 Assessment

7.3.1 A detailed Impact Assessment has been compiled as part of this report to assess the impacts imposed upon the subject trees from the proposal.

7.3.2 The assessment looked at each tree or tree group at an individual level, and considered the type, level and severity of impact(s) upon the tree(s) to determine the feasibility of available mitigation measures.

7.3.3 Following the assessment, a determination was made as to whether the tree(s) was considered viable for retention should the development proceed.

7.3.4 Where the trees were deemed to be feasible for retention, the required mitigation measures have been detailed within the recommendations section of this report.

7.4 Results

7.4.1 The following table has been included to provide a summary of the findings and resulting tree removal and retention requirements.

Conclusion	Description	Tree Number(s)	Total
Retain: Zero Encroachment	Trees are located outside of extent of the proposed works. Tree(s) to be retained with basic tree protection measures implemented.	1-25, 29-34, 71, 107, 108, 110, 111, 116, 490-683, 743-768, 805, 807-836	288
Retain: Minor (<10%) Encroachment	Minor encroachment only from proposed design. Allowance for compensatory TPZ and basic tree protection measures implemented.	26, 27, 61, 68, 69, 72, 73, 75, 76, 83-85, 103-106, 109, 112, 113, 115, 489, 769, 778, 838-841, 843	27
Retain: Major (>10%) Encroachment Mitigation Feasible	Major encroachment requiring specific tree protection measures. Trees deemed to be viable for retention is mitigation measures are implemented.	28, 50-60, 62-67, 70, 74, 77-82, 86-102, 114, 125, 126, 148-151, 153-163, 166-169, 449, 837, 842, 844	69
Remove: Major (>10%) Encroachment Not Feasible for Mitigation	Major encroachment without suitable mitigation measures available. Tree removal required for the development to proceed.	49, 165, 170, 200, 488, 770, 775, 779	8
Remove: Total 100% Encroachment	Total encroachment of the tree from the design proposal. Tree removal required for the development to proceed.	36-48, 117-124, 127-147, 152, 164, 171-199, 201-448, 450-487, 489, 684-742, 771-774, 776, 777, 780-806, 845	451
Remove: Hazardous Tree	Tree has been assigned a hazardous rating following assessment of its structural condition & should be removed.	35	1

Table 2 - Impact Assessment Results

8 Recommendations

8.1 Overview

8.1.1 This report does not in any part count as consent for the recommendations contained within. Any tree pruning or removal works must only be undertaken following approval from the consent authority.

8.1.2 Tree Removal & Retention

- Four-hundred and fifty-nine (459) trees require removal should the current proposal proceed.
- One (1) tree should be removed regardless of the development due to its hazardous form (Tree 35).
- Three-hundred and eighty-four (384) trees are viable for retention under the current design.

8.2 Tree Removal

8.2.1 The Project Arborist is to attend site prior to site establishment to clearly identify and mark the correct trees for removal.

8.2.2 All tree removal works are to be undertaken by a suitably experienced and insured arborist with a minimum qualification of AQF Level-3 in Arboriculture.

8.2.3 Works must be carried out in accordance with the following:

- *(AS4373 – 2007) Pruning of Amenity Trees*
- *NSW Code of Practice for the Amenity Tree Industry 1998*
- *NSW Code of Practice for Work Near Overhead Power Lines 2006*
- *NSW Work Health & Safety Act & Regulations 2011*
- *Safe Work Guide to managing Risks of Tree Trimming and Removal Work 2016*

8.2.4 Palm tree removals will likely require specific processes due to the potential biosecurity hazard associated with Fusarium Wilt.

8.2.5 The contractor engaged for the removal of the trees should consult with the Department of Primary Industries (DPI) to confirm the required protocols, but as a minimum the following should be considered:

- Palms should be removed separately to all other species,
- Debris should be disposed of at a suitable facility, and
- tools must be sterilised afterward to reduce the risk of cross contamination.

8.3 Replacement Planting

8.3.1 Three thousand six hundred sixty-four (3,664) replacement tree plantings would be required in order to achieve the 8:1 replacement planting ratio as prescribed by Councils DCP. This target would impose a significant constraint upon redevelopment of the site that would severely inhibit the ability of any development proposal being successful.

8.3.2 As such, in addition to the proposed internal site plantings, the inclusion of a VMP area similar to that of the one implemented under the stage-1 early works DA for the site should be considered under this proposal.

8.3.3 The foreshore setback zone provides sufficient opportunity for a VMP area. The intention should be to introduce a VMP area comprised of groundcover, mid-story and canopy species representative of the adjacent BVM listed vegetation community.

8.3.4 A detailed landscape plan should be developed by the Landscape Architect in consultation with the Ecologist that in addition to the proposed internal plantings, provides a VMP area consistent with the BVM vegetation community that aims to offset the loss of vegetation elsewhere within the site.

8.4 Tree Protection

8.4.1 The following tree protection recommendations have been detailed to ensure that all trees proposed for retention are afforded the best possible chance of survival both during, and post development.

9 Tree Protection Recommendations

9.1 Introduction

9.1.1 All trees proposed for retention are to be protected in accordance with Australian Standard: AS4970-2009 “Protection of trees on development sites”.

9.1.2 The following recommendations highlight the primary tree protection measure requirements. A detailed tree protection methodology has been provided to further guide the implementation of the recommendations.

9.1.3 The tree protection methodology can be found in section - **Appendix 2: Tree Protection Methodology**.

9.2 Appointment of a Project Arborist

9.2.1 Upon development approval, a Project Arborist (PA) should be engaged to oversee all arboricultural aspects associated with the development.

9.2.2 The PA is to be engaged prior to site establishment and occupancy by the Principal Contractor (PC).

9.2.3 Collaboration between the PC & PA will be necessary to ensure an effective tree retention outcome.

9.3 Basic Tree Protection Measures

9.3.1 Physical Tree Protection Measures (TPM) must be installed to protect all retained trees from incidental damage throughout the duration of the development.

9.3.2 As a minimum, tree protection fencing must be installed around the TPZ perimeter of any tree proposed for retention to form a barricaded tree protection zone. The fenced area should display signage that clearly identifies the area as a restricted tree protection zone, examples of appropriate signage have been included within the tree protection methodology.

9.3.3 Restricted activities are imposed within all tree protection zones, detail of restrictions can be found in the tree protection methodology. Access to or works within the TPZ are strictly prohibited without the prior approval of the PA.

9.3.4 Tree protection zones may require mulching and irrigation throughout the construction process. The PA can provide guidance as to the necessity and requirements of mulch and irrigation in line with the tree protection methodology.

9.3.5 Trees located within/adjacent to site access and egress points may require additional protection such as ground and trunk protection. This aspect should be reviewed by the Project Arborist upon completion of the Construction Management Plan.

9.4 Specific Tree Protection Measures

9.4.1 The below table identifies tree specific protection requirements.

9.4.2 It should be noted that in addition to the specific measures outlined below, all basic tree protection measures detailed above must be applied to the subject trees.

Trees	Impact	Tree Protection Requirements
28	• Bulk Earthworks – Plans show minor fill within the TPZ	• All works including demolition and bulk earthworks within the TPZ are to be completed under the supervision of the project arborist • Minimise fill within the TPZ where feasible
50 – 60, 62-67, 70, 74, 77-82, 86-102, 114, 125, 126, 148-151, 153-163, 166-169	• Demolition of existing road surface • Bulk Earthworks – Plans show minor fill within the TPZ • Proposed road upgrade • Installation of services • Construction of retaining wall	These trees are located within the existing garden bed along the boundary with Solander Fields. Whilst the TPZ encroachments to many of the trees is major, existing structure(s) are in situ in the same location as the proposed road upgrade. For this reason, provided specific tree protection and tree sensitive construction measures are implemented, retention remains viable • Locate services outside of the TPZ where feasible • Demolition of the existing road surface is to be completed under the supervision of the project arborist to ensure retention of potential tree roots located beneath the surface • Excavation within the TPZ(s) is to be undertaken utilising non-destructive measures such as HydroVac under the supervision of the project arborist • New road is to be constructed above existing grade to retain any structural roots located below the existing structure • Retaining wall is to be constructed above existing grade and then subject to minor fill, where depth is required for the footing(s) of the retaining wall, piers are to be utilised
449	• Bulk Earthworks – Plans show cut within the TPZ	• Minimise cut within the TPZ where feasible • Excavation is to be undertaken utilising non-destructive measures such as HydroVac • All works including demolition and bulk earthworks within the TPZ are to be completed under the supervision of the project arborist
833, 835, 836, 837, 842, 843, 844	• Bulk Earthworks – Plans show minor fill within the TPZ	• All works including demolition and bulk earthworks within the TPZ are to be completed under the supervision of the project arborist • Minimise fill within the TPZ where feasible

Table 3 - Tree Specific Protection Requirements

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11 Glossary of Common Terms & Abbreviations

AIA: Arboricultural Impact Assessment

AS4373-2007: Australian Standard AS4373-2007: 'Pruning of amenity trees' is the underpinning standard to which practical Arboricultural works are based upon within Australia.

AS4970-2009: Australian Standard AS4970-2009: 'Protection of trees on development sites' is the underpinning standard to which development-based Arboricultural works and guidance are based upon within Australia

BVM: Biodiversity Values Map

CDC: Complying Development Certificate

CMP: Construction Management Plan

DA: Development Application

DAB: Diameter at Base - The diameter of the tree taken at ground level above the root buttress flare

DBH: Diameter at Breast Height - Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4m.

DCP: Development Control Plan

ELE: Estimated Life Expectancy

GTC: Green Tree Consultancy

H/D: Height over Diameter

IACA: Institute of Australian Consulting Arborists

LEP: Local Environmental plan

LGA: Local Government Area

PA: Project Arborist

PC: Principal Contractor

PM: Project Manager

SEPP: State Environmental Planning Policy

SRZ: Structural Root Zone

STARS: Significance of a Tree Assessment Rating System

TEC: Threatened Ecological Community

TPM: Tree Protection Measures

TPZ: Tree Protection Zone

VTA: Visual Tree Assessment

12 Disclaimer

The information contained within this report is to be used solely for the purposes that were specified at the time of engagement.

All attempts have been made to ensure the legitimacy of any information which has been gathered in the process of compiling this report, however, Green Tree Consultancy cannot be held liable for inaccurate or misguiding information which has been provided by others.

Any tree inspections or assessments which have been carried out for the purposes of this report are valid only at the time of inspection and are based on what could reasonably be seen or diagnosed from during the inspection.

Unless otherwise stated, all inspections utilised the processes of the Visual Tree Assessment (VTA) procedure in the form of a basic VTA, in addition to the application of industry best practice and learnt knowledge.

No internal diagnostic testing or below ground investigation has been carried out unless otherwise stated.

Trees are a dynamic living organism and as such they have a finite lifespan the end of which cannot always be predicted or understood, even apparently healthy trees can die suddenly or fall without warning. As such there is no warranty or guarantee provided, or implied, regarding the future risks associated with any tree.

Unless specifically stated within the scope and methodology sections of this report, this report does not constitute a detailed Arboricultural Hazard & Risk Assessment if relating to construction and development related report types.

Assessment of tree health and condition has been included to guide assessment of tree retention aspects only and is based on a basic visual assessment using elements of the VTA method. Tree defects may be discussed briefly within this report; however, this report does not satisfy the requirements of a detailed Arboricultural Risk Assessment report.

It is noted that upon acceptance and completion of any development, that there may be trees that impose a risk of impacting a target that was not previously present prior to the development.

It is up to the client and the tree owner/manager to determine the risk threshold that they are willing to accept and undertake a suitably detailed Arboricultural risk assessment that identifies potential tree risk(s) and provides tree management recommendations in line with this threshold.

Please feel free to contact GTC if you have any questions regarding this report.

13 Appendix 1: Tree Assessment Methodology

13.1 Visual Tree Assessment (VTA)

13.1.1 The VTA system is based on the theory of tree biology and physiology, as well as tree architecture and structure. This method is used by arborists to identify visible signs on trees that indicate good health, or potential problems. Symptoms of decay, growth patterns and defects are identified and assessed as to their potential to cause whole-tree, part-tree and/or branch failure. This system is based around methods discussed in `*The Body Language of Trees*'. (Claus Mattheck, 1994)

13.2 Health & Vigour Assessment

13.2.1 The health and vigour of a tree are assessed by looking at the tree and tree canopy and how it is performing. Certain indicators provide information on which to base the assessment. Abnormally small leaves, chlorosis (yellowing), sparse crown, wilting, and die-back can be signs of ill-health or decline but may also be related to a temporary imbalance due to drought or pest infestations. Epicormic growth can be a sign of stress and low energy reserves but can also be related to increased light levels through the removal or pruning of adjacent trees. Extension growth can be a good indicator of vigour, but this can vary greatly between species and under differing climatic conditions. For these reasons, each individual symptom or observation needs to be assessed with objectivity and consideration of all available information.

13.3 Structural Assessment

13.3.1 For the purpose of this report, elements of the VTA system will be used, along with industry standards, arboricultural literature, and other relevant studies that provide an insight into potential hazards in trees. This assessment is a snapshot of what could be reasonably seen or determined from a basic visual inspection. The VTA system is generally used as a means to identify hazardous trees; however, it is important to realize that for a tree to be hazardous there must be a target; a hazard poses no risk if there is no exposure to the hazard.

13.4 Tree Protection Zone (TPZ) & Structural Root Zone (SRZ) Methodology

13.4.1 In accordance with Australian Standard *AS4970-2009 Protection of trees on development sites* (Standards Australia, 2009), Tree Protection Zone (TPZ) radius is calculated using the following procedure. Diameter of the trunk is measured at approximately 1.4m above ground level; this measurement is referred to as DBH (Diameter at Breast Height). $R_{TPZ} = DBH \times 12$. For multi-stemmed trees the formula used is $R_{TPZ} = \sqrt{[(DBH1)^2 + (DBH2)^2 + (DBH3)^2]}$. The TPZ is measured radially from the centre of the stem and must be protected on all sides.

13.4.2 The Structural Root Zone (SRZ) radius is calculated by measuring the diameter of the stem close to ground level, just above the basal flare. This measurement is taken as ***D*** and then used in the following formula: $R_{SRZ} = (Dx50)^{0.42} \times 0.64$ and becomes the Structural Root Zone, measured radially from the centre of the stem.

13.4.3 It is important to realize that these calculations provide a notional figure only and tree dynamics, form and site conditions will greatly affect these zones, and it is the job of the arborist to interpret the information correctly.

13.4.4 For palms, cycads, tree ferns, and similar monocots, the TPZ is positioned at least 1m outside the crown projection. SRZs are not applicable to these plant types.

AS4970-2009 states "*a TPZ should not be less than 2m nor greater than 15m (except where crown protection is required*" and the minimum radius for an SRZ is 1.5m.

13.5 Tree Retention Value Methodology - Significance of a Tree Assessment Rating System (STARS)

IACA Significance of a Tree, Assessment Rating System (STARS)© (IACA 2010)©

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2001.

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of *High*, *Medium* and *Low* significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined. An example of its use in an Arboricultural report is shown as Appendix A.

Tree Significance - Assessment Criteria

1. High Significance in landscape

- The tree is in good condition and good vigour;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa *in situ* - tree is appropriate to the site conditions.

2. Medium Significance in landscape

- The tree is in fair-good condition and good or low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa *in situ*.

3. Low Significance in landscape

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa *in situ* - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

Hazardous/Irreversible Decline

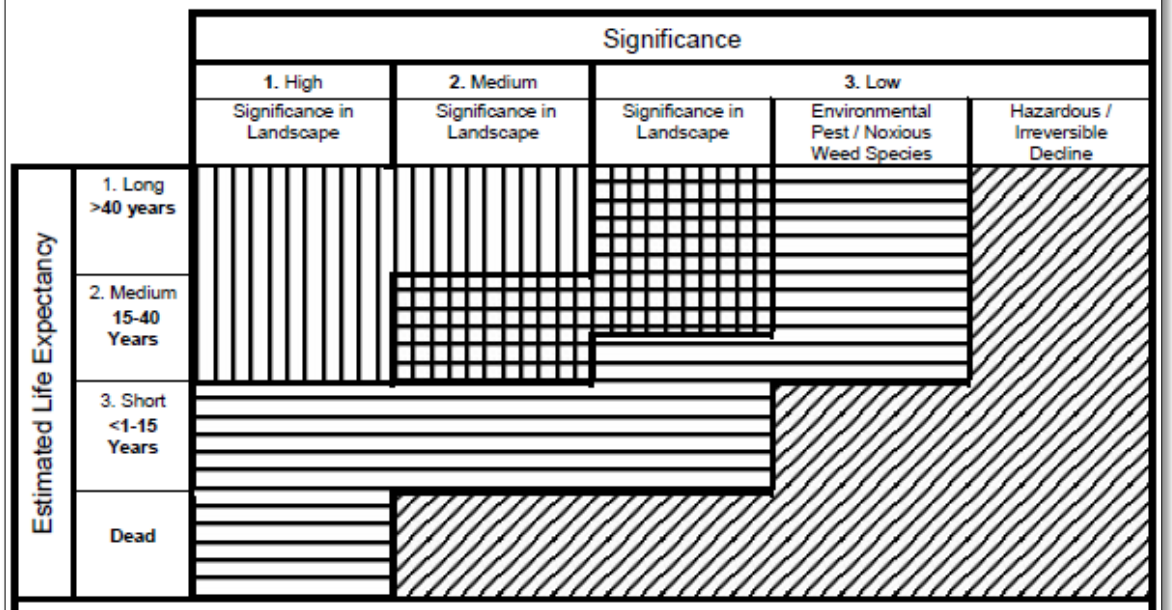
- The tree is structurally unsound and/or unstable and is considered potentially dangerous,
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g. hedge.

IACA 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, www.iaca.org.au

Table 1.0 Tree Retention Value - Priority Matrix.



Legend for Matrix Assessment

Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 *Protection of trees on development sites*. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.

Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.

Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.

Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

USE OF THIS DOCUMENT AND REFERENCING

The IACA Significance of a Tree, Assessment Rating System (STARS) is free to use, but only in its entirety and must be cited as follows:

IACA, 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

REFERENCES

Australia ICOMOS Inc. 1999, *The Burra Charter – The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, www.icomos.org/australia

Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

IACA 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, www.iaca.org.au

Figure 2- Significance of a Tree Assessment Rating System (STARS) – IACA

14 Appendix 2: Tree Protection Methodology

14.1 Introduction

- Early identification & protection of important trees on development sites is essential from the outset & will minimise problems associated with retaining inappropriate trees, & in turn focus time, resources & budget on the retention & protection of the most valuable trees on site (Standards Australia, 2009).
- Tree protection will form an essential part of the success of the development & should be prioritised at the earliest stage of the project. Where trees are proposed for retention on site, proper tree protection & management procedures will be crucial in ensuring that the trees remain valuable assets over the long-term.
- The following specification has been developed to provide detailed guidance for tree protection measures & processes associated with the development project.

14.2 Applicable Standards:

Australian Standard AS4970-2009: Protection of trees on development sites (Standards Australia, 2009).

Australian Standard AS4373-2007: Pruning of amenity trees (Standards Australia, 2007).

- Australian Standards AS4373-2007 & AS4970-2009 are the underpinning documents that Arboricultural practice within Australia is based upon.
- The preparation of this specification has been prepared in accordance with & has been closely aligned with the foundations & principles of these standards.
- As such, this specification & any associated report(s) should be read in conjunction with AS4970 & AS4373.

14.3 Approval from consent authority

- It is important to note that this specification & any associated report(s), do not count as approval for the recommendations contained within. It is vital that approval is obtained from the consent authority prior to following any recommendations provided by Green Tree Consultancy as part of this specification or report.
- Upon approval from the consent authority, it is important that any variation between this specification & the Conditions of Consent (CoC) are identified, discussed & addressed with the Project Arborist, Project Manager & the consent authority to resolve any discrepancies.
- Unless otherwise advised by the consent authority, the CoC shall prevail.

14.4 Planning & Design

14.4.1 In addition to the commonly identified physical tree protection measures, tree protection is most effective when addressed through early-stage planning & design. Ideally this would mitigate the need to encroach on the tree(s) TPZ entirely resulting in only basic physical tree protection measures being required.

14.4.2 The undertaking of a Preliminary Tree Assessment report is a key step in the process of tree protection. As through consultation between planners, the design team, project managers, the principal contractor & the project arborist; redesign, planning & detailed site management can achieve an outcome that both mitigates impacts to significant trees on site, & maintains the desired outcomes of the development.

14.4.3 However, this may not always be feasible or have been considered early on in the development. Therefore, tree protection measures become paramount for the development to proceed successfully. At this point, the use of tree sensitive construction methods, combined with physical tree protection measures should be utilised for any part of the development that encroaches the TPZ of a tree proposed for retention.

14.5 Tree Sensitive Construction Methods

- Tree sensitive construction methods are methods of construction that minimise the impact(s) to the tree(s) on site. Typically, in the form of minimising impacts associated with the below ground parts of the tree(s) root system.
- Examples of tree sensitive construction methods include, but are not limited to:
    - Pier & Beam style footings
    - Cantilevered Building Sections
    - Contiguous Piling
    - Suspended Slabs
    - Screw Piles
    - Directional under-boring

14.6 Construction Management Plan

- A Construction Management Plan (CMP) should be compiled by the Principal Contractor in consultation with the Project Arborist in order to address any issues related to aspects such as the access & egress of vehicles and machinery & the storage of site materials.

14.7 Compliance

- Compliance with this specification is best managed through the appointment of a Project Arborist to ensure that works are undertaken in accordance with the recommendations & hold-points detailed within this specification.
- This specification should be clearly communicated with the Principal Contractor & Project Manager to ensure that all works are undertaken in accordance with this specification.
- Tree protection measures should form part of the site-specific induction process to ensure that all workers on site are familiar with the requirements set out within the specification.
- The Project Arborist & Project Manager are to be responsible for the monitoring & enforcement of all tree protection measures on site.

14.8 The Project Arborist

14.8.1 Project Arborist Appointment & Qualifications

- A Project Arborist (PA) with a minimum Australian Qualification Framework (AQF) Level-5 qualification in arboriculture should be appointed as the Consulting Arborist for the project.
- The PA is to have sufficient experience in managing trees on development sites & must be familiar with the required legislation & standards, & up to date on industry best practice methodologies.
- The PA is to be appointed prior to the start of any works on site, inclusive of tree pruning & removal works & prior to site establishment & occupation.

14.8.2 Responsibilities of the Project Arborist & Record Keeping

- The PA is to be consulted at the design stage to ensure that impacts to valuable trees on site is either mitigated, or effectively managed throughout the project.
- The PA is to attend an on-site meeting with the Project Manager & Principal Contractor to discuss the requirements for tree protection measures for the project. This is to be conducted prior to any works on site & prior to site establishment & occupation.
- The PA is to be responsible for the compliance with the specification, AS4970 & any CoC placed upon the development by the consent authority.
- The PA is to guide all tree pruning & removal works in accordance with AS4970 & AS4373.
- Certification of the installation of tree protection measures and any additional relevant hold-points as detailed within this specification is to be undertaken by the PA in accordance with the relevant industry standards and reporting requirements.
- The PA is responsible for supervision of any & all works within the TPZ of any tree proposed for retention.
- Record keeping of all supervision works by the PA is to be completed via a statement of attendance, detailing what works were undertaken and certifying that they were undertaken in accordance with the relevant standards e.g., AS4970 & AS4373.
- Whilst the above noted responsibilities are primarily that of the PA, it is the responsibility of the project manager/site manager to contact the PA prior to any works that require Arborist involvement and to assist with direct enforcement of all tree protection measures with all contractors.

14.9 Tree Protection Zone (TPZ)

14.9.1 Tree Protection Zone: Definition & Purpose

- The Tree Protection Zone (TPZ) is defined within AS4970 as:

  ''A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development.'' (Standards Australia, 2009)
- The TPZ is calculated in accordance with AS4970 by taking the Diameter at Breast Height (DBH) of the subject tree and multiplying it by twelve (12).
- It is important to note that this calculation provides a notional TPZ only, which is indicative of a generalised area that a tree may require to maintain tree health & structure. There are many aspects that contribute to the TPZ, and it is up to

the PA to ensure that all aspects have been considered when determining the TPZ as this may differ from the notional TPZ calculation.

14.9.2 Structural Root Zone: Definition & Purpose

- The Structural Root Zone (SRZ) is defined within AS4970 as:

  'The area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area.'' (Standards Australia, 2009)

14.10 Restricted activities in the TPZ

- It is important to restrict certain activities within the TPZ in order to mitigate any detrimental impacts to the tree(s) health and condition. Some activities may not appear to be of concern, however even indirect impacts can have a long-term and lasting effect on tree health and condition.

  Examples of restricted activities as detailed within AS4970 are listed below:

  - machine excavation including trenching
  - excavation for silt fencing
  - cultivation
  - storage
  - preparation of any chemicals, including cement
  - parking of vehicles and plant
  - refuelling
  - dumping of waste
  - wash down and cleaning of equipment
  - placement of fill
  - lighting of fires
  - soil level changes
  - temporary or permanent installation of utilities
  - physical damage to the tree

14.11 TPZ Considerations

14.11.1 TPZ Encroachments

- Encroachment to the TPZ may at times be a necessity due to site limitations and constraints & are generally decided upon during the planning & Development Application stages. It is imperative that any encroachment to the TPZ is only undertaken with prior approval from the Consent Authority & under the guidance of the PA.
- TPZ encroachments are considered to be items that have a longer-term effect on the TPZ e.g., excavation, trenching, building footings, installation of services etc.
- There are typically two (2) categories of TPZ encroachment which each have their own specific assessment & management processes as detailed below.

14.11.2 Minor TPZ Encroachments:

- Where an encroachment is <10% of the trees total TPZ area & provided it is outside of the SRZ, then it is considered to be a minor encroachment.
- A minor encroachment would not generally warrant further, or detailed root investigation.
- Where an encroachment occurs, the TPZ must be adapted to compensate for the loss of area due to the encroachment, the compensated area must be contiguous to the existing TPZ.

14.11.3 Major TPZ Encroachments:

- Where an encroachment is >10% of the trees total TPZ area, or if it encroaches the SRZ, then it is considered to be a major encroachment.
- A major encroachment will require assessment by the PA and may require exploratory root investigation works to demonstrate the viability of the tree over the long-term.
- As with a minor encroachment, where an encroachment occurs, the TPZ must be adapted to compensate for the loss of area due to the encroachment, the compensated area must be contiguous to the existing TPZ.

14.11.4 Canopy Protection

- As well as the below-ground parts, the above-ground parts of the tree also require protection throughout development.
- On occasion, the notional TPZ calculation may be located within the tree canopy, therefore, the TPZ will require adjustment to 1m outside of the dripline to ensure that the tree canopy is properly protected.
- This will generally require the TPZ and associated fencing to be extended to a distance of 1m outside the perimeter of the tree canopy dripline as a minimum.
- In some cases, site space & constraints may result in the requirement for tree branches to be pruned. In this instance, a pruning specification may be required & must be undertaken in accordance with the relevant standards & under the

guidance of the PA.

14.11.5 Additional Considerations

- Variations to the TPZ may also be required where the PA has demonstrated that one of the following (or other) aspects are impacting the likely TPZ requirement for the subject tree:
    - Existing or historical structures that are likely to have impacted the location of tree roots
    - The future growth requirements of the tree, including both above & below ground parts
    - Tree health
    - Tree structure
    - The characteristics of the individual tree species & its ability to tolerate development impacts
    - Site topography & soil type

14.12 Construction Processes & Tree Sensitive Methodologies

14.12.1 Grade Changes Within the TPZ

- Grade changes within the TPZ will require prior approval by the consent authority & the PA. They will generally consist of a raise in soil level only & not a reduction in grade.
- Where grade changes are permitted, they will generally be restricted to a maximum fill of 200mm above existing grade.
- The fill material must be a non-compacted material that is coarser than the existing soil & must be inspected & approved by the PA.

14.12.2 Underground Services

- Where feasible, all underground services should be located outside of the TPZ.
- In situations where site limitations dictate the location of service within the TPZ, then they would ideally be installed using directional under-boring to minimise disturbance to the TPZ.

14.12.3 Directional Under-boring

- Directional under-boring is undertaken using specialist equipment that can bore below ground to avoid conflict with trees, structures & infrastructure. Whilst it is a highly beneficial method for minimising impacts with trees, there are certain aspects that must still be considered to successfully mitigate any significant impact with tree root systems.
- Entry/exit pits – The directional drilling equipment requires an entry & exit pit in order to start the drilling process, the size may vary depending on the make/model of equipment, but 2m² should be considered as a minimum requirement. It is important to ensure that the entry/exit pit is located outside of the TPZ where possible. Where the entry or exit pit must be within the TPZ of a tree, the PA is to assess the viability of the proposal and the entry/exit pit is to be excavated using non-destructive means.
- Drilling depth – different machines are capable of drilling to different depths, and different soil types or bedrock may guide the desired depth of the bore, but generally speaking most machines are capable of drilling to a depth that avoids conflict with the tree's root system. The PA is to provide guidance on the minimum depth required based on soil type, tree species and site conditions.

14.13 Above-ground Services & Structures

14.13.1 Building Alignment

- Where feasible, building alignments should be positioned outside of the TPZ & must consider the future growth of the trees above & below ground parts. This should be considered at the design stage to avoid encroachment into the TPZ.
- Where the building alignment is to be positioned within the trees TPZ, it must be done so only after consultation & assessment with the PA and following approval from the consent authority.
- Tree sensitive design & construction methods will need to be utilised to minimise impacts and the PA is to supervise all works within the TPZ.

14.13.2 Above-ground services – Tree Canopy

- Consideration needs to be given to the location of above-ground services to minimise conflict with the trees canopy.
- Where services are to pass near to, or within the tree canopy, consultation with the PA will be required.
- A pruning specification may be required to guide the installation of the service(s) and the tree(s).

14.14 Monitoring & Certification

14.14.1 Supervision

- This refers to the supervision of any works within the TPZ of a tree proposed for retention.
- Supervision should be undertaken by the PA or a suitably qualified & experienced AQF Lvl-5 Arborist.
- The primary purpose of supervision is to ensure that the PA is on site during works within the vicinity of the TPZ(s), to ensure that damage to the subject tree(s) is avoided by ensuring that works in these areas are undertaken in accordance with AS4970 & industry best practice.
- A secondary purpose of supervision is to ensure that the PA is present during works to provide guidance & advice should tree roots be encountered, or otherwise unforeseen tree related matters arise during the works.
- All supervision works should be documented & certified as detailed below.

14.14.2 Hold Points & Monitoring

- Monitoring of the project is essential in order to ensure that tree protection measures remain in place & all tree protection & tree sensitive construction methods are undertaken in accordance with the specification & CoC.
- This can be achieved by ensuring compliance with the hold points detailed below.
- All hold points will require certification by the PA.
- Certification is generally provided in a memo style certification letter, that will clearly identify & document the following items as a minimum:
    - Date, time & location of assessment/works & details of the person(s) and company(s) involved,
    - Applicable standards and or assessment methodology,
    - Detailed description of the works/assessment & detail of the involvement of the PA,
    - Description & location of trees subject to assessment,
    - Description of subject trees health & condition,
    - Photographic evidence that clearly shows examples of the works processes,
    - Items of non-compliance are clearly identified, documented & remediation recommendations provided.
    - Confirmation that any areas of non-compliance requiring remediation have been rectified (as required).
    - Signed acknowledgement of complying works and standards to which they have been assessed by.
- Certification will be provided to the client & will be the responsibility of the client to ensure that the certification is provided to the relevant consent authority & certifier as required.

14.15 Hold-Point Inspection Schedule

Point	Description	Stage	Actions
1	**Tree Pruning & Removal**	Prior to site establishment	◦ Project Arborist to attend site to identify and mark all trees proposed for pruning and removal. ◦ Oversee works to ensure that tree pruning & removal works are undertaken in accordance with AS4373-2007 & industry best practice. ◦ Confirm that tree works are compliant with approved plans and conditions of consent.
2	**Tree Protection Certification**	Following tree works & prior to site occupancy	◦ Inspect and assess the installation of all tree protection measures ◦ Confirm that tree protection measures have been installed in accordance with AS4970-2009, conditions of consent and applicable pruning specifications ◦ Provide a letter of certification to be supplied to the principal certifier.
3	**Supervision of works within the TPZ**	At any time that access or works are required within the TPZ, temporary or otherwise.	◦ Arboricultural supervision of works within the TPZ to ensure that works are completed in accordance with AS4970-2009 and the conditions of consent. ◦ Provide a letter of certification to be supplied to the principal certifier.
4	**Final Inspection Certification**	Following project completion	◦ Confirm that all tree protection measures have been removed ◦ Undertake an assessment of the health & condition of the site trees and detail any required remedial works ◦ Provide a letter of certification to be supplied to the principal certifier.

Table 4 - Hold-point Inspection Schedule

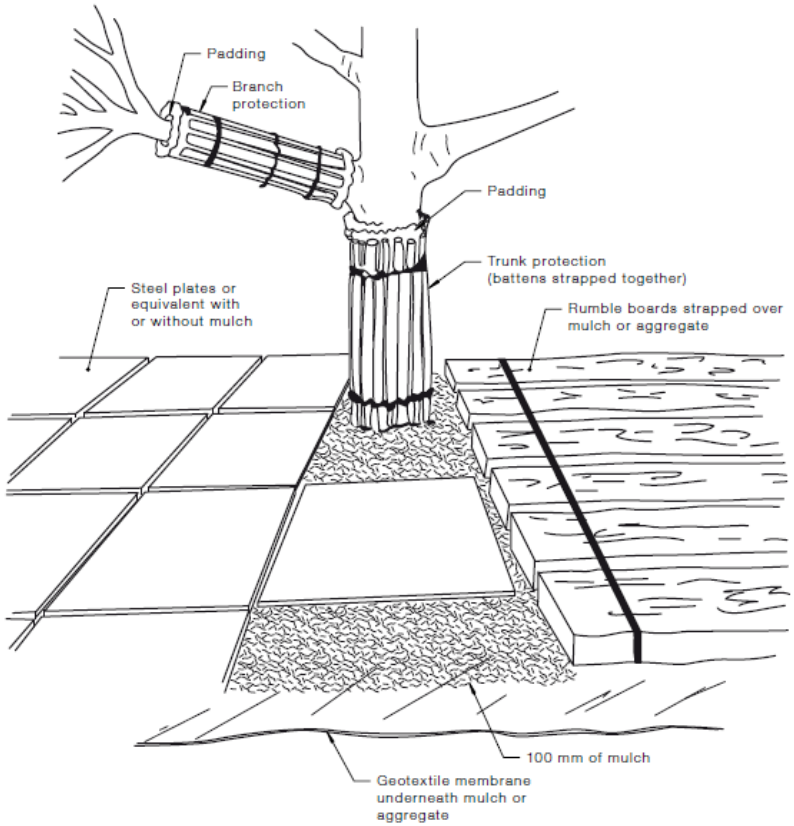
14.16 Reference diagrams



LEGEND:

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

Figure 3 - Tree Protection Fencing & Signage Example Diagram(s) - (Standards Australia, 2009)



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

Figure 4 - Ground Protection Example Diagram - (Standards Australia, 2009)

15 Appendix 3: Tree Schedule

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
1	Casuarina cunninghamiana | River She-oak	20	8	425	480	5100	2431	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
2	Casuarina cunninghamiana | River She-oak	15	6	380	440	4560	2344	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
3	Casuarina cunninghamiana | River She-oak	21	9	500	560	6000	2594	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
4	Casuarina cunninghamiana | River She-oak	18	4	300	340	3600	2104	Good	Fair		Low	Medium	Low	NA	0%	Retain
5	Casuarina cunninghamiana | River She-oak	15	4	350	380	4200	2204	Fair	Poor		Low	Medium	Low	NA	0%	Retain
6	Casuarina cunninghamiana | River She-oak	10	6	375	400	4500	2252	Fair	Fair		Low	Medium	Low	NA	0%	Retain
7	Casuarina cunninghamiana | River She-oak	18	6	375	400	4500	2252	Fair	Fair		Low	Medium	Low	NA	0%	Retain
8	Eucalyptus saligna x botryoides | Hybrid Sydney Blue Gum	18	10	420	460	5040	2388	Poor	Fair		Medium	Short	Low	NA	0%	Retain
9	Corymbia maculata | Spotted Gum	15	5	300	340	3600	2104	Good	Fair		Low	Medium	Low	NA	0%	Retain
10	Corymbia maculata | Spotted Gum	15	5	300	340	3600	2104	Good	Fair		Low	Medium	Low	NA	0%	Retain
11	Eucalyptus microcorys | Tallowwood	19	9	330	400	3960	2252	Good	Fair		Low	Medium	Low	NA	0%	Retain
12	Eucalyptus saligna x botryoides | Hybrid Sydney Blue Gum	16	4	250	300	3000	1996	Fair	Fair	Poor tree form	Low	Medium	Low	NA	0%	Retain
13	Eucalyptus sp. | Eucalypt	24	10	550	300	6600	1996	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
14	Banksia integrifolia | Coast Banksia	16	10	390	410	4680	2276	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
15	Banksia integrifolia | Coast Banksia	6	6	350	390	4200	2228	Good	Fair		Medium	Medium	Low	NA	0%	Retain
16	Banksia integrifolia | Coast Banksia	7	3	280	325	3360	2064	Fair	Poor		Low	Medium	Low	NA	0%	Retain
17	Eucalyptus saligna x botryoides | Hybrid Sydney Blue Gum	20	11	480	525	5760	2525	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
18	Eucalyptus saligna x botryoides | Hybrid Sydney Blue Gum	16	5	300	325	3600	2064	Poor	Fair		Low	Medium	Low	NA	0%	Retain
19	Corymbia maculata | Spotted Gum	20	9	400	440	4800	2344	Good	Good		Medium	Medium	Medium	NA	0%	Retain
20	Corymbia maculata | Spotted Gum	19	6	350	375	4200	2192	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
21	Corymbia maculata | Spotted Gum	14	4	275	300	3300	1996	Fair	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
22	Melaleuca quinquenervia | Broad-leaved Paperbark	20	8	400	460	4800	2388	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
23	Eucalyptus botryoides | Southern Mahogany	6	6	320	350	3840	2129	Fair	Fair		Low	Medium	Low	NA	0%	Retain
24	Casuarina cunninghamiana | River She-oak	20	9	475	525	5700	2525	Good	Fair		Low	Medium	Medium	NA	0%	Retain
25	Casuarina cunninghamiana | River She-oak	20	9	440	500	5280	2474	Good	Fair		Low	Medium	Medium	NA	0%	Retain
26	Casuarina cunninghamiana | River She-oak	19	8	400	450	4800	2366	Good	Fair		Low	Medium	Low	Fill Minor	1.5%	Retain
27	Casuarina cunninghamiana | River She-oak	18	7	390	430	4680	2322	Fair	Fair		Low	Medium	Low	Fill Minor	8.0%	Retain
28	Casuarina cunninghamiana | River She-oak	20	9	400	430	4800	2322	Fair	Fair		Low	Medium	Low	Fill Minor	11.2%	Retain
29	Casuarina cunninghamiana | River She-oak	17	9	375	420	4500	2299	Fair	Fair		Low	Medium	Low	NA	0%	Retain
30	Casuarina cunninghamiana | River She-oak	21	11	525	600	6300	2670	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
31	Casuarina cunninghamiana | River She-oak	18	8	375	400	4500	2252	Good	Fair		Low	Medium	Low	NA	0%	Retain
32	Casuarina cunninghamiana | River She-oak	18	8	375	400	4500	2252	Good	Fair		Low	Medium	Low	NA	0%	Retain
33	Casuarina cunninghamiana | River She-oak	18	8	375	400	4500	2252	Good	Fair	Poor tree form | Wound(s)	Low	Medium	Low	NA	0%	Retain
34	Casuarina cunninghamiana | River She-oak	17	7	320	380	3840	2204	Fair	Fair		Low	Medium	Low	NA	0%	Retain
35	Dead Tree | Dead tree	5	1	150	200	2000	1683	Dead	Fair		Low	n/a	Very Low	NA	0%	Remove - Hazard
36	Phoenix canariensis | Canary Island Date Palm	12	6	500	600	4000	0	Good	Good		Medium	Medium	Medium	Parking	100%	Remove
37	Corymbia citriodora | Lemon-scented Gum	17	9	375	400	4500	2252	Good	Good		Medium	Medium	Medium	Parking	100%	Remove
38	Corymbia citriodora | Lemon-scented Gum	18	12	440	550	5280	2575	Good	Good		Medium	Medium	Medium	Utilities	100%	Remove
39	Corymbia maculata | Spotted Gum	18	9	425	500	5100	2474	Good	Good		Medium	Medium	Medium	Utilities	100%	Remove
40	Corymbia maculata | Spotted Gum	17	8	390	450	4680	2366	Good	Good		Medium	Medium	Medium	Utilities	100%	Remove
41	Corymbia maculata | Spotted Gum	10	4	200	275	2400	1924	Good	Good		Low	Medium	Medium	Utilities	100%	Remove
42	Corymbia maculata | Spotted Gum	20	10	575	650	6900	2762	Good	Fair		Medium	Medium	Medium	B 8	100%	Remove
43	Corymbia citriodora | Lemon-scented Gum	20	10	480	540	5760	2555	Fair	Fair		Medium	Medium	Medium	B 8	100%	Remove
44	Corymbia citriodora | Lemon-scented Gum	10	8	300	340	3600	2104	Fair	Fair		Low	Medium	Low	B 8	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
45	Corymbia citriodora | Lemon-scented Gum	16	10	380	400	4560	2252	Fair	Fair		Medium	Medium	Medium	B 8	100%	Remove
46	Corymbia maculata | Spotted Gum	2	14	500	575	6000	2623	Good	Good		Medium	Medium	Medium	B 8	100%	Remove
47	Corymbia citriodora | Lemon-scented Gum	17	10	425	475	5100	2421	Good	Good		Medium	Medium	Medium	B 8	100%	Remove
48	Cupaniopsis anacardioides | Tuckaroo	7	6	375	440	4500	2344	Good	Good		Medium	Medium	Medium	B 8	100%	Remove
49	Cupaniopsis anacardioides | Tuckaroo	4	4	300	350	3600	2129	Poor	Poor		Low	Short	Low	B 8	18.5%	Remove
50	Corymbia maculata | Spotted Gum	17	11	480	540	5760	2555	Good	Good		Medium	Medium	Medium	B 8 & Path	13.5%	Retain
51	Corymbia citriodora | Lemon-scented Gum	17	9	370	400	4440	2252	Good	Good		Medium	Medium	Medium	B 8 & Path & RW	32.6%	Retain
52	Corymbia maculata | Spotted Gum	17	9	370	400	4440	2252	Good	Good		Medium	Medium	Medium	B 8 & Path & RW	19.4%	Retain
53	Corymbia maculata | Spotted Gum	16	9	350	380	4200	2204	Good	Good		Medium	Medium	Medium	B 8 & Path & RW	20.2%	Retain
54	Corymbia maculata | Spotted Gum	16	11	380	420	4560	2299	Good	Good		Medium	Medium	Medium	B 8 & Path & RW	15.5%	Retain
55	Corymbia maculata | Spotted Gum	18	10	390	500	4680	2474	Good	Fair	Multi stemmed at base - basal suckers	Medium	Medium	Low	B 8 & Path & RW	18.2%	Retain
56	Corymbia maculata | Spotted Gum	17	9	380	420	4560	2299	Good	Fair		Medium	Medium	Medium	B 8 & Path & RW	19.9%	Retain
57	Corymbia maculata | Spotted Gum	14	6	350	400	4200	2252	Good	Fair		Medium	Medium	Medium	B 8 & Path & RW	23.5%	Retain
58	Corymbia maculata | Spotted Gum	18	10	390	420	4680	2299	Good	Good		Medium	Medium	Medium	B 8 & Parking & RW	28.7%	Retain
59	Corymbia maculata | Spotted Gum	18	10	380	400	4560	2252	Good	Good		Medium	Medium	Medium	Parking & RW	33.3%	Retain
60	Corymbia maculata | Spotted Gum	18	10	380	400	4560	2252	Good	Good		Medium	Medium	Medium	Parking & RW	32.6%	Retain
61	Eucalyptus sp. | Eucalypt	23	14	500	550	6000	2575	Good	Fair		High	Medium	High	Parking & RW	9.5%	Retain
62	Corymbia maculata | Spotted Gum	16	7	280	325	3360	2064	Good	Good		Low	Medium	Low	Rd & RW	32.4%	Retain
63	Corymbia maculata | Spotted Gum	16	7	325	360	3900	2155	Fair	Fair		Low	Medium	Medium	Rd & RW	33.2%	Retain
64	Corymbia maculata | Spotted Gum	18	10	450	500	5400	2474	Good	Good		Medium	Medium	Medium	Rd & RW	41.8%	Retain
65	Corymbia maculata | Spotted Gum	9	3	200	250	2400	1849	Fair	Fair		Low	Medium	Low	Rd & RW	14.2%	Retain
66	Corymbia maculata | Spotted Gum	15	7	300	380	3600	2204	Good	Fair		Low	Medium	Low	Rd & RW	23.9%	Retain
67	Corymbia maculata | Spotted Gum	23	14	575	650	6900	2762	Good	Fair	Wound(s) | Previous failures	Medium	Medium	Medium	Rd & RW	39.5%	Retain
68	Eucalyptus microcorys | Tallowwood	8	8	380	400	4560	2252	Fair	Fair		Low	Medium	Low	RW	0.9%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
69	Eucalyptus sp. | Eucalypt	21	16	675	720	8100	2883	Fair	Fair		High	Medium	High	Rd & RW	7.4%	Retain
70	Eucalyptus microcorys | Tallowwood	21	13	1050	1150	12600	3509	Good	Fair		High	Medium	High	Rd & RW	28.2%	Retain
71	Acacia decurrens | Green Wattle	2	5	275	325	3300	2064	Fair	Fair		Low	Short	Low	NA	0%	Retain
72	Callistemon viminalis | Weeping Bottlebrush	6	4	200	250	2400	1849	Good	Good		Low	Medium	Low	RW	6.0%	Retain
73	Callistemon viminalis | Weeping Bottlebrush	6	4	200	250	2400	1849	Good	Good		Low	Medium	Low	RW	0.4%	Retain
74	Callistemon viminalis | Weeping Bottlebrush	6	4	300	350	3600	2129	Good	Good		Low	Medium	Low	Rd & RW	18.1%	Retain
75	Callistemon viminalis | Weeping Bottlebrush	3	2	100	200	2000	1683	Fair	Poor		Low	Short	Low	RW	9.8%	Retain
76	Callistemon viminalis | Weeping Bottlebrush	3	2	100	200	2000	1683	Fair	Poor		Low	Short	Low	RW	7.5%	Retain
77	Callistemon viminalis | Weeping Bottlebrush	6	5	325	370	3900	2180	Good	Fair		Low	Medium	Low	Rd & RW	22.6%	Retain
78	Callistemon viminalis | Weeping Bottlebrush	6	5	325	370	3900	2180	Good	Fair		Low	Medium	Low	Rd & RW	25.0%	Retain
79	Callistemon viminalis | Weeping Bottlebrush	6	5	325	370	3900	2180	Good	Fair		Low	Medium	Low	Rd & RW	28.7%	Retain
80	Callistemon viminalis | Weeping Bottlebrush	6	5	325	370	3900	2180	Good	Fair		Low	Medium	Low	Rd & RW	25.1%	Retain
81	Callistemon viminalis | Weeping Bottlebrush	6	5	325	370	3900	2180	Good	Fair		Low	Medium	Low	Rd & RW	23.0%	Retain
82	Callistemon viminalis | Weeping Bottlebrush	6	5	325	370	3900	2180	Good	Fair		Low	Medium	Low	Rd & RW	20.1%	Retain
83	Callistemon viminalis | Weeping Bottlebrush	5	4	225	275	2700	1924	Good	Fair		Low	Medium	Low	Rd & RW	8.2%	Retain
84	Callistemon viminalis | Weeping Bottlebrush	5	4	225	275	2700	1924	Good	Fair		Low	Medium	Low	Rd & RW	7.8%	Retain
85	Callistemon viminalis | Weeping Bottlebrush	5	4	225	275	2700	1924	Good	Fair		Low	Medium	Low	Rd & RW	8.4%	Retain
86	Callistemon viminalis | Weeping Bottlebrush	5	4	225	275	2700	1924	Good	Fair		Low	Medium	Low	Rd & RW	12.8%	Retain
87	Callistemon viminalis | Weeping Bottlebrush	5	4	225	275	2700	1924	Good	Fair		Low	Medium	Low	Rd & RW	15.1%	Retain
88	Callistemon viminalis | Weeping	5	5	280	325	3360	2064	Good	Fair		Low	Medium	Low	Rd & RW	20.7%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
	Bottlebrush															
89	Callistemon viminalis | Weeping Bottlebrush	5	5	280	325	3360	2064	Good	Fair		Low	Medium	Low	Rd & RW	17.8%	Retain
90	Callistemon viminalis | Weeping Bottlebrush	5	5	320	360	3840	2155	Good	Fair		Low	Medium	Low	Rd & RW	33.2%	Retain
91	Callistemon viminalis | Weeping Bottlebrush	5	5	300	340	3600	2104	Good	Fair		Low	Medium	Low	Rd & RW	29.1%	Retain
92	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	23.8%	Retain
93	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	20.7%	Retain
94	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	17.0%	Retain
95	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	21.8%	Retain
96	Callistemon viminalis | Weeping Bottlebrush	5	4	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	30.6%	Retain
97	Callistemon viminalis | Weeping Bottlebrush	5	4	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	13.7%	Retain
98	Callistemon viminalis | Weeping Bottlebrush	5	4	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	18.3%	Retain
99	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	11.9%	Retain
100	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	13.8%	Retain
101	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	Rd & RW	13.7%	Retain
102	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	Parking & RW	17.0%	Retain
103	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	RW	8.5%	Retain
104	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	RW	0.5%	Retain
105	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	RW	1.5%	Retain
106	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	RW	2.9%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
107	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	NA	0%	Retain
108	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	NA	0%	Retain
109	Callistemon viminalis | Weeping Bottlebrush	5	5	275	300	3300	1996	Good	Fair		Low	Medium	Low	RW	0.02%	Retain
110	Callistemon viminalis | Weeping Bottlebrush	5	4	250	270	3000	1910	Good	Fair		Low	Medium	Low	NA	0%	Retain
111	Callistemon viminalis | Weeping Bottlebrush	5	4	250	270	3000	1910	Good	Fair		Low	Medium	Low	NA	0%	Retain
112	Callistemon viminalis | Weeping Bottlebrush	5	4	250	270	3000	1910	Good	Fair		Low	Medium	Low	RW & Path	8.2%	Retain
113	Callistemon viminalis | Weeping Bottlebrush	5	4	250	270	3000	1910	Good	Fair		Low	Medium	Low	RW & Path	8.2%	Retain
114	Callistemon viminalis | Weeping Bottlebrush	5	4	250	270	3000	1910	Good	Fair		Low	Medium	Low	RW & Path	12.2%	Retain
115	Callistemon viminalis | Weeping Bottlebrush	5	5	275	270	3300	1910	Good	Fair		Low	Medium	Low	RW & Path	3.9%	Retain
116	Callistemon viminalis | Weeping Bottlebrush	5	5	275	270	3300	1910	Good	Fair		Low	Medium	Low	NA	0%	Retain
117	Casuarina glauca | Swamp she-oak	17	9	550	550	6600	2575	Poor	Poor	Included bark | Poor tree form | Multi stemmed at base	Low	Short	Low	Rd	100%	Remove
118	Casuarina glauca | Swamp she-oak (x3)	12	6	308	350	3696	2129	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
119	Casuarina glauca | Swamp she-oak	20	6	380	430	4560	2322	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
120	Casuarina glauca | Swamp she-oak (x4)	12	4	280	320	3360	2051	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
121	Casuarina glauca | Swamp she-oak (x4)	12	4	280	320	3360	2051	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
122	Corymbia citriodora | Lemon-scented Gum	21	6	375	400	4500	2252	Fair	Fair		Low	Medium	Medium	B 6	100%	Remove
123	Corymbia citriodora | Lemon-scented Gum	18	6	350	390	4200	2228	Fair	Fair		Low	Medium	Medium	Rd	100%	Remove
124	Corymbia citriodora | Lemon-scented Gum	18	6	340	390	4080	2228	Fair	Fair		Low	Medium	Medium	Rd	100%	Remove
125	Corymbia citriodora | Lemon-scented Gum	19	6	375	400	4500	2252	Fair	Fair		Low	Medium	Medium	Rd & RW	38.7%	Retain
126	Corymbia citriodora | Lemon-scented Gum	22	6	375	400	4500	2252	Fair	Fair		Low	Medium	Medium	Rd & RW	36.4%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
127	Corymbia citriodora | Lemon-scented Gum (x2)	15	3	300	350	3600	2129	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
128	Corymbia citriodora | Lemon-scented Gum	18	5	325	360	3900	2155	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
129	Corymbia citriodora | Lemon-scented Gum (x2)	11	4	250	280	3000	1939	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
130	Corymbia citriodora | Lemon-scented Gum	19	7	350	400	4200	2252	Good	Fair	Slender form	Low	Medium	Low	B 6	100%	Remove
131	Corymbia citriodora | Lemon-scented Gum	18	7	340	400	4080	2252	Good	Fair		Low	Medium	Medium	B 6	100%	Remove
132	Corymbia citriodora | Lemon-scented Gum	18	7	350	400	4200	2252	Good	Fair		Low	Medium	Medium	B 6	100%	Remove
133	Corymbia citriodora | Lemon-scented Gum	18	7	350	400	4200	2252	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
134	Corymbia citriodora | Lemon-scented Gum	19	7	350	400	4200	2252	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
135	Corymbia citriodora | Lemon-scented Gum	17	7	340	380	4080	2204	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
136	Corymbia citriodora | Lemon-scented Gum	17	5	320	360	3840	2155	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
137	Corymbia citriodora | Lemon-scented Gum	7	2	150	200	2000	1683	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
138	Corymbia citriodora | Lemon-scented Gum	17	5	300	350	3600	2129	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
139	Corymbia citriodora | Lemon-scented Gum	15	5	300	350	3600	2129	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
140	Corymbia citriodora | Lemon-scented Gum	15	5	300	350	3600	2129	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
141	Corymbia citriodora | Lemon-scented Gum	17	6	300	350	3600	2129	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
142	Corymbia citriodora | Lemon-scented Gum	17	5	300	350	3600	2129	Poor	Poor	Major decline	Low	Medium	Low	B 6	100%	Remove
143	Corymbia citriodora | Lemon-scented Gum	17	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	B 6	100%	Remove
144	Dead Tree | Dead tree	15	3	275	340	3300	2104	Dead	Fair		Low	n/a	Low	Rd	100%	Remove
145	Corymbia citriodora | Lemon-scented Gum	18	6	350	390	4200	2228	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
146	Corymbia citriodora | Lemon-scented Gum	16	4	275	325	3300	2064	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
147	Corymbia citriodora | Lemon-scented Gum	10	3	150	190	2000	1647	Poor	Fair		Low	Short	Low	Rd	100%	Remove
148	Corymbia citriodora | Lemon-scented Gum	10	3	150	190	2000	1647	Fair	Fair		Low	Medium	Low	Rd & RW	15.0%	Retain
149	Corymbia citriodora | Lemon-scented Gum	14	5	200	250	2400	1849	Fair	Poor	Poor tree form	Low	Medium	Low	Rd & RW	16.0%	Retain
150	Eucalyptus longifolia | Woollybutt	23	14	700	800	8400	3013	Good	Good		High	Medium	High	Rd & RW	17.8%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
151	Corymbia citriodora | Lemon-scented Gum	17	8	340	380	4080	2204	Good	Fair		Low	Medium	Medium	Rd & RW	37.8%	Retain
152	Corymbia citriodora | Lemon-scented Gum	17	8	340	380	4080	2204	Good	Fair		Low	Medium	Medium	Rd & RW	100%	Remove
153	Corymbia citriodora | Lemon-scented Gum	5	3	100	150	2000	1500	Good	Fair		Low	Medium	Low	Rd & RW	23.6%	Retain
154	Eucalyptus paniculata | Grey Ironbark	17	11	750	875	9000	3129	Good	Fair		High	Medium	High	Rd & RW	20.8%	Retain
155	Corymbia citriodora | Lemon-scented Gum	17	10	400	450	4800	2366	Fair	Fair		Low	Medium	Medium	Rd & RW	34.1%	Retain
156	Corymbia citriodora | Lemon-scented Gum	17	10	400	450	4800	2366	Fair	Fair		Low	Medium	Medium	Rd & RW	28.0%	Retain
157	Corymbia citriodora | Lemon-scented Gum	17	10	400	450	4800	2366	Fair	Fair		Low	Medium	Medium	Rd & RW	27.6%	Retain
158	Corymbia citriodora | Lemon-scented Gum	12	5	260	300	3120	1996	Fair	Fair		Low	Medium	Low	Rd & RW	20.7%	Retain
159	Corymbia citriodora | Lemon-scented Gum	17	10	325	370	3900	2180	Fair	Fair		Low	Medium	Low	Rd & RW	23.8%	Retain
160	Corymbia citriodora | Lemon-scented Gum	16	8	340	380	4080	2204	Fair	Fair		Low	Medium	Low	Rd & RW	23.8%	Retain
161	Corymbia citriodora | Lemon-scented Gum	17	8	340	380	4080	2204	Fair	Fair		Low	Medium	Low	Rd & RW	20.2%	Retain
162	Corymbia citriodora | Lemon-scented Gum	12	4	250	300	3000	1996	Fair	Fair		Low	Medium	Low	Rd & RW	13.9%	Retain
163	Corymbia citriodora | Lemon-scented Gum	14	4	280	330	3360	2077	Fair	Fair		Low	Medium	Low	Rd & RW	16.8%	Retain
164	Corymbia citriodora | Lemon-scented Gum	16	5	280	330	3360	2077	Fair	Fair		Low	Medium	Low	Rd & RW & Exit Path	100.0 %	Remove
165	Corymbia citriodora | Lemon-scented Gum	12	4	280	330	3360	2077	Fair	Fair		Low	Medium	Low	Rd & RW & Exit Path	16.4%	Remove
166	Corymbia citriodora | Lemon-scented Gum	11	4	280	330	3360	2077	Fair	Fair		Low	Medium	Low	Rd & RW	17.8%	Retain
167	Corymbia citriodora | Lemon-scented Gum	12	4	280	340	3360	2104	Fair	Fair		Low	Medium	Low	Rd & RW	28.1%	Retain
168	Corymbia citriodora | Lemon-scented Gum	12	4	280	340	3360	2104	Poor	Fair		Low	Medium	Low	Rd & RW	21.7%	Retain
169	Eucalyptus paniculata | Grey Ironbark	18	11	750	875	9000	3129	Poor	Fair		Medium	Medium	Medium	RW	23.7%	Retain
170	Corymbia citriodora | Lemon-scented Gum	16	4	275	320	3300	2051	Poor	Fair		Low	Medium	Low	Rd & RW	49.7%	Remove
171	Corymbia citriodora | Lemon-scented Gum	17	6	300	350	3600	2129	Fair	Fair		Low	Medium	Low	Rd & RW	100%	Remove
172	Corymbia citriodora | Lemon-scented Gum	18	7	340	385	4080	2216	Fair	Fair		Low	Medium	Low	Rd & RW	100%	Remove
173	Corymbia citriodora | Lemon-scented Gum	18	8	400	440	4800	2344	Fair	Fair		Low	Medium	Low	Rd & RW	100%	Remove
174	Corymbia citriodora | Lemon-scented Gum	17	6	380	400	4560	2252	Fair	Fair		Low	Medium	Low	Rd & RW	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
175	Corymbia citriodora | Lemon-scented Gum	17	6	380	400	4560	2252	Fair	Fair		Low	Medium	Low	Rd & RW	100%	Remove
176	Corymbia citriodora | Lemon-scented Gum	12	5	275	300	3300	1996	Fair	Fair		Low	Medium	Low	Rd & RW	100%	Remove
177	Corymbia citriodora | Lemon-scented Gum	15	6	320	390	3840	2228	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
178	Corymbia citriodora | Lemon-scented Gum	15	6	350	400	4200	2252	Fair	Fair	Poor tree form	Low	Medium	Low	Parking	100%	Remove
179	Corymbia citriodora | Lemon-scented Gum	14	4	280	340	3360	2104	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
180	Corymbia citriodora | Lemon-scented Gum	17	7	340	370	4080	2180	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
181	Corymbia citriodora | Lemon-scented Gum	14	5	260	290	3120	1968	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
182	Corymbia citriodora | Lemon-scented Gum	18	9	360	385	4320	2216	Fair	Fair		Low	Medium	Medium	Rd	100%	Remove
183	Corymbia citriodora | Lemon-scented Gum	18	9	360	385	4320	2216	Fair	Fair		Low	Medium	Medium	Rd	100%	Remove
184	Corymbia citriodora | Lemon-scented Gum	15	5	320	350	3840	2129	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
185	Corymbia citriodora | Lemon-scented Gum	7	3	130	170	2000	1572	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
186	Corymbia citriodora | Lemon-scented Gum	18	8	350	380	4200	2204	Good	Fair		Low	Medium	Low	Rd	100%	Remove
187	Corymbia citriodora | Lemon-scented Gum	18	8	350	380	4200	2204	Good	Fair		Low	Medium	Low	Rd	100%	Remove
188	Corymbia citriodora | Lemon-scented Gum	15	6	300	340	3600	2104	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
189	Corymbia citriodora | Lemon-scented Gum	17	6	300	340	3600	2104	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
190	Corymbia citriodora | Lemon-scented Gum	18	10	420	450	5040	2366	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
191	Corymbia citriodora | Lemon-scented Gum	14	5	270	320	3240	2051	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
192	Corymbia citriodora | Lemon-scented Gum	16	7	340	370	4080	2180	Fair	Fair	Bleeding/sap flow	Low	Medium	Low	Rd	100%	Remove
193	Corymbia citriodora | Lemon-scented Gum	16	4	275	300	3300	1996	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
194	Corymbia citriodora | Lemon-scented Gum	16	4	275	300	3300	1996	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
195	Corymbia citriodora | Lemon-scented Gum	16	4	275	300	3300	1996	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
196	Corymbia citriodora | Lemon-scented Gum	19	8	375	410	4500	2276	Fair	Fair		Low	Medium	Medium	Rd	100%	Remove
197	Corymbia citriodora | Lemon-scented Gum	14	3	250	280	3000	1939	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
198	Corymbia citriodora | Lemon-scented Gum	12	3	140	200	2000	1683	Fair	Fair		Low	Medium	Low	Rd	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
199	Corymbia citriodora | Lemon-scented Gum	12	3	140	200	2000	1683	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
200	Corymbia citriodora | Lemon-scented Gum	17	7	350	375	4200	2192	Fair	Fair		Low	Medium	Low	Rd & RW	39.0%	Remove
201	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Good	Good		Low	Medium	Low	Rd	100%	Remove
202	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Good	Good		Low	Medium	Low	Rd	100%	Remove
203	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Good	Good		Low	Medium	Low	B 6	100%	Remove
204	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Good	Good		Low	Medium	Low	B 6	100%	Remove
205	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Good		Low	Medium	Low	B 6	100%	Remove
206	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Good		Low	Medium	Low	B 6	100%	Remove
207	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Good		Low	Medium	Low	B 6	100%	Remove
208	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Dead	Fair	Suspected Fusarium Wilt	Low	n/a	Low	B 6	100%	Remove
209	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Good		Low	Medium	Low	B 6	100%	Remove
210	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Good		Low	Medium	Low	B 6 & Path	100%	Remove
211	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Good		Low	Medium	Low	Rd	100%	Remove
212	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Good		Low	Medium	Low	Rd	100%	Remove
213	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair	Suspected Fusarium Wilt	Low	Medium	Low	Rd	100%	Remove
214	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Dead	Fair	Suspected Fusarium Wilt	Low	n/a	Low	B 5 Office	100%	Remove
215	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair	Suspected Fusarium Wilt	Low	Medium	Low	B 5 Office	100%	Remove
216	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Dead	Fair	Suspected Fusarium Wilt	Low	n/a	Low	Rd & Parking	100%	Remove
217	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Dead	Fair	Suspected Fusarium Wilt	Low	n/a	Low	Rd & Parking	100%	Remove
218	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Dead	Fair	Suspected Fusarium Wilt	Low	n/a	Low	Rd & Parking	100%	Remove
219	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	Rd & Parking	100%	Remove
220	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 4	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
221	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Poor	Fair	Suspected Fusarium Wilt	Low	Medium	Low	B 4	100%	Remove
222	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 4	100%	Remove
223	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 4	100%	Remove
224	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 4	100%	Remove
225	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 4	100%	Remove
226	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 4	100%	Remove
227	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 4	100%	Remove
228	Magnolia grandiflora | Bull Bay	4	4	200	250	2400	1849	Poor	Fair		Low	Medium	Low	B 5	100%	Remove
229	Magnolia grandiflora | Bull Bay	5	5	350	380	4200	2204	Good	Fair		Low	Medium	Low	B 5	100%	Remove
230	Magnolia grandiflora | Bull Bay	5	5	350	380	4200	2204	Good	Fair		Low	Medium	Low	B 5	100%	Remove
231	Magnolia grandiflora | Bull Bay	3	4	200	250	2400	1849	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
232	Magnolia grandiflora | Bull Bay	3	4	275	325	3300	2064	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
233	Corymbia citriodora | Lemon-scented Gum	19	10	380	400	4560	2252	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
234	Corymbia citriodora | Lemon-scented Gum	19	10	380	400	4560	2252	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
235	Corymbia citriodora | Lemon-scented Gum	10	4	240	280	2880	1939	Fair	Fair		Low	Medium	Low	Path	100%	Remove
236	Corymbia citriodora | Lemon-scented Gum	17	8	370	390	4440	2228	Fair	Fair		Low	Medium	Low	Path	100%	Remove
237	Corymbia citriodora | Lemon-scented Gum	17	8	370	390	4440	2228	Fair	Fair		Low	Medium	Medium	B 6	100%	Remove
238	Corymbia citriodora | Lemon-scented Gum	15	4	240	280	2880	1939	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
239	Corymbia citriodora | Lemon-scented Gum	15	4	240	280	2880	1939	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
240	Corymbia citriodora | Lemon-scented Gum	17	7	320	375	3840	2192	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
241	Corymbia citriodora | Lemon-scented Gum	12	2	200	240	2400	1817	Poor	Poor	Dead leader	Low	Short	Low	B 6	100%	Remove
242	Corymbia citriodora | Lemon-scented Gum	18	8	350	380	4200	2204	Fair	Fair		Low	Medium	Medium	B 6	100%	Remove
243	Corymbia citriodora | Lemon-scented Gum	18	8	350	380	4200	2204	Fair	Fair		Low	Medium	Medium	B 6	100%	Remove
244	Corymbia citriodora | Lemon-scented Gum	18	8	350	380	4200	2204	Fair	Fair		Low	Medium	Medium	B 6	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
245	Corymbia citriodora | Lemon-scented Gum	18	8	350	380	4200	2204	Fair	Fair		Low	Medium	Medium	B 6	100%	Remove
246	Corymbia citriodora | Lemon-scented Gum	16	6	300	340	3600	2104	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
247	Corymbia citriodora | Lemon-scented Gum	16	6	300	340	3600	2104	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
248	Corymbia citriodora | Lemon-scented Gum	12	5	260	300	3120	1996	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
249	Corymbia citriodora | Lemon-scented Gum	16	7	320	340	3840	2104	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
250	Corymbia citriodora | Lemon-scented Gum	15	9	350	400	4200	2252	Fair	Fair	Poor tree form	Low	Medium	Low	B 6	100%	Remove
251	Corymbia citriodora | Lemon-scented Gum	18	8	350	400	4200	2252	Fair	Fair		Low	Medium	Medium	B 6	100%	Remove
252	Corymbia citriodora | Lemon-scented Gum	11	5	225	270	2700	1910	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
253	Corymbia citriodora | Lemon-scented Gum	11	5	225	270	2700	1910	Poor	Fair		Low	Medium	Low	B 6	100%	Remove
254	Corymbia citriodora | Lemon-scented Gum	11	5	225	270	2700	1910	Poor	Fair		Low	Medium	Low	B 6	100%	Remove
255	Corymbia citriodora | Lemon-scented Gum	17	5	350	380	4200	2204	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
256	Corymbia citriodora | Lemon-scented Gum	17	5	350	380	4200	2204	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
257	Corymbia citriodora | Lemon-scented Gum	17	5	350	380	4200	2204	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
258	Corymbia citriodora | Lemon-scented Gum	17	5	350	380	4200	2204	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
259	Corymbia citriodora | Lemon-scented Gum	14	4	300	340	3600	2104	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
260	Corymbia citriodora | Lemon-scented Gum	17	5	350	380	4200	2204	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
261	Corymbia citriodora | Lemon-scented Gum	14	4	300	350	3600	2129	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
262	Corymbia citriodora | Lemon-scented Gum	17	5	350	380	4200	2204	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
263	Corymbia citriodora | Lemon-scented Gum	16	4	275	320	3300	2051	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
264	Corymbia citriodora | Lemon-scented Gum	12	3	250	275	3000	1924	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
265	Corymbia citriodora | Lemon-scented Gum	16	5	275	320	3300	2051	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
266	Corymbia citriodora | Lemon-scented Gum	18	6	340	380	4080	2204	Fair	Fair		Low	Medium	Medium	B 6	100%	Remove
267	Corymbia citriodora | Lemon-scented Gum	17	3	260	300	3120	1996	Fair	Fair		Low	Medium	Low	B 6	100%	Remove
268	Corymbia citriodora | Lemon-scented Gum	17	4	280	340	3360	2104	Fair	Fair	Previous failures	Low	Medium	Low	B 6	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
269	Corymbia citriodora | Lemon-scented Gum	17	4	280	340	3360	2104	Dead	Fair		Low	n/a	Low	Rd & Path	100%	Remove
270	Corymbia citriodora | Lemon-scented Gum	18	5	325	370	3900	2180	Fair	Fair		Low	Medium	Medium	Rd & Path	100%	Remove
271	Corymbia citriodora | Lemon-scented Gum	14	6	325	370	3900	2180	Dead	Fair		Low	n/a	Low	Rd	100%	Remove
272	Corymbia citriodora | Lemon-scented Gum	8	7	220	300	2640	1996	Fair	Fair	Poor tree form	Low	Medium	Low	Rd	100%	Remove
273	Magnolia grandiflora | Bull Bay	5	5	275	350	3300	2129	Good	Good		Low	Medium	Low	Parking	100%	Remove
274	Magnolia grandiflora | Bull Bay	5	5	275	350	3300	2129	Good	Good		Low	Medium	Low	Rd & Parking	100%	Remove
275	Magnolia grandiflora | Bull Bay	5	5	300	350	3600	2129	Good	Good		Low	Medium	Low	Rd	100%	Remove
276	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Dead	Poor	Suspected Fusarium Wilt	Low	n/a	Low	B 6	100%	Remove
277	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Dead	Poor	Suspected Fusarium Wilt	Low	n/a	Low	B 6	100%	Remove
278	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Good	Good	Suspected Fusarium Wilt	Low	Medium	Low	B 6	100%	Remove
279	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Poor	Fair	Suspected Fusarium Wilt	Low	Medium	Low	B 6	100%	Remove
280	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Dead	Poor	Suspected Fusarium Wilt	Low	n/a	Low	B 6	100%	Remove
281	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Good	Good		Low	Medium	Low	B 6	100%	Remove
282	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Good	Good		Low	Medium	Low	Parking	100%	Remove
283	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Good	Good		Low	Medium	Low	Parking	100%	Remove
284	Washingtonia robusta | Washington Palm	5	5	300	350	3500	0	Good	Good		Low	Medium	Low	Parking	100%	Remove
285	Corymbia citriodora | Lemon-scented Gum	16	10	400	450	4800	2366	Good	Fair		Low	Medium	Medium	Parking	100%	Remove
286	Corymbia citriodora | Lemon-scented Gum	17	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	Parking	100%	Remove
287	Corymbia citriodora | Lemon-scented Gum	15	8	300	350	3600	2129	Good	Fair		Low	Medium	Low	Parking	100%	Remove
288	Corymbia citriodora | Lemon-scented Gum	17	8	340	380	4080	2204	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
289	Corymbia citriodora | Lemon-scented Gum	17	8	340	380	4080	2204	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
290	Corymbia citriodora | Lemon-scented Gum	9	5	200	250	2400	1849	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
291	Corymbia citriodora | Lemon-scented Gum	9	5	200	250	2400	1849	Fair	Fair		Low	Medium	Low	Parking	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
292	Corymbia citriodora | Lemon-scented Gum	18	8	375	420	4500	2299	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
293	Corymbia citriodora | Lemon-scented Gum	18	9	390	430	4680	2322	Good	Fair		Low	Medium	Medium	Parking	100%	Remove
294	Corymbia citriodora | Lemon-scented Gum	18	9	440	500	5280	2474	Good	Fair		Low	Medium	Medium	B 6	100%	Remove
295	Corymbia citriodora | Lemon-scented Gum (x3)	10	4	225	270	2700	1910	Good	Fair		Low	Medium	Low	Parking	100%	Remove
296	Corymbia citriodora | Lemon-scented Gum	18	9	410	440	4920	2344	Good	Fair		Low	Medium	Medium	B 6	100%	Remove
297	Phoenix canariensis | Canary Island Date Palm	5	5	400	500	3500	0	Good	Fair		Low	Medium	Low	Rd & Parking	100%	Remove
298	Magnolia grandiflora | Bull Bay	5	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	Path & B 6	100%	Remove
299	Magnolia grandiflora | Bull Bay	5	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	B 6	100%	Remove
300	Magnolia grandiflora | Bull Bay	5	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	B 6	100%	Remove
301	Magnolia grandiflora | Bull Bay	5	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	Path & Parking	100%	Remove
302	Magnolia grandiflora | Bull Bay	5	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	Rd	100%	Remove
303	Magnolia grandiflora | Bull Bay	3	3	250	300	3000	1996	Fair	Good		Low	Medium	Low	B 7	100%	Remove
304	Magnolia grandiflora | Bull Bay	3	3	250	300	3000	1996	Fair	Good		Low	Medium	Low	B 7	100%	Remove
305	Magnolia grandiflora | Bull Bay	6	6	385	430	4620	2322	Good	Good		Low	Medium	Low	B 7	100%	Remove
306	Magnolia grandiflora | Bull Bay	4	300	385	320	4620	2051	Fair	Good		Low	Medium	Low	B 7	100%	Remove
307	Magnolia grandiflora | Bull Bay	4	300	385	320	4620	2051	Fair	Good		Low	Medium	Low	B 7	100%	Remove
308	Magnolia grandiflora | Bull Bay	5	5	350	370	4200	2180	Fair	Good		Low	Medium	Low	B 7	100%	Remove
309	Magnolia grandiflora | Bull Bay (x3)	4	4	250	300	3000	1996	Fair	Good		Low	Medium	Low	Parking	100%	Remove
310	Magnolia grandiflora | Bull Bay	6	6	375	400	4500	2252	Good	Good		Low	Medium	Low	Parking	100%	Remove
311	Magnolia grandiflora | Bull Bay	4	5	275	325	3300	2064	Fair	Good		Low	Medium	Low	Parking	100%	Remove
312	Magnolia grandiflora | Bull Bay	5	7	350	380	4200	2204	Good	Good		Low	Medium	Low	B 5 & Parking	100%	Remove
313	Magnolia grandiflora | Bull Bay	3	3	250	285	3000	1953	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
314	Magnolia grandiflora | Bull Bay	3	3	250	285	3000	1953	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
315	Magnolia grandiflora | Bull Bay	3	3	250	285	3000	1953	Fair	Fair		Low	Medium	Low	B 5	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
316	Magnolia grandiflora | Bull Bay	8	9	475	500	5700	2474	Good	Good		Medium	Medium	Medium	B 5	100%	Remove
317	Magnolia grandiflora | Bull Bay	7	8	420	450	5040	2366	Good	Good		Medium	Medium	Medium	B 5	100%	Remove
318	Magnolia grandiflora | Bull Bay	6	5	325	375	3900	2192	Good	Good		Low	Medium	Low	B 5	100%	Remove
319	Magnolia grandiflora | Bull Bay	6	5	325	375	3900	2192	Good	Good		Low	Medium	Low	B 5	100%	Remove
320	Magnolia grandiflora | Bull Bay	6	5	325	375	3900	2192	Good	Good		Low	Medium	Low	B 5	100%	Remove
321	Corymbia citriodora | Lemon-scented Gum	16	8	340	400	4080	2252	Fair	Fair	Poor tree form	Low	Medium	Low	B 5	100%	Remove
322	Corymbia citriodora | Lemon-scented Gum	19	9	420	480	5040	2431	Good	Fair	Wound(s)	Low	Medium	Medium	B 5	100%	Remove
323	Corymbia citriodora | Lemon-scented Gum	16	6	300	360	3600	2155	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
324	Corymbia citriodora | Lemon-scented Gum	18	8	400	440	4800	2344	Good	Poor	Poor tree form | Potential root plate movement	Low	Medium	Low	B 5	100%	Remove
325	Corymbia citriodora | Lemon-scented Gum	20	8	400	440	4800	2344	Good	Fair		Low	Medium	Medium	B 5	100%	Remove
326	Corymbia citriodora | Lemon-scented Gum	12	4	200	250	2400	1849	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
327	Corymbia citriodora | Lemon-scented Gum	20	7	340	400	4080	2252	Fair	Fair		Low	Medium	Medium	B 5	100%	Remove
328	Corymbia citriodora | Lemon-scented Gum	18	7	320	350	3840	2129	Fair	Fair		Low	Medium	Medium	B 5	100%	Remove
329	Corymbia citriodora | Lemon-scented Gum	18	9	380	410	4560	2276	Good	Fair	Bleeding/sap flow	Low	Medium	Medium	B 5	100%	Remove
330	Corymbia citriodora | Lemon-scented Gum	14	6	320	370	3840	2180	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
331	Corymbia citriodora | Lemon-scented Gum	10	3	180	200	2160	1683	Poor	Fair		Low	Medium	Low	B 5	100%	Remove
332	Corymbia citriodora | Lemon-scented Gum	18	11	440	480	5280	2431	Fair	Fair		Low	Medium	Medium	B 5	100%	Remove
333	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair	Suspected Fusarium Wilt	Low	Medium	Low	B 5	100%	Remove
334	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Good	Suspected Fusarium Wilt	Low	Medium	Low	B 5	100%	Remove
335	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair	Suspected Fusarium Wilt	Low	Medium	Low	B 5	100%	Remove
336	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Poor	Poor	Suspected Fusarium Wilt	Low	Medium	Low	B 5	100%	Remove
337	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Dead	Poor	Suspected Fusarium Wilt	Low	n/a	Low	B 5	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
338	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair	Suspected Fusarium Wilt	Low	Medium	Low	B 5	100%	Remove
339	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
340	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
341	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
342	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
343	Cupaniopsis anacardioides | Tuckaroo	7	10	640	620	7680	2707	Good	Fair		Low	Medium	Medium	B 5	100%	Remove
344	Syzygium sp. | Lilly Pilly	6	2	200	230	2400	1785	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
345	Howea forsteriana | Kentia Palm	5	3	200	250	2500	0	Good	Good		Low	Medium	Low	B 5	100%	Remove
346	Ficus benjamina | Weeping Fig	16	12	670	780	8040	2981	Good	Fair	Included bark	Low	Medium	Low	B 5	100%	Remove
348	Cupaniopsis anacardioides | Tuckaroo	4	3	200	250	2400	1849	Fair	Fair		Low	Medium	Low	B 5 & Rd	100%	Remove
349	Dypsis leutescens | Golden Cane Palm	4	3	200	250	2500	0	Fair	Fair		Low	Medium	Low	B 5 & Rd	100%	Remove
350	Beaucarnea recurvata | Ponytail Palm	4	4	300	350	3000	0	Fair	Fair		Low	Medium	Low	B 5 & Rd	100%	Remove
351	Archontophoenix alexandrea | Alexandrea Palm (x3)	8	3	300	350	2500	0	Good	Good		Low	Medium	Low	B 5 & Rd	100%	Remove
352	Dypsis leutescens | Golden Cane Palm	4	3	200	250	2500	0	Fair	Fair		Low	Medium	Low	B 5 & Rd	100%	Remove
353	Cupaniopsis anacardioides | Tuckaroo	5	5	375	400	4500	2252	Fair	Fair		Low	Medium	Low	B 5 & Rd	100%	Remove
354	Stenocarpus sinuatus | Fire Wheel Tree	4	2	150	180	2000	1611	Fair	Fair		Low	Medium	Low	B 5 & Rd	100%	Remove
355	Syzygium sp. | Lilly Pilly	3	2	200	280	2400	1939	Poor	Fair		Low	Medium	Low	B 5 & Rd	100%	Remove
356	Archontophoenix alexandrea | Alexandrea Palm	8	3	325	380	2500	0	Fair	Good		Low	Medium	Low	Rd	100%	Remove
357	Archontophoenix alexandrea | Alexandrea Palm	8	3	325	380	2500	0	Fair	Good		Low	Medium	Low	Rd	100%	Remove
358	Corymbia citriodora | Lemon-scented Gum	21	12	450	500	5400	2474	Good	Good		Medium	Medium	Medium	Rd	100%	Remove
359	Corymbia citriodora | Lemon-scented Gum	17	7	370	400	4440	2252	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
360	Corymbia citriodora | Lemon-scented Gum	17	7	370	400	4440	2252	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
361	Corymbia citriodora | Lemon-scented Gum	16	6	300	350	3600	2129	Fair	Fair		Low	Medium	Low	Rd	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
362	Corymbia citriodora | Lemon-scented Gum	16	6	300	350	3600	2129	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
363	Corymbia citriodora | Lemon-scented Gum	8	5	200	280	2400	1939	Poor	Poor		Low	Medium	Low	Rd	100%	Remove
364	Corymbia citriodora | Lemon-scented Gum	16	7	340	380	4080	2204	Dead	Poor		Low	n/a	Low	Rd	100%	Remove
365	Corymbia citriodora | Lemon-scented Gum	16	7	340	380	4080	2204	Poor	Fair		Low	Medium	Low	Rd	100%	Remove
366	Corymbia citriodora | Lemon-scented Gum	16	7	340	380	4080	2204	Poor	Fair		Low	Medium	Low	Rd	100%	Remove
367	Corymbia citriodora | Lemon-scented Gum	7	3	200	250	2400	1849	Poor	Fair		Low	Medium	Low	Rd	100%	Remove
368	Corymbia citriodora | Lemon-scented Gum	14	6	325	370	3900	2180	Poor	Fair		Low	Medium	Low	Rd	100%	Remove
369	Corymbia citriodora | Lemon-scented Gum	17	10	400	470	4800	2410	Fair	Good		Medium	Medium	Medium	Rd	100%	Remove
370	Corymbia citriodora | Lemon-scented Gum	16	5	270	310	3240	2024	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
371	Corymbia citriodora | Lemon-scented Gum	8	3	200	250	2400	1849	Dead	Fair		Low	n/a	Low	Rd	100%	Remove
372	Corymbia citriodora | Lemon-scented Gum	10	3	275	320	3300	2051	Dead	Fair		Low	n/a	Low	Rd	100%	Remove
373	Corymbia citriodora | Lemon-scented Gum	20	10	440	480	5280	2431	Fair	Fair		Medium	Medium	Medium	Rd	100%	Remove
374	Corymbia citriodora | Lemon-scented Gum	10	5	225	280	2700	1939	Poor	Fair		Low	Medium	Low	Rd	100%	Remove
375	Corymbia citriodora | Lemon-scented Gum	15	9	375	420	4500	2299	Fair	Good		Medium	Medium	Medium	Rd	100%	Remove
376	Magnolia grandiflora | Bull Bay	4	5	275	300	3300	1996	Good	Good		Low	Medium	Low	Parking	100%	Remove
377	Magnolia grandiflora | Bull Bay	4	5	275	300	3300	1996	Good	Good		Low	Medium	Low	Parking	100%	Remove
378	Magnolia grandiflora | Bull Bay	4	5	275	300	3300	1996	Good	Good		Low	Medium	Low	Parking	100%	Remove
379	Magnolia grandiflora | Bull Bay	4	5	300	350	3600	2129	Good	Good		Low	Medium	Low	Café	100%	Remove
380	Magnolia grandiflora | Bull Bay	6	6	400	380	4800	2204	Good	Good		Low	Medium	Low	Café	100%	Remove
381	Banksia serrata | Saw-toothed Banksia	4	4	250	350	3000	2129	Poor	Fair		Low	Medium	Low	Café	100%	Remove
382	Melaleuca bracteata | Black Tea Tree	8	8	450	500	5400	2474	Good	Fair		Low	Medium	Low	B 5	100%	Remove
383	Melaleuca bracteata | Black Tea Tree	8	8	450	500	5400	2474	Good	Fair		Low	Medium	Low	B 5	100%	Remove
384	Melaleuca bracteata | Black Tea Tree	8	8	450	500	5400	2474	Good	Fair		Low	Medium	Low	B 5	100%	Remove
385	Melaleuca bracteata | Black Tea Tree	5	3	250	280	3000	1939	Fair	Fair		Low	Medium	Low	B 5	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
386	Jacaranda mimosifolia | Jacaranda	5	6	400	425	4800	2310	Good	Fair		Low	Medium	Low	B 5	100%	Remove
387	Banksia integrifolia | Coast Banksia	4	4	320	390	3840	2228	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
388	Banksia integrifolia | Coast Banksia	10	8	530	680	6360	2814	Dead	Fair		Low	n/a	Low	B 5	100%	Remove
389	Banksia integrifolia | Coast Banksia	12	5	320	360	3840	2155	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
390	Banksia integrifolia | Coast Banksia	12	5	375	400	4500	2252	Good	Fair		Low	Medium	Low	Café	100%	Remove
391	Washingtonia robusta | Washington Palm	4	3	300	350	2500	0	Fair	Fair		Low	Medium	Low	Café	100%	Remove
392	Banksia integrifolia | Coast Banksia	6	5	350	375	4200	2192	Fair	Fair		Low	Medium	Low	Café	100%	Remove
393	Banksia integrifolia | Coast Banksia	17	8	440	490	5280	2453	Good	Fair		Medium	Medium	Medium	Café	100%	Remove
394	Banksia integrifolia | Coast Banksia	9	5	330	380	3960	2204	Fair	Fair		Low	Medium	Low	Café	100%	Remove
395	Banksia integrifolia | Coast Banksia	4	2	225	260	2700	1879	Fair	Fair		Low	Medium	Low	Café	100%	Remove
396	Banksia integrifolia | Coast Banksia	17	7	420	450	5040	2366	Good	Fair		Medium	Medium	Medium	Café	100%	Remove
397	Washingtonia robusta | Washington Palm	9	5	420	450	3500	0	Good	Fair		Low	Medium	Low	Café	100%	Remove
398	Callistemon viminalis | Weeping Bottlebrush	5	5	390	440	4680	2344	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
399	Callistemon viminalis | Weeping Bottlebrush	5	5	390	440	4680	2344	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
400	Syzygium sp. | Lilly Pilly	4	4	300	370	3600	2180	Good	Good		Low	Medium	Low	B 5	100%	Remove
401	Corymbia citriodora | Lemon-scented Gum	18	11	520	625	6240	2717	Good	Fair		Medium	Medium	Medium	B 5	100%	Remove
402	Corymbia citriodora | Lemon-scented Gum	18	11	450	520	5400	2515	Fair	Fair	Decay | Root damage | Soil grade change | Wound(s)			Low	B 5	100%	Remove
403	Corymbia maculata | Spotted Gum	12	6	340	380	4080	2204	Poor	Poor	Decay | Dieback-general | Wound(s)		Short	Low	B 5	100%	Remove
404	Syzygium sp. | Lilly Pilly	4	5	370	360	4440	2155	Good	Fair		Low	Medium	Low	B 5	100%	Remove
405	Cupaniopsis anacardioides | Tuckaroo	5	5	320	350	3840	2129	Good	Fair		Low	Medium	Low	B 5	100%	Remove
406	Cupaniopsis anacardioides | Tuckaroo	6	5	350	380	4200	2204	Good	Fair		Low	Medium	Low	B 5	100%	Remove
407	Syzygium sp. | Lilly Pilly	5	3	225	270	2700	1910	Fair	Fair		Low	Medium	Low	B 5	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
408	Syzygium sp. | Lilly Pilly	5	3	225	270	2700	1910	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
409	Syzygium sp. | Lilly Pilly	4	3	240	260	2880	1879	Poor	Fair		Low	Medium	Low	B 5	100%	Remove
410	Syzygium sp. | Lilly Pilly	4	3	240	260	2880	1879	Poor	Fair		Low	Medium	Low	B 5	100%	Remove
411	Cupaniopsis anacardioides | Tuckaroo	5	4	380	390	4560	2228	Good	Poor		Low	Medium	Low	B 5	100%	Remove
412	Cupaniopsis anacardioides | Tuckaroo	9	9	460	500	5520	2474	Good	Fair		Medium	Medium	Medium	B 5	100%	Remove
413	Cupaniopsis anacardioides | Tuckaroo	8	5	340	290	4080	1968	Good	Fair		Low	Medium	Low	B 5	100%	Remove
414	Cupaniopsis anacardioides | Tuckaroo	8	5	340	290	4080	1968	Good	Fair		Low	Medium	Low	B 5	100%	Remove
415	Cupaniopsis anacardioides | Tuckaroo	8	5	340	290	4080	1968	Good	Fair		Low	Medium	Low	B 5	100%	Remove
416	Cupaniopsis anacardioides | Tuckaroo	8	5	340	290	4080	1968	Good	Fair		Low	Medium	Low	B 5	100%	Remove
417	Cupaniopsis anacardioides | Tuckaroo	8	5	340	290	4080	1968	Good	Fair		Low	Medium	Low	B 5	100%	Remove
418	Cupaniopsis anacardioides | Tuckaroo	7	4	325	360	3900	2155	Good	Fair		Low	Medium	Low	B 5	100%	Remove
419	Cupaniopsis anacardioides | Tuckaroo	7	4	325	360	3900	2155	Good	Fair		Low	Medium	Low	B 5	100%	Remove
420	Cupaniopsis anacardioides | Tuckaroo	7	4	325	360	3900	2155	Good	Fair		Low	Medium	Low	B 5	100%	Remove
421	Cupaniopsis anacardioides | Tuckaroo	5	3	270	310	3240	2024	Good	Fair		Low	Medium	Low	B 5	100%	Remove
422	Cupaniopsis anacardioides | Tuckaroo	8	5	375	430	4500	2322	Good	Fair		Low	Medium	Low	B 5	100%	Remove
423	Cupaniopsis anacardioides | Tuckaroo	8	5	375	430	4500	2322	Good	Fair		Low	Medium	Low	B 5	100%	Remove
424	Cupaniopsis anacardioides | Tuckaroo	6	6	325	375	3900	2192	Good	Fair		Low	Medium	Low	B 5	100%	Remove
425	Cupaniopsis anacardioides | Tuckaroo	3	3	200	250	2400	1849	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
426	Cupaniopsis anacardioides | Tuckaroo	8	10	530	500	6360	2474	Good	Fair		Medium	Medium	Medium	B 5	100%	Remove
427	Syzygium sp. | Lilly Pilly	4	2	200	250	2400	1849	Poor	Fair		Low	Medium	Low	B 5	100%	Remove
428	Syzygium sp. | Lilly Pilly	4	2	200	250	2400	1849	Poor	Fair		Low	Medium	Low	B 5	100%	Remove
429	Melaleuca quinquenervia | Broad-leaved Paperbark	14	8	450	500	5400	2474	Fair	Fair		Medium	Medium	Medium	B 5	100%	Remove
430	Melaleuca quinquenervia | Broad-leaved Paperbark	9	5	375	400	4500	2252	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
431	Melaleuca quinquenervia | Broad-leaved	17	10	800	800	9600	3013	Fair	Fair		Medium	Medium	Medium	B 5	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
	Paperbark															
432	Melaleuca quinquenervia | Broad-leaved Paperbark	15	9	450	480	5400	2431	Fair	Fair		Medium	Medium	Medium	B 5	100%	Remove
433	Melaleuca quinquenervia | Broad-leaved Paperbark (x3)	10	6	360	380	4320	2204	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
434	Melaleuca quinquenervia | Broad-leaved Paperbark	10	6	425	480	5100	2431	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
435	Melaleuca quinquenervia | Broad-leaved Paperbark	6	4	325	370	3900	2180	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
436	Melaleuca quinquenervia | Broad-leaved Paperbark	6	4	325	370	3900	2180	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
437	Melaleuca quinquenervia | Broad-leaved Paperbark	8	5	375	400	4500	2252	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
438	Melaleuca quinquenervia | Broad-leaved Paperbark	8	5	375	400	4500	2252	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
439	Melaleuca quinquenervia | Broad-leaved Paperbark	6	3	325	370	3900	2180	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
440	Melaleuca quinquenervia | Broad-leaved Paperbark	6	3	325	370	3900	2180	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
441	Melaleuca quinquenervia | Broad-leaved Paperbark	5	6	375	400	4500	2252	Good	Fair		Low	Medium	Low	B 5	100%	Remove
442	Washingtonia robusta | Washington Palm	14	5	375	400	3500	0	Fair	Good		Low	Medium	Low	B 5	100%	Remove
443	Melaleuca quinquenervia | Broad-leaved Paperbark (x2)	3	3	270	300	3240	1996	Fair	Fair		Low	Medium	Low	B 5	100%	Remove
444	Angophora costata | Smooth-barked Apple Myrtle	12	9	400	440	4800	2344	Good	Good		Medium	Medium	Medium	B 5	100%	Remove
445	Schefflera actinophylla | Umbrella Tree	4	4	450	450	3000	0	Good	Poor		Low	Medium	Low	Rd & Parking	100%	Remove
446	Howea forsteriana | Kentia Palm (x2)	6	3	270	320	2500	0	Fair	Fair		Low	Medium	Low	Rd & Parking	100%	Remove
447	Archontophoenix cunninghamiana | Bangalow Palm	6	3	270	320	2500	0	Fair	Fair		Low	Medium	Low	Rd & Parking	100%	Remove
448	Phoenix canariensis | Canary Island Date Palm	12	6	600	800	4000	0	Good	Good		Medium	Medium	Medium	Rd & Parking	100%	Remove
449	Phoenix canariensis | Canary Island Date Palm	12	6	600	800	4000	0	Good	Good		Low	Medium	Low	Rd	17.9%	Retain
450	Araucaria columnaris | Cook Araucaria	22	8	600	680	7200	2814	Good	Good		High	Medium	High	Parking	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
451	Araucaria columnaris | Cook Araucaria	8	3	320	360	3840	2155	Good	Good		Low	Medium	Low	Parking	100%	Remove
452	Araucaria columnaris | Cook Araucaria	16	5	425	480	5100	2431	Good	Good		Medium	Medium	Medium	Parking	100%	Remove
453	Araucaria columnaris | Cook Araucaria	21	7	480	540	5760	2555	Good	Good		High	Medium	High	Parking	100%	Remove
454	Washingtonia robusta | Washington Palm	14	5	400	440	3500	0	Fair	Fair	Suspected Fusarium Wilt	Low	Medium	Low	Parking	100%	Remove
455	Callistemon viminalis | Weeping Bottlebrush	4	9	440	450	5280	2366	Good	Fair	Suspected Fusarium Wilt	Low	Medium	Low	Parking	100%	Remove
456	Cupaniopsis anacardioides | Tuckaroo	3	3	150	200	2000	1683	Good	Good	Suspected Fusarium Wilt	Low	Medium	Low	Parking	100%	Remove
457	Washingtonia sp | Washington Palm	14	5	400	485	3500	0	Fair	Fair	Suspected Fusarium Wilt	Low	Medium	Low	Parking	100%	Remove
458	Gleditsia triacanthos | Honey Locust	4	4	300	330	3600	2077	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
459	Glochidion ferdinandi | Cheese Tree	3	3	275	300	3300	1996	Poor	Fair		Low	Medium	Low	Parking	100%	Remove
460	Washingtonia robusta | Washington Palm	8	3	275	300	2500	0	Poor	Fair		Low	Medium	Low	Parking	100%	Remove
461	Livistona australis | Cabbage Fan Palm	14	3	275	300	2500	0	Poor	Fair		Low	Medium	Low	Cut	100%	Remove
462	Phoenix canariensis | Canary Island Date Palm	7	4	400	460	3000	0	Poor	Poor	Suspected Fusarium Wilt	Low	Medium	Low	Cut	100%	Remove
463	Washingtonia robusta | Washington Palm	8	4	400	500	3000	0	Fair	Fair		Low	Medium	Low	Fill	100%	Remove
464	Livistona australis | Cabbage Fan Palm	12	4	370	400	3000	0	Fair	Fair		Low	Medium	Low	Fill	100%	Remove
465	Washingtonia robusta | Washington Palm	5	4	400	500	3000	0	Good	Fair		Low	Medium	Low	Fill	100%	Remove
466	Washingtonia robusta | Washington Palm	10	4	400	500	3000	0	Fair	Fair		Low	Medium	Low	Fill	100%	Remove
467	Washingtonia robusta | Washington Palm	10	4	400	500	3000	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
468	Livistona australis | Cabbage Fan Palm	9	4	325	375	3000	0	Good	Fair		Low	Medium	Low	Parking	100%	Remove
469	Cupaniopsis anacardioides | Tuckaroo	10	9	420	460	5040	2388	Good	Fair		Medium	Medium	Medium	Parking	100%	Remove
470	Cupaniopsis anacardioides | Tuckaroo	10	9	420	460	5040	2388	Good	Fair		Low	Medium	Low	Parking	100%	Remove
471	Cupaniopsis anacardioides | Tuckaroo	8	9	450	440	5400	2344	Good	Fair		Low	Medium	Low	Parking	100%	Remove
472	Washingtonia robusta | Washington Palm	14	5	340	385	3500	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
473	Washingtonia robusta | Washington Palm	5	5	400	465	3500	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
474	Livistona sp. | Fan Palm	11	5	375	400	3500	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
475	Melia azedarach | White Cedar	4	4	270	290	3240	1968	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
476	Cotoneaster sp. | Cotoneaster	4	6	375	400	4500	2252	Good	Fair		Low	Medium	Low	Parking	100%	Remove
477	Phoenix canariensis | Canary Island Date Palm	9	6	800	1000	4000	0	Good	Fair		Low	Medium	Low	Parking	100%	Remove
478	Alnus jorullensis | Mexican Alder	6	6	375	420	4500	2299	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
479	Phoenix dactylifera | Date Palm	10	6	375	420	4000	0	Good	Fair		Low	Medium	Low	Parking & Fill	100%	Remove
480	Archontophoenix cunninghamiana | Bangalow Palm	6	3	300	370	2500	0	Fair	Fair		Low	Medium	Low	Parking & Fill	100%	Remove
481	Banksia integrifolia | Coast Banksia	3	3	250	300	3000	1996	Good	Fair		Low	Medium	Low	Parking & Fill	100%	Remove
482	Phoenix canariensis | Canary Island Date Palm	4	3	400	500	2500	0	Dead	Fair		Low	n/a	Low	Parking & Cut	100%	Remove
483	Washingtonia robusta | Washington Palm	16	4	400	475	3000	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
484	Howea forsteriana | Kentia Palm (x3)	4	3	250	300	2500	0	Good	Fair		Low	Medium	Low	Parking	100%	Remove
485	Washingtonia robusta | Washington Palm	16	3	375	440	2500	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
486	Beaucarnea recurvata | Ponytail Palm	3	5	400	1000	3500	0	Good	Fair		Low	Medium	Low	Parking	100%	Remove
487	Phoenix canariensis | Canary Island Date Palm	10	5	600	750	3500	0	Good	Fair		Low	Medium	Low	Parking	100%	Remove
488	Dypsis leutescens | Golden Cane Palm	4	5	350	400	3500	0	Fair	Fair		Low	Medium	Low	Parking	48%	Remove
489	Alnus jorullensis | Mexican Alder	5	5	340	375	4080	2192	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
490	Washingtonia robusta | Washington Palm	11	5	340	375	3500	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
491	Washingtonia robusta | Washington Palm	17	6	800	900	4000	0	Good	Good		High	Medium	High	NA	0%	Retain
492	Melaleuca bracteata | Black Tea Tree	8	3	320	350	3840	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
493	Melaleuca styphelioides | Prickly-leaved Paperbark	11	7	390	420	4680	2299	Fair	Fair		Low	Medium	Low	NA	0%	Retain
494	Livistona australis | Cabbage Fan Palm	4	3	300	370	2500	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
495	Livistona australis | Cabbage Fan Palm	11	6	400	470	4000	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
496	Melaleuca bracteata | Black Tea Tree	11	6	400	470	4800	2410	Fair	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
497	Casuarina glauca | Swamp she-oak	17	5	350	400	4200	2252	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
498	Casuarina glauca | Swamp she-oak	17	5	350	400	4200	2252	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
499	Syagrus romanzoffiana | Cocos Palm	12	5	375	440	3500	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
500	Dracena sp. | Dracena	3	4	375	450	3000	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
501	Casuarina glauca | Swamp she-oak	16	5	300	350	3600	2129	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
502	Casuarina glauca | Swamp she-oak	16	5	400	440	4800	2344	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
503	Casuarina glauca | Swamp she-oak	16	5	400	440	4800	2344	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
504	Casuarina glauca | Swamp she-oak	16	5	350	380	4200	2204	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
505	Casuarina glauca | Swamp she-oak	11	5	200	250	2400	1849	Fair	Fair		Low	Medium	Low	NA	0%	Retain
506	Casuarina glauca | Swamp she-oak	16	5	400	440	4800	2344	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
507	Casuarina glauca | Swamp she-oak	16	5	400	460	4800	2388	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
508	Casuarina glauca | Swamp she-oak	16	5	400	460	4800	2388	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
509	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
510	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
511	Casuarina glauca | Swamp she-oak	16	5	380	430	4560	2322	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
512	Casuarina glauca | Swamp she-oak	16	6	380	430	4560	2322	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
513	Casuarina glauca | Swamp she-oak	16	6	380	430	4560	2322	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
514	Casuarina glauca | Swamp she-oak	17	6	380	425	4560	2310	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
515	Casuarina glauca | Swamp she-oak	18	6	360	390	4320	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
516	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
517	Casuarina glauca | Swamp she-oak	12	3	200	250	2400	1849	Fair	Fair		Low	Medium	Low	NA	0%	Retain
518	Casuarina glauca | Swamp she-oak	17	4	375	390	4500	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
519	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
520	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
521	Casuarina glauca | Swamp she-oak	19	7	400	460	4800	2388	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
522	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
523	Casuarina glauca | Swamp she-oak	11	3	200	230	2400	1785	Fair	Fair		Low	Medium	Low	NA	0%	Retain
524	Casuarina glauca | Swamp she-oak	11	3	175	200	2100	1683	Fair	Fair		Low	Medium	Low	NA	0%	Retain
525	Casuarina glauca | Swamp she-oak	18	5	400	460	4800	2388	Fair	Fair		Low	Medium	Low	NA	0%	Retain
526	Casuarina glauca | Swamp she-oak	18	6	420	520	5040	2515	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
527	Casuarina glauca | Swamp she-oak	9	3	180	200	2160	1683	Fair	Fair		Low	Medium	Low	NA	0%	Retain
528	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
529	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
530	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
531	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
532	Casuarina glauca | Swamp she-oak	16	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
533	Casuarina glauca | Swamp she-oak	16	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
534	Casuarina glauca | Swamp she-oak	16	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
535	Casuarina glauca | Swamp she-oak	11	3	275	300	3300	1996	Fair	Fair		Low	Medium	Low	NA	0%	Retain
536	Casuarina glauca | Swamp she-oak	17	5	390	440	4680	2344	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
537	Casuarina glauca | Swamp she-oak	10	3	200	225	2400	1769	Fair	Fair		Low	Medium	Low	NA	0%	Retain
538	Casuarina glauca | Swamp she-oak	17	5	390	435	4680	2333	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
539	Casuarina glauca | Swamp she-oak	11	4	240	270	2880	1910	Fair	Fair		Low	Medium	Low	NA	0%	Retain
540	Casuarina glauca | Swamp she-oak	9	3	200	240	2400	1817	Fair	Fair		Low	Medium	Low	NA	0%	Retain
541	Casuarina glauca | Swamp she-oak	18	6	390	440	4680	2344	Fair	Fair		Low	Medium	Low	NA	0%	Retain
542	Casuarina glauca | Swamp she-oak	9	4	200	230	2400	1785	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
543	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
544	Casuarina glauca | Swamp she-oak	17	5	350	390	4200	2228	Fair	Fair		Low	Medium	Medium	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
545	Casuarina glauca | Swamp she-oak	16	5	350	375	4200	2192	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
546	Casuarina glauca | Swamp she-oak	16	5	325	375	3900	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
547	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
548	Casuarina glauca | Swamp she-oak	16	5	325	390	3900	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
549	Casuarina glauca | Swamp she-oak	19	6	400	440	4800	2344	Fair	Fair	Included bark	Low	Medium	Low	NA	0%	Retain
550	Casuarina glauca | Swamp she-oak	7	2	130	150	2000	1500	Fair	Fair		Low	Medium	Low	NA	0%	Retain
551	Washingtonia robusta | Washington Palm	8	3	350	400	2500	0	Good			Low	Medium	Low	NA	0%	Retain
552	Casuarina glauca | Swamp she-oak	16	5	300	370	3600	2180	Fair	Fair		Low	Medium	Low	NA	0%	Retain
553	Casuarina glauca | Swamp she-oak	16	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
554	Casuarina glauca | Swamp she-oak	16	5	300	375	3600	2192	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
555	Casuarina glauca | Swamp she-oak	17	6	350	380	4200	2204	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
556	Casuarina glauca | Swamp she-oak	8	3	180	220	2160	1752	Fair	Fair		Low	Medium	Low	NA	0%	Retain
557	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
558	Casuarina glauca | Swamp she-oak	17	6	375	400	4500	2252	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
559	Casuarina glauca | Swamp she-oak	17	5	375	425	4500	2310	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
560	Casuarina glauca | Swamp she-oak	15	5	360	400	4320	2252	Fair	Fair		Low	Medium	Low	NA	0%	Retain
561	Casuarina glauca | Swamp she-oak	4	2	100	120	2000	1500	Fair	Fair		Low	Medium	Low	NA	0%	Retain
562	Casuarina glauca | Swamp she-oak	18	6	400	450	4800	2366	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
563	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
564	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
565	Casuarina glauca | Swamp she-oak	15	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
566	Casuarina glauca | Swamp she-oak	15	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
567	Casuarina glauca | Swamp she-oak	9	3	180	210	2160	1718	Fair	Fair		Low	Medium	Low	NA	0%	Retain
568	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
569	Casuarina glauca | Swamp she-oak	15	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
570	Casuarina glauca | Swamp she-oak	16	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
571	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
572	Casuarina glauca | Swamp she-oak	8	3	175	190	2100	1647	Fair	Fair		Low	Medium	Low	NA	0%	Retain
573	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
574	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
575	Casuarina glauca | Swamp she-oak	17	6	360	390	4320	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
576	Casuarina glauca | Swamp she-oak	8	2	180	230	2160	1785	Fair	Fair					NA	0%	Retain
577	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
578	Casuarina glauca | Swamp she-oak	18	6	400	430	4800	2322	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
579	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
580	Casuarina glauca | Swamp she-oak	17	6	390	425	4680	2310	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
581	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
582	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
583	Casuarina glauca | Swamp she-oak	19	7	430	450	5160	2366	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
584	Casuarina glauca | Swamp she-oak	18	6	340	380	4080	2204	Fair	Fair		Low	Medium	Low	NA	0%	Retain
585	Casuarina glauca | Swamp she-oak	7	3	180	200	2160	1683	Fair	Fair		Low	Medium	Low	NA	0%	Retain
586	Casuarina glauca | Swamp she-oak	16	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
587	Casuarina glauca | Swamp she-oak	16	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
588	Casuarina glauca | Swamp she-oak	17	6	330	350	3960	2129	Fair	Fair		Low	Medium	Low	NA	0%	Retain
589	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
590	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
591	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
592	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
593	Casuarina glauca | Swamp she-oak	18	6	400	430	4800	2322	Fair	Fair		Low	Medium	Low	NA	0%	Retain
594	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
595	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
596	Casuarina glauca | Swamp she-oak	15	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
597	Casuarina glauca | Swamp she-oak	15	4	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
598	Casuarina glauca | Swamp she-oak	15	4	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
599	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
600	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
601	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
602	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
603	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
604	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
605	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
606	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
607	Casuarina glauca | Swamp she-oak	17	5	375	420	4500	2299	Fair	Fair		Low	Medium	Low	NA	0%	Retain
608	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
609	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
610	Casuarina glauca | Swamp she-oak	15	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
611	Casuarina glauca | Swamp she-oak	17	6	375	400	4500	2252	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
612	Casuarina glauca | Swamp she-oak	16	4	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
613	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
614	Casuarina glauca | Swamp she-oak	18	5	380	440	4560	2344	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
615	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
616	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
617	Casuarina glauca | Swamp she-oak	16	4	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
618	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
619	Casuarina glauca | Swamp she-oak	17	5	380	400	4560	2252	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
620	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
621	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
622	Casuarina glauca | Swamp she-oak	16	5	300	390	3600	2228	Fair	Fair		Low	Medium	Low	NA	0%	Retain
623	Casuarina glauca | Swamp she-oak	18	6	425	480	5100	2431	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
624	Casuarina glauca | Swamp she-oak	17	5	390	420	4680	2299	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
625	Cupaniopsis anacardioides | Tuckaroo	4	4	275	300	3300	1996	Fair	Fair		Low	Medium	Low	NA	0%	Retain
626	Dracena sp. | Dracena	4	4	350	400	3000	0	Good	Fair		Low	Medium	Low	NA	0%	Retain
627	Cupaniopsis anacardioides | Tuckaroo (x7)	5	5	300	340	3600	2104	Good	Fair		Low	Medium	Low	NA	0%	Retain
628	Syagrus romanzoffiana | Cocos Palm	14	4	380	400	3000	0	Good	Fair		Medium	Medium	Medium	NA	0%	Retain
629	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
630	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
631	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
632	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
633	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
634	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
635	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
636	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
637	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
638	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
639	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
640	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
641	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
642	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
643	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
644	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
645	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
646	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
647	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
648	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
649	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
650	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
651	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
652	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
653	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
654	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
655	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
656	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
657	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
658	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
659	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
660	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
661	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
662	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
663	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
664	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
665	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
666	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
667	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
668	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
669	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
670	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
671	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
672	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
673	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
674	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
675	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
676	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
677	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
678	Cupaniopsis anacardioides | Tuckaroo	5	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
679	Phoenix canariensis | Canary Island Date Palm	9	4	600	675	3000	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
680	Howea forsteriana | Kentia Palm	6	3	200	240	2500	0	Fair	Poor		Low	Medium	Low	NA	0%	Retain
681	Syagrus romanzoffiana | Cocos Palm	9	5	375	350	3500	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
682	Syagrus romanzoffiana | Cocos Palm	12	5	375	400	3500	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
683	Livistona sp. | Fan Palm	9	5	375	400	3500	0	Fair	Fair		Low	Medium	Low	NA	0%	Retain
684	Syagrus romanzoffiana | Cocos Palm (x3)	8	5	375	400	3500	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
685	Phoenix roebelenii | Dwarf Date Palm	3	3	250	300	3000	1996	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
686	Syagrus romanzoffiana | Cocos Palm	6	3	250	300	2500	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
687	Syagrus romanzoffiana | Cocos Palm	6	3	250	300	2500	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
688	Washingtonia robusta | Washington Palm	4	4	300	375	3000	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
689	Syagrus romanzoffiana | Cocos Palm	11	4	375	400	3000	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
690	Syagrus romanzoffiana | Cocos Palm	11	4	375	400	3000	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
691	Syagrus romanzoffiana | Cocos Palm	11	4	325	370	3000	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
692	Syagrus romanzoffiana | Cocos Palm	11	4	325	370	3000	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
693	Syagrus romanzoffiana | Cocos Palm	11	4	325	370	3000	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
694	Washingtonia robusta | Washington Palm	10	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	Parking	100%	Remove
695	Washingtonia robusta | Washington Palm	6	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
696	Syagrus romanzoffiana | Cocos Palm	9	5	300	350	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
697	Phoenix roebelenii | Dwarf Date Palm	3	3	180	200	2160	1683	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
698	Washingtonia robusta | Washington Palm	8	5	230	260	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
699	Phoenix roebelenii | Dwarf Date Palm	3	5	180	220	2160	1752	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
700	Howea forsteriana | Kentia Palm	3	3	240	300	2500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
701	Washingtonia robusta | Washington Palm	5	5	600	750	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
702	Washingtonia robusta | Washington Palm	12	5	600	750	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
703	Howea forsteriana | Kentia Palm	5	3	200	250	2500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
704	Howea forsteriana | Kentia Palm	5	4	200	250	3000	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
705	Washingtonia robusta | Washington Palm	15	5	300	375	3500	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
706	Washingtonia robusta | Washington Palm	15	5	300	375	3500	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
707	Washingtonia robusta | Washington Palm	15	5	300	375	3500	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
708	Washingtonia robusta | Washington Palm (x3)	11	5	300	375	3500	0	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
709	Callistemon viminalis | Weeping Bottlebrush	4	5	350	375	4200	2192	Fair	Fair		Low	Medium	Low	Rd	100%	Remove
710	Washingtonia robusta | Washington Palm	7	5	350	375	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
711	Cupaniopsis anacardioides | Tuckaroo	6	6	400	450	4800	2366	Good	Fair	Previous failures	Low	Medium	Low	B 3	100%	Remove
712	Callistemon viminalis | Weeping	5	5	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
	Bottlebrush															
713	Callistemon viminalis | Weeping Bottlebrush	5	4	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
714	Callistemon viminalis | Weeping Bottlebrush	5	4	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
715	Callistemon viminalis | Weeping Bottlebrush (x3)	5	5	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
716	Callistemon viminalis | Weeping Bottlebrush (x3)	5	4	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
717	Callistemon viminalis | Weeping Bottlebrush (x2)	5	2	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
718	Callistemon viminalis | Weeping Bottlebrush (x2)	5	2	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
719	Callistemon viminalis | Weeping Bottlebrush (x3)	5	3	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
720	Callistemon viminalis | Weeping Bottlebrush (x3)	5	3	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
721	Callistemon viminalis | Weeping Bottlebrush (x3)	5	3	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
722	Callistemon viminalis | Weeping Bottlebrush (x3)	5	3	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
723	Callistemon viminalis | Weeping Bottlebrush (x3)	5	3	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
724	Callistemon viminalis | Weeping Bottlebrush (x2)	5	3	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
725	Callistemon viminalis | Weeping Bottlebrush (x3)	5	3	325	350	3900	2129	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
726	Angophora costata | Smooth-barked Apple Myrtle	15	7	425	470	5100	2410	Fair	Fair		Low	Medium	Medium	B 3	100%	Remove
727	Angophora costata | Smooth-barked Apple Myrtle	10	6	300	350	3600	2129	Poor	Fair	Major decline	Low	Medium	Low	B 3	100%	Remove
728	Livistona australis | Cabbage Fan Palm	4	4	300	350	3000	0	Fair	Good		Low	Medium	Low	B 3	100%	Remove
729	Washingtonia robusta | Washington Palm	6	5	300	350	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
730	Washingtonia robusta | Washington Palm	6	5	300	350	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
731	Angophora costata | Smooth-barked Apple Myrtle	14	8	380	420	4560	2299	Fair	Fair		Medium	Medium	Medium	B 3	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
732	Angophora costata | Smooth-barked Apple Myrtle	11	6	300	350	3600	2129	Poor	Fair		Low	Medium	Low	B 3	100%	Remove
733	Dead Tree | Dead tree	7	5	275	340	3300	2104	Dead	Fair		Low	n/a	Low	B 3	100%	Remove
734	Washingtonia robusta | Washington Palm	6	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
735	Washingtonia robusta | Washington Palm	6	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
736	Washingtonia robusta | Washington Palm	7	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
737	Washingtonia robusta | Washington Palm	8	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
738	Washingtonia robusta | Washington Palm	4	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
739	Dead Tree | Dead tree	7	4	300	350	3600	2129	Dead	Fair		Low	n/a	Low	B 3	100%	Remove
740	Angophora costata | Smooth-barked Apple Myrtle	11	7	375	400	4500	2252	Fair	Good		Low	Medium	Low	B 3	100%	Remove
741	Callistemon viminalis | Weeping Bottlebrush	5	6	325	380	3900	2204	Fair	Fair		Low	Medium	Low	B 4	100%	Remove
742	Pittosporum undulatum | Sweet Pittosporum	5	4	300	330	3600	2077	Good	Fair		Low	Medium	Medium	Ausgrid Easement	100%	Remove
743	Phoenix canariensis | Canary Island Date Palm	5	5	400	500	3500	0	Fair	Fair		Low	Medium	Medium	NA	0%	Retain
744	Melaleuca quinquenervia | Broad-leaved Paperbark	15	8	400	440	4800	2344	Good	Good		Low	Medium	Low	NA	0%	Retain
745	Melaleuca quinquenervia | Broad-leaved Paperbark	15	8	400	440	4800	2344	Good	Good		Low	Medium	Low	NA	0%	Retain
746	Melaleuca quinquenervia | Broad-leaved Paperbark	10	8	400	460	4800	2388	Good	Fair		Low	Medium	Low	NA	0%	Retain
747	Melaleuca quinquenervia | Broad-leaved Paperbark	11	6	320	360	3840	2155	Good	Good		Low	Medium	Medium	NA	0%	Retain
748	Acmena smithii | Lilly Pilly	10	4	300	380	3600	2204	Good	Fair		Low	Medium	Low	NA	0%	Retain
749	Melaleuca quinquenervia | Broad-leaved Paperbark	10	6	375	470	4500	2410	Good	Fair		Low	Medium	Low	NA	0%	Retain
750	Melaleuca quinquenervia | Broad-leaved Paperbark	12	6	400	440	4800	2344	Fair	Fair		Low	Medium	Low	NA	0%	Retain
751	Acmena smithii | Lilly Pilly	8	4	300	325	3600	2064	Good	Fair		Low	Medium	Low	NA	0%	Retain
752	Melaleuca quinquenervia | Broad-leaved Paperbark	8	5	340	375	4080	2192	Good	Fair		Low	Medium	Medium	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
753	Melaleuca quinquenervia | Broad-leaved Paperbark	9	5	390	420	4680	2299	Fair	Fair		Low	Medium	Low	NA	0%	Retain
754	Melaleuca quinquenervia | Broad-leaved Paperbark	9	5	380	400	4560	2252	Fair	Fair		Low	Medium	Low	NA	0%	Retain
755	Melaleuca quinquenervia | Broad-leaved Paperbark	9	5	380	400	4560	2252	Fair	Fair		Low	Medium	Low	NA	0%	Retain
756	Acmena smithii | Lilly Pilly	4	2	225	250	2700	1849	Fair	Fair		Low	Medium	Low	NA	0%	Retain
757	Cupaniopsis anacardioides | Tuckaroo	7	7	380	420	4560	2299	Good	Fair		Low	Medium	Low	NA	0%	Retain
758	Cupaniopsis anacardioides | Tuckaroo	7	7	380	420	4560	2299	Fair	Fair		Low	Medium	Low	NA	0%	Retain
759	Cupaniopsis anacardioides | Tuckaroo	6	5	375	360	4500	2155	Fair	Fair		Low	Medium	Low	NA	0%	Retain
760	Cupaniopsis anacardioides | Tuckaroo	6	5	375	360	4500	2155	Fair	Fair		Low	Medium	Low	NA	0%	Retain
761	Acmena smithii | Lilly Pilly	4	4	280	325	3360	2064	Fair	Fair		Low	Medium	Low	NA	0%	Retain
762	Acmena smithii | Lilly Pilly	4	4	280	325	3360	2064	Fair	Fair		Low	Medium	Low	NA	0%	Retain
763	Melaleuca quinquenervia | Broad-leaved Paperbark	4	4	300	370	3600	2180	Fair	Fair		Low	Medium	Low	NA	0%	Retain
764	Melaleuca quinquenervia | Broad-leaved Paperbark	4	4	300	370	3600	2180	Fair	Fair		Low	Medium	Low	NA	0%	Retain
765	Ficus benjamina | Weeping Fig	6	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
766	Ficus benjamina | Weeping Fig	6	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
767	Ficus benjamina | Weeping Fig	6	5	300	375	3600	2192	Fair	Fair		Low	Medium	Low	NA	0%	Retain
768	Ficus benjamina | Weeping Fig	7	6	425	400	5100	2252	Fair	Fair		Low	Medium	Low	NA	0%	Retain
769	Ficus benjamina | Weeping Fig	11	8	430	400	5160	2252	Good	Fair		Medium	Medium	Medium	NA	0.4%	Retain
770	Ficus benjamina | Weeping Fig	14	10	470	450	5640	2366	Good	Fair		Low	Medium	Low	RW	68.2%	Remove
771	Ficus benjamina | Weeping Fig	14	7	385	380	4620	2204	Fair	Fair		Low	Medium	Low	RW	100%	Remove
772	Ficus benjamina | Weeping Fig	11	5	350	350	4200	2129	Fair	Fair		Low	Medium	Low	RW & Fill	100%	Remove
773	Ficus benjamina | Weeping Fig	11	5	350	350	4200	2129	Fair	Fair		Low	Medium	Low	RW & Fill	100%	Remove
774	Syzygium sp. | Lilly Pilly	6	3	230	250	2760	1849	Good	Fair		Low	Medium	Low	Fill	100%	Remove
775	Washingtonia sp | Washington Palm	6	5	380	450	3500	0	Fair	Fair		Low	Medium	Low	RW & Fill	35.1%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
776	Washingtonia robusta | Washington Palm	6	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	RW & Fill	100%	Remove
777	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	Fill	100%	Remove
778	Washingtonia robusta | Washington Palm	15	5	400	500	3500	0	Fair	Fair		Low	Medium	Low	RW	5.1%	Retain
779	Melaleuca quinquenervia | Broad-leaved Paperbark	7	4	340	380	4080	2204	Fair	Fair		Low	Medium	Low	RW	26.6%	Remove
780	Melaleuca quinquenervia | Broad-leaved Paperbark	7	4	340	380	4080	2204	Fair	Fair		Low	Medium	Low	RW & Fill	100%	Remove
781	Melaleuca quinquenervia | Broad-leaved Paperbark	7	4	340	380	4080	2204	Fair	Fair		Low	Medium	Low	RW & Fill	100%	Remove
782	Melaleuca quinquenervia | Broad-leaved Paperbark	7	4	340	380	4080	2204	Fair	Fair		Low	Medium	Low	RW & Fill	100%	Remove
783	Plumeria sp. | Frangipani	7	4	340	380	3000	0	Fair	Fair		Low	Medium	Low	B 4	100%	Remove
784	Washingtonia robusta | Washington Palm	16	5	400	500	3500	0	Fair	Good		Low	Medium	Medium	B 4	100%	Remove
785	Corymbia citriodora | Lemon-scented Gum	16	12	520	580	6240	2633	Good	Good		Medium	Medium	Medium	Rd	100%	Remove
786	Archontophoenix alexandrea | Alexandrea Palm	5	4	225	280	3000	0	Good	Good		Low	Medium	Low	Rd	100%	Remove
787	Archontophoenix alexandrea | Alexandrea Palm (x3)	5	4	225	280	3000	0	Good	Good		Low	Medium	Low	Rd	100%	Remove
788	Archontophoenix alexandrea | Alexandrea Palm	5	4	225	280	3000	0	Good	Good		Low	Medium	Low	Rd	100%	Remove
789	Archontophoenix alexandrea | Alexandrea Palm	5	4	225	280	3000	0	Good	Good		Low	Medium	Low	Rd	100%	Remove
790	Archontophoenix alexandrea | Alexandrea Palm	5	4	225	280	3000	0	Good	Good		Low	Medium	Low	Rd	100%	Remove
791	Corymbia citriodora | Lemon-scented Gum	12	9	400	475	4800	2421	Fair	Good		Low	Medium	Medium	Rd	100%	Remove
792	Howea forsteriana | Kentia Palm	1	3	200	250	2500	0	Good	Good		Low	Medium	Low	B 3	100%	Remove
793	Melaleuca quinquenervia | Broad-leaved Paperbark	12	8	480	460	5760	2388	Good	Good		Low	Medium	Medium	B 3	100%	Remove
794	Archontophoenix alexandrea | Alexandrea Palm	6	4	250	300	3000	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
795	Archontophoenix alexandrea | Alexandrea Palm	6	4	250	300	3000	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
796	Archontophoenix alexandrea | Alexandrea	6	4	250	300	3000	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
	Palm															
797	Archontophoenix alexandrea | Alexandrea Palm	6	4	250	300	3000	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
798	Archontophoenix alexandrea | Alexandrea Palm	6	4	250	300	3000	0	Fair	Fair		Low	Medium	Low	B 3	100%	Remove
799	Melaleuca quinquenervia | Broad-leaved Paperbark	10	8	480	540	5760	2555	Good	Fair		Low	Medium	Medium	Rd & Parking	100%	Remove
800	Howea forsteriana | Kentia Palm	3	3	180	250	2500	0	Fair	Good		Low	Medium	Low	Rd & Parking	100%	Remove
801	Archontophoenix alexandrea | Alexandrea Palm	5	5	300	375	3500	0	Good	Good		Low	Medium	Low	Rd & Parking	100%	Remove
802	Cyathea sp. | Tree Fern (x3)	3	4	200	250	3000	0	Good	Good		Low	Medium	Low	B 4	100%	Remove
803	Archontophoenix alexandrea | Alexandrea Palm	7	4	375	400	3000	0	Good	Fair		Low	Medium	Low	B 4	100%	Remove
804	Dypsis decaryi | Triangle Palm	5	5	375	400	3500	0	Fair	Good		Low	Medium	Low	B 4	100%	Remove
805	Angophora costata | Smooth-barked Apple Myrtle	8	4	300	340	3600	2104	Fair	Fair		Low	Medium	Low	NA	0%	Retain
806	Phoenix canariensis | Canary Island Date Palm	7	6	400	500	4000	0	Fair	Fair		Low	Medium	Low	RW & Fill	100%	Remove
807	Eucalyptus robusta | Swamp Mahogany	10	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
808	Eucalyptus robusta | Swamp Mahogany	10	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
809	Eucalyptus robusta | Swamp Mahogany	10	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
810	Eucalyptus robusta | Swamp Mahogany	9	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
811	Eucalyptus robusta | Swamp Mahogany	9	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
812	Eucalyptus robusta | Swamp Mahogany	9	4	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
813	Eucalyptus robusta | Swamp Mahogany	10	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
814	Eucalyptus robusta | Swamp Mahogany	9	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
815	Eucalyptus robusta | Swamp Mahogany	8	3	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
816	Eucalyptus robusta | Swamp Mahogany	10	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
817	Eucalyptus robusta | Swamp Mahogany	10	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
818	Eucalyptus robusta | Swamp Mahogany	9	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
819	Eucalyptus robusta | Swamp Mahogany	10	5	300	350	3600	2129	Good	Fair		Low	Medium	Low	NA	0%	Retain
820	Eucalyptus robusta | Swamp Mahogany	12	8	450	500	5400	2474	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
821	Eucalyptus robusta | Swamp Mahogany	16	12	580	620	6960	2707	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
822	Corymbia maculata | Spotted Gum	20	8	430	480	5160	2431	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
823	Corymbia maculata | Spotted Gum	20	11	500	580	6000	2633	Good	Good		High	Medium	High	NA	0%	Retain
824	Corymbia maculata | Spotted Gum	17	8	400	475	4800	2421	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
825	Corymbia maculata | Spotted Gum	20	9	400	475	4800	2421	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
826	Corymbia maculata | Spotted Gum	20	9	400	475	4800	2421	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
827	Corymbia maculata | Spotted Gum	22	12	600	660	7200	2779	Good	Good		High	Medium	High	NA	0%	Retain
828	Corymbia maculata | Spotted Gum	20	10	475	500	5700	2474	Good	Good		High	Medium	High	NA	0%	Retain
829	Corymbia maculata | Spotted Gum	18	10	475	500	5700	2474	Fair	Fair		Medium	Medium	Medium	NA	0%	Retain
830	Corymbia maculata | Spotted Gum	17	9	450	480	5400	2431	Fair	Good		Medium	Medium	Medium	NA	0%	Retain
831	Corymbia maculata | Spotted Gum	20	9	690	780	8280	2981	Fair	Good		High	Medium	High	NA	0%	Retain
832	Corymbia maculata | Spotted Gum	18	8	450	520	5400	2515	Good	Good		Medium	Medium	Medium	NA	0%	Retain
833	Corymbia maculata | Spotted Gum	20	12	680	680	8160	2814	Fair	Fair		High	Medium	High	NA	0%	Retain
834	Angophora costata | Smooth-barked Apple Myrtle (x3)	5	3	275	300	3300	1996	Good	Good		Low	Medium	Low	NA	0%	Retain
835	Corymbia maculata | Spotted Gum	17	9	425	460	5100	2388	Good	Good		Medium	Medium	Medium	NA	0%	Retain
836	Corymbia maculata | Spotted Gum	17	9	425	460	5100	2388	Good	Good		Medium	Medium	Medium	NA	0%	Retain
837	Corymbia maculata | Spotted Gum	17	9	425	460	5100	2388	Good	Good		Medium	Medium	Medium	Fill Minor	10.8%	Retain
838	Eucalyptus sp. | Eucalypt (x2)	4	3	250	300	3000	1996	Fair	Fair		Low	Medium	Low	Fill Minor	5.1%	Retain
839	Corymbia citriodora | Lemon-scented Gum	10	7	330	370	3960	2180	Good	Good		Medium	Medium	Medium	Fill Minor	4.2%	Retain
840	Corymbia citriodora | Lemon-scented Gum	10	7	330	370	3960	2180	Good	Good		Medium	Medium	Medium	Fill Minor	7.4%	Retain
841	Corymbia maculata | Spotted Gum	14	8	350	375	4200	2192	Fair	Good		Medium	Medium	Medium	Fill Minor	5.3%	Retain

Tree No.	Species	Height (m)	Canopy Spread (Dia. In m)	DBH (mm)	DAB (mm)	TPZ (Radial in mm)	SRZ (Radial in mm)	Health	Structure	Tree Notes	Landscape	ELE	Retention Value	Primary Impact(s)	TPZ Encroachment	Retain / Remove
842	Corymbia maculata | Spotted Gum	17	9	475	520	5700	2515	Good	Good		Medium	Medium	Medium	Fill Minor	12.0%	Retain
843	Corymbia maculata | Spotted Gum	17	9	400	430	4800	2322	Good	Good		Medium	Medium	Medium	Fill Minor	7.1%	Retain
844	Corymbia maculata | Spotted Gum	18	9	460	500	5520	2474	Fair	Good		Medium	Medium	Medium	Fill Minor	14.0%	Retain
845	Phoenix canariensis | Canary Island Date Palm	6	5	460	500	3500	0	Poor	Poor	Suspected Fusarium Wilt	Low	Short	Low	Cut & Parking	100%	Remove

Table 5 - Tree Schedule

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16 Appendix 4: Tree mapping

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LEVEL 1

BUILDING 4

NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum) LEVELS SHOWN ARE INDICATIVE ONLY AND SUBJECT TO FURTHER CIVIL DETAIL DESIGN. THESE MIGHT VARY +/- 1000 mm

EXTENT OF RETAINING WALLS SHOWN AS INDICATIVE ONLY SUBJECT TO CIVIL REVIEW

GROSS LETTABLE AREA (GLA) IS THE TOTAL FLOOR AREA OF A BUILDING, MEASURED FROM THE OUTSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL ROOFED AREAS

5% OF CARPARKING SPACES PROVIDED TO BE DEDICATED AS CAR SHARING BAYS
5% OF CARPARKING SPACES PROVIDED TO BE DEDICATED AS ELECTRICAL VEHICLE BAYS

DEVELOPMENT ANALYSIS

USE		GFA WOLLONGONG
BUILDING 3		
WAREHOUSE	3A	649 m²
WAREHOUSE	3B	676 m²
WAREHOUSE	3C	677 m²
WAREHOUSE	3D	677 m²
WAREHOUSE	3E	698 m²
WAREHOUSE	3F	805 m²
OFFICE	3A	126 m²
OFFICE	3B	127 m²
OFFICE	3C	127 m²
OFFICE	3D	127 m²
OFFICE	3E	127 m²
OFFICE	3F	126 m²
TOTAL AREA		4,942 m²
BUILDING 4		
WAREHOUSE	GROUND LEVEL	4,132 m²
WAREHOUSE	LEVEL 1	3,028 m²
OFFICE MEZZANINE	GROUND LEVEL	841 m²
OFFICE MEZZANINE	LEVEL 1	924 m²
TOTAL AREA		8,925 m²
BUILDING 5		
WAREHOUSE	5A	1,071 m²
WAREHOUSE	5B	3,047 m²
WAREHOUSE	5C	2,163 m²
WAREHOUSE	5D	2,732 m²
WAREHOUSE	5E	2,023 m²
OFFICE	5A	333 m²
OFFICE	5B	432 m²
OFFICE	5C	403 m²
OFFICE	5D	424 m²
OFFICE	5E	391 m²
TOTAL AREA		13,019 m²

BUILDING 5 COMMERCIAL	
CAFE	76 m²
CHILDCARE	648 m²
CHILDCARE OUTDOOR	571 m²
COMMERCIAL	554 m²
COMMON AREAS	13 m²
ESTATE OFFICE	22 m²
TOTAL AREA	1,884 m²

BUILDING 6		
WAREHOUSE	6A	354 m²
WAREHOUSE	6B	597 m²
WAREHOUSE	6C	594 m²
WAREHOUSE	6D	920 m²
OFFICE	6A	89 m²
OFFICE	6B	118 m²
OFFICE	6C	117 m²
OFFICE	6D	171 m²
TOTAL AREA		2,960 m²
BUILDING 7		
WAREHOUSE	7A	698 m²
WAREHOUSE	7B	647 m²
WAREHOUSE	7C	644 m²
WAREHOUSE	7D	694 m²
WAREHOUSE	7E	647 m²
WAREHOUSE	7F	644 m²
OFFICE	7A	117 m²
OFFICE	7B	118 m²
OFFICE	7C	117 m²
OFFICE	7D	110 m²
OFFICE	7E	118 m²
OFFICE	7F	117 m²
TOTAL AREA		4,671 m²
BUILDING 8		
WAREHOUSE	8A	736 m²
WAREHOUSE	8B	642 m²
OFFICE	8A	139 m²
OFFICE	8B	130 m²
TOTAL AREA		1,647 m²
GRAND TOTAL GFA		38,048 m²

SITE COVERAGE	
TOTAL SITE AREA	123,898.129 m²
BUILDING 3 - 8 FOOTPRINT	31,903 m²
BUILDING 1 & 2 FOOTPRINT APPROX.	27,878 m²
SITE COVERAGE APPROX.	48.25%
LANDSCAPING	14.02%

LEGEND

- ESTATE BOUNDARY
- FORESHORE LINE BOUNDARY
- TRANSMISSION EASEMENT
- LANDSCAPE SETBACK
- BUILDING SETBACK
- 2.5 m BICYCLE & PDESTRIAN SHARED PATH
- PEDESTRIAN CONCRETE FOOTPATH
- PERMEABLE HARD SURFACE
- PYLON SIGN
- RW RETAINING WALL
- OA OUTDOOR AREA
- RWT RAIN WATER TANK
- W WASTE AREA
- MSB MAIN SWITCH BOARD
- PL PARCEL LOCKERS
- BG BOOM GATE
- RPC RAISED PEDESTRAIN CROSSING
- DP DELIVERY PARKING BAY
- SP SHARED PARKING BAY (5%)
- EV ELECTRICAL VEHICLE BAY (5%)
- EXISTING TREE PROTECTION ZONE
- PROPOSED TREE
- BIORETENTION BASIN / RAIN GARDEN

PARKING PROVISION

PARKING ALLOCATION SHOWN AS INDICATIVE ONLY

		CARS	BICYCLES
Building 1A		51	-
Building 1B		81	-
Building 1C		12	-
Building 1D		35	-
Building 1E		10	-
Building 2		12	-
Building 3		19	12
Building 4		131	64
Building 5	Block 1	48	12
Building 5	Block 2	19	8
Building 5	Childcare	17	4
Building 5	Commercial	15	8
Building 6		29	8
Building 7		62	12
Building 8		22	4
TOTAL		563	132
MOTORBIKES			26

No.	DATE:	REVISION:	BY:	CHK:
P12	01.08.2023	FOR COORDINATION	AS	JF
P13	25.08.2023	90% DA	AS	JF
P14	06.09.2023	ISSUE FOR APPROVAL	AS	JF
P15	12.09.2023	ISSUE FOR APPROVAL	AS	JF
A	28.09.2023	FOR LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
ESTATE MASTERPLAN

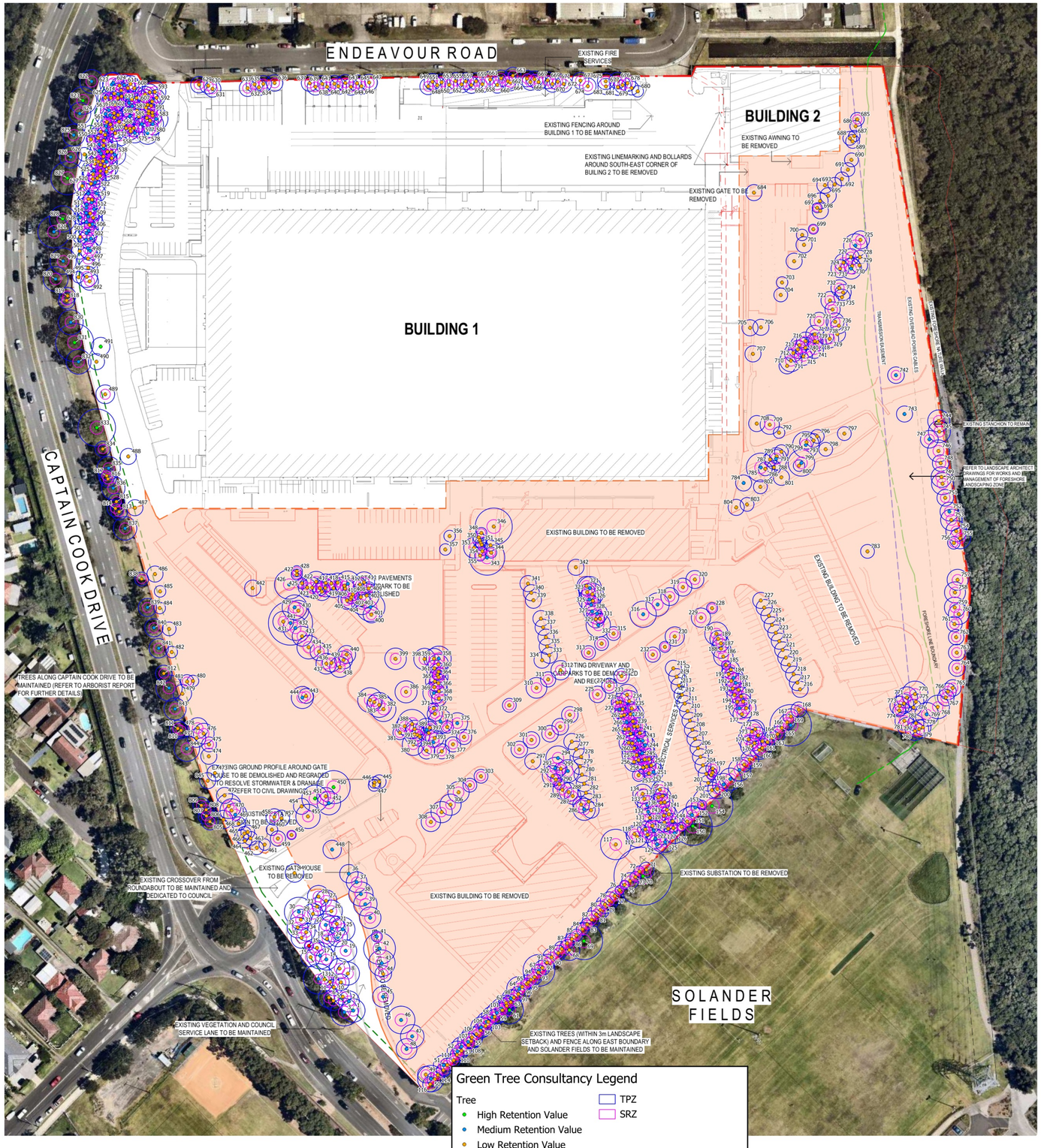
TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: AS
SCALE: 1:1000 @ A1
SCALE: 1:2000 @ A3

JOB NO: 22366
DRAWING NO: 005
REVISION: A

watson young



NOTES: DEMOLITION

EXTENT OF DEMOLITION WORKS SHOWN DASHED TO INCLUDE, BUT NOT BE LIMITED TO THE DEMOLITION & REMOVAL OF ALL WALLS, WALL LININGS, FRAMING, SERVICES & POWER FITTINGS & FIXTURES, JOINERY UNITS & EXISTING FLOOR COVERINGS.
REMOVE/REDIRECT ALL SERVICES TO SUIT NEW CONDITIONS.

THE BUILDER IS TO MAKE GOOD ALL SURFACES ON COMPLETION OF DEMOLITION INCLUDING BUT NOT LIMITED TO WALLS, PAINT, SKIRTING, GLAZING, CEILING AND FLOOR FINISHES.

CONTRACTOR IS TO CONFIRM LOCATION OF ALL EXISTING IN GROUND SERVICES PRIOR TO COMMENCEMENT OF WORKS.

ALL DEMOLITION WORKS ARE TO BE IN ACCORDANCE WITH APPLICABLE PORTIONS OF THE FOLLOWING CURRENT AUSTRALIAN STANDARDS:
- AS-2187
- AS-2436
- AS-2601

AND ALSO MUST COMPLY WITH THE CURRENT REQUIREMENTS OF
- NCC
- LOCAL COUNCIL
- BASE BUILDING GUIDELINES

REFER TO PLANNING REPORT FOR STAGING OF DEMOLITION WORKS

LEGEND

- EXTENT OF WORKS
- EXISTING ELEMENTS TO BE DEMOLISHED
- EXISTING UNDERGROUND ELEMENTS TO BE DEMOLISHED
- ESTATE BOUNDARY
- FORESHORE LINE BOUNDARY
- TRANSMISSION EASEMENT
- LANDSCAPE SETBACK
- EXISTING TREE PROTECTION ZONE (REFER TO ARBORIST REPORT FOR FURTHER DETAILS ON TREES TO BE RETAINED)

No.	DATE:	REVISION:	BY:	CHK:
P1	09.08.2023	90% DA	AS	MH
P2	22.08.2023	90% DA	AS	JF
A	28.09.2023	FOR LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
DEMOLITION PLAN

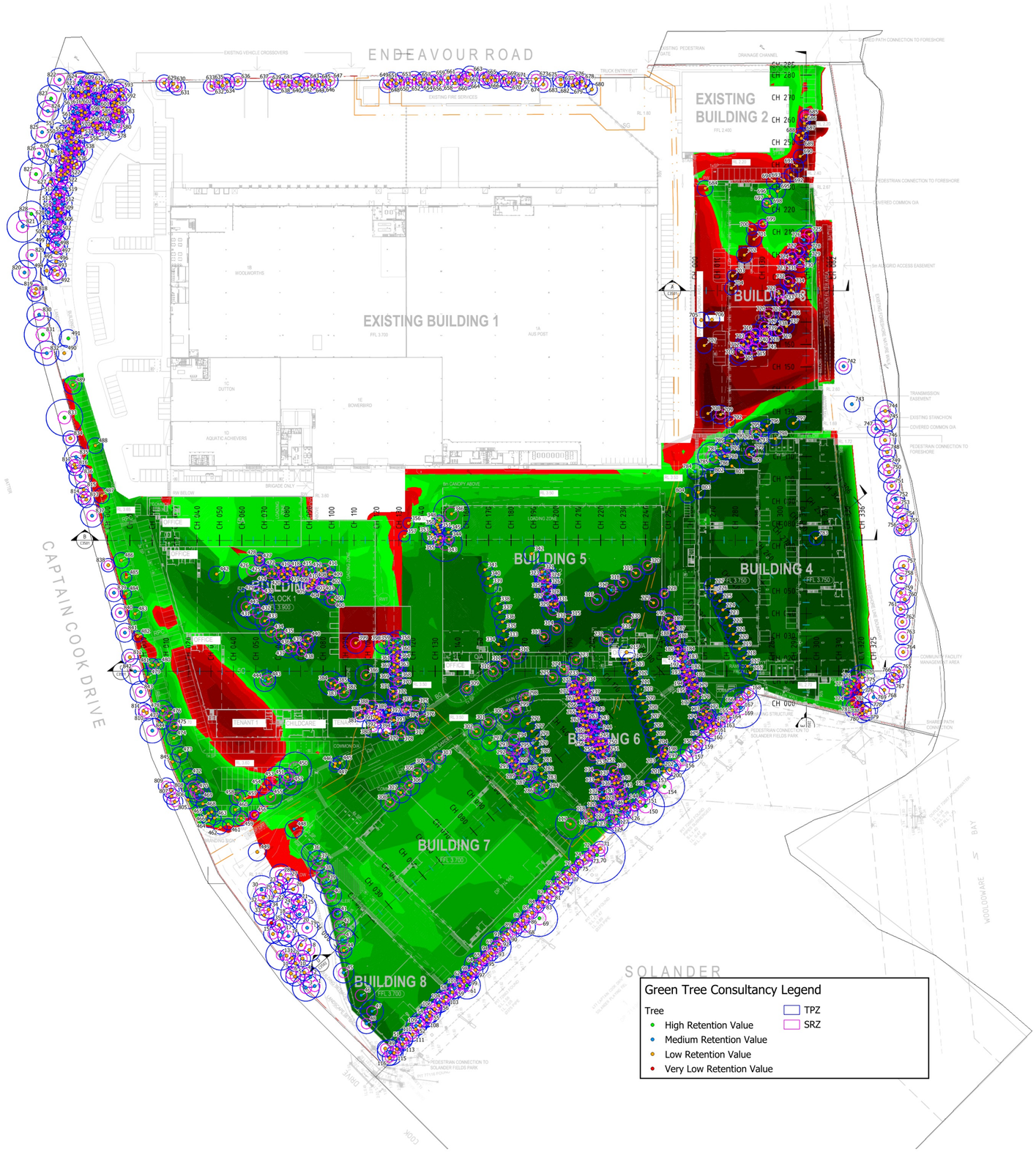
TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: AS
SCALE: 1:1000 @ A1
SCALE: 1:2000 @ A3

JOB NO: 22366
DRAWING NO: 004
REVISION: A

watson young


ENDEAVOUR ROAD
EXISTING BUILDING 1
EXISTING BUILDING 2
BUILDING 3
BUILDING 4
BUILDING 5
BUILDING 6
BUILDING 7
BUILDING 8
CAPTAIN COOK DRIVE
SOLANDER
EXISTING VEHICLE CROSSOVERS
EXISTING PEDESTRIAN GATE
EXISTING FIRE SERVICES
TRUCK ENTRY/EXIT
DRAINAGE CHANNEL
COVERED PATH CONNECTION TO FORESHORE
PEDESTRIAN CONNECTION TO FORESHORE
COVERED COMMON O/A
5M AUSGRID ACCESS EASEMENT
TRANSMISSION EASEMENT
EXISTING STANCHION
PEDESTRIAN CONNECTION TO SOLANDER FIELDS PARK
BRIGADE ONLY
LOADING ZONE
OFFICE
TENANT 1
FIELDCARE
COMMON O/A
RAMP DOWN
RAMP UP
6m CANOPY ABOVE
RW BELOW
FFL 3.700
FFL 3.750
FFL 2.400
RL 3.60
RL 2.67
RL 2.80
RL 1.60
RL 1.72
RL 1.90
RL 1.95
RL 2.00
RL 2.10
RL 2.20
RL 2.30
RL 2.40
RL 2.50
RL 2.60
RL 2.70
RL 2.80
RL 2.90
RL 3.00
RL 3.10
RL 3.20
RL 3.30
RL 3.40
RL 3.50
RL 3.60
RL 3.70
RL 3.80
RL 3.90
RL



LEGEND

20.000	FINISHED SURFACE MAJOR CONTOUR LINE
20.100	FINISHED SURFACE MINOR CONTOUR LINE
20.150	FINISHED SURFACE CREST/TRANSITION LINE
20.100	EXISTING CONTOUR LINE
FFL 555.555	FINISHED FLOOR LEVEL OF PROPOSED BUILDING
exFL 25.000	FLOOR LEVEL OF EXISTING BUILDING
+ FS55.555	FINISHED SURFACE LEVEL
+ eRL55.555	EXISTING REDUCED SURFACE LEVEL
+ TOW55.555	TOP OF WALL LEVEL
+ BOW55.555	BOTTOM OF WALL LEVEL
+ TOK55.555	TOP OF KERB LEVEL
+ IOK55.555	INVERT OF KERB LEVEL
	PROPERTY BOUNDARY LINE
	EASEMENT BOUNDARY LINE
IK	PROPOSED INTEGRAL KERB - REFER DETAIL
FALL 5.0% / FALL 1:20	DIRECTION OF SURFACE FALL
RW	RETAINING WALL
	LIMIT OF WORKS
INT	**PAVEMENT INTERFACE - MATCH NEATLY TO EXISTING LEVELS**
	PROPOSED STORMWATER PIPE (≤Φ300)
	EXISTING STORMWATER PIPE
	EXISTING STORMWATER PIPE TO BE REMOVED OR REDUNDANT
	PROPOSED TEMPORARY STORMWATER PIPE
	PROPOSED STORMWATER BOX CULVERT
	PROPOSED STORMWATER INLET PIT (GRATED COVER)
	PROPOSED STORMWATER JUNCTION PIT (SEALED COVER)
	EXISTING KERB INLET PIT
	EXISTING STORMWATER INLET PIT (LEFT: GRATED COVER - RIGHT:SEALED COVER)
	EXISTING STORMWATER PIT TO BE REMOVED
	TREATMENT FILTER CHAMBER/DEVICE
	BIORETENTION BASIN/RAIN GARDEN
DP	PROPOSED DOWNPIPE

Green Tree Consultancy Legend

Tree
- High Retention Value
- Medium Retention Value
- Low Retention Value
- Very Low Retention Value

TPZ
SRZ

DEVELOPMENT APPLICATION ISSUE

IMPORTANT
- DO NOT SCALE OFF THIS DRAWING. USE DIMENSIONS & ARCHITECTURAL DRAWINGS ONLY
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NORTH POINT

REFERENCES

DATE	AMENDMENT	INIT	REV
16.06.23	20% ISSUE	JK	1
29.06.23	REVISED SITE GRADING	MY	2
10.07.23	50% ISSUE	JK	3
28.07.23	75% ISSUE	JK	4
22.08.23	90% ISSUE	MW	5
15.09.23	DA ISSUE	MY	A

KEY PLAN

STRUCTURAL
-

MECHANICAL
-

ELECTRICAL
-

CIVIL
SPARKS & PARTNERS CONSULTING ENGINEERS

BUILDER

CLIENT
Aliro

ARCHITECT
watson young

PROJECT
13 ENDEAVOUR ROAD, CARINGBAH

SPARKS+PARTNERS
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https://sparksandpartners.com.au/

DRAWING TITLE
MASTER PLAN
CONCEPT STORMWATER &
GRADING PLAN

DATE	DRAWN	DESIGNED	CHECKED
JUNE 23	JK	JK	MW

SCALE	SIZE	REVISION
1:1000	A1	A

PROJECT No 23106
DRAWING No DA4101



LEVEL 1
BUILDING 4

NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum) LEVELS SHOWN ARE INDICATIVE ONLY AND SUBJECT TO FURTHER CIVIL DETAIL DESIGN. THESE MIGHT VARY +/- 1000 mm

EXTENT OF RETAINING WALLS SHOWN AS INDICATIVE ONLY SUBJECT TO CIVIL REVIEW

GROSS LETTABLE AREA (GLA) IS THE TOTAL FLOOR AREA OF A BUILDING, MEASURED FROM THE OUTSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL ROOFED AREAS

5% OF CARPARKING SPACES PROVIDED TO BE DEDICATED AS CAR SHARING BAYS
5% OF CARPARKING SPACES PROVIDED TO BE DEDICATED AS ELECTRICAL VEHICLE BAYS

DEVELOPMENT ANALYSIS

USE		GFA (EXCLUDING 22M² PL)
BUILDING 3		
WAREHOUSE	3A	649 m²
WAREHOUSE	3B	676 m²
WAREHOUSE	3C	677 m²
WAREHOUSE	3D	677 m²
WAREHOUSE	3E	698 m²
WAREHOUSE	3F	805 m²
OFFICE	3A	126 m²
OFFICE	3B	127 m²
OFFICE	3C	127 m²
OFFICE	3D	127 m²
OFFICE	3E	127 m²
OFFICE	3F	126 m²
TOTAL AREA		4,942 m²
BUILDING 4		
WAREHOUSE	GROUND LEVEL	4,132 m²
WAREHOUSE	LEVEL 1	3,028 m²
OFFICE MEZZANINE	GROUND LEVEL	841 m²
OFFICE MEZZANINE	LEVEL 1	924 m²
TOTAL AREA		8,925 m²
BUILDING 5		
WAREHOUSE	5A	1,071 m²
WAREHOUSE	5B	3,047 m²
WAREHOUSE	5C	2,163 m²
WAREHOUSE	5D	2,732 m²
WAREHOUSE	5E	2,023 m²
OFFICE	5A	333 m²
OFFICE	5B	432 m²
OFFICE	5C	403 m²
OFFICE	5D	424 m²
OFFICE	5E	391 m²
TOTAL AREA		13,019 m²
BUILDING 5 COMMERCIAL		
CAFE		76 m²
CHILDCARE		648 m²
CHILDCARE OUTDOOR		571 m²
COMMERCIAL		554 m²
COMMON AREAS		13 m²
ESTATE OFFICE		22 m²
TOTAL AREA		1,884 m²
BUILDING 6		
WAREHOUSE	6A	354 m²
WAREHOUSE	6B	597 m²
WAREHOUSE	6C	594 m²
WAREHOUSE	6D	920 m²
OFFICE	6A	89 m²
OFFICE	6B	118 m²
OFFICE	6C	117 m²
OFFICE	6D	171 m²
TOTAL AREA		2,960 m²
BUILDING 7		
WAREHOUSE	7A	698 m²
WAREHOUSE	7B	647 m²
WAREHOUSE	7C	644 m²
WAREHOUSE	7D	694 m²
WAREHOUSE	7E	647 m²
WAREHOUSE	7F	644 m²
OFFICE	7A	117 m²
OFFICE	7B	118 m²
OFFICE	7C	117 m²
OFFICE	7D	110 m²
OFFICE	7E	118 m²
OFFICE	7F	117 m²
TOTAL AREA		4,671 m²
BUILDING 8		
WAREHOUSE	8A	736 m²
WAREHOUSE	8B	642 m²
OFFICE	8A	139 m²
OFFICE	8B	130 m²
TOTAL AREA		1,647 m²
GRAND TOTAL GFA		38,048 m²

SITE COVERAGE	
TOTAL SITE AREA	123,898.129 m²
BUILDING 3 - 8 FOOTPRINT	31,903 m²
BUILDING 1 & 2 FOOTPRINT APPROX.	27,878 m²
SITE COVERAGE APPROX.	48.25%
LANDSCAPING	14.02%

LEGEND

- ESTATE BOUNDARY
- FORESHORE LINE BOUNDARY
- TRANSMISSION EASEMENT
- LANDSCAPE SETBACK
- BUILDING SETBACK
- 2.5 m BICYCLE & PDESTRIAN SHARED PATH
- PEDESTRIAN CONCRETE FOOTPATH
- PERMEABLE HARD SURFACE
- PYLON SIGN
- RW RETAINING WALL
- OA OUTDOOR AREA
- RWT RAIN WATER TANK
- W WASTE AREA
- MSB MAIN SWITCH BOARD
- PL PARCEL LOCKERS
- BG BOOM GATE
- RPC RAISED PEDESTRAIN CROSSING
- DP DELIVERY PARKING BAY
- SP SHARED PARKING BAY (5%)
- EV ELECTRICAL VEHICLE BAY (5%)
- EXISTING TREE PROTECTION ZONE
- PROPOSED TREE
- BIORETENTION BASIN / RAIN GARDEN

PARKING PROVISION

PARKING ALLOCATION SHOWN AS INDICATIVE ONLY

		CARS	BICYCLES
Building 1A		51	-
Building 1B		81	-
Building 1C		12	-
Building 1D		35	-
Building 1E		10	-
Building 2		12	-
Building 3		19	12
Building 4		131	64
Building 5	Block 1	48	12
Building 5	Block 2	19	8
Building 5	Childcare	17	4
Building 5	Commercial	15	8
Building 6		29	8
Building 7		62	12
Building 8		22	4
TOTAL		563	132
MOTORBIKES			26

No.	DATE:	REVISION:	BY:	CHK:
P12	01.08.2023	FOR COORDINATION	AS	JF
P13	25.08.2023	90% DA	AS	JF
P14	06.09.2023	ISSUE FOR APPROVAL	AS	JF
P15	12.09.2023	ISSUE FOR APPROVAL	AS	JF
A	28.09.2023	FOR LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
ESTATE MASTERPLAN

TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: AS
SCALE: 1:1000 @ A1
SCALE: 1:2000 @ A3

JOB NO: 22366
DRAWING NO: 005
REVISION: A

watson young

Appendix D Vegetation Management Plan

Construction Environmental Management Plan (CEMP)

TripleTwoNine Endeavour Road, Caringbah

Aliro Group Pty Ltd

SLR Project No.: 630.031866.00001

31 October 2024

TripleTwoNine
13 Endeavour Road Caringbah

Vegetation Management Plan

prepared for

Aliro Group

TripleTwoNine, 13 Endeavour Road Caringbah – Vegetation Management Plan

prepared for

Aliro Group

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Statement of Authorship

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- BAM Assessor Accreditation no: BAAS17054
- EIANZ Certified Environmental Practitioner
- Ecological Consultants Association of NSW Practicing member

Revision Schedule

Rev No	Date	Description	Issued to
1	04/10/2023	Vegetation Management Report_Draft	Aliro Group
2	09/10/2023	Vegetation Management Report	Aliro Group

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1. Introduction

1.1 Background

This Vegetation Management Plan (VMP) has been prepared by écologique on behalf of Aliro Group, to support a Development Application (DA) for a mixed-use warehouse and distribution, light industrial, commercial, childcare and café development known as TripleTwoNine, 13 Endeavour Road, Caringbah.

The Site is located adjacent to Woolooware Bay to the northeast, which comprises several environmentally sensitive aspects, which include:

- Towra Point Aquatic Reserve listed under the *Marine Parks Act 1997*
- Taren Point Shorebird Reserve located approximately 1.2km to the north along the foreshore
- 'Coastal Wetlands' under the State Environmental Planning Policy (Resilience and Hazards) 2021
- Key Fish Habitat mapped by DPI Fisheries – Woolooware Bay to the highest astronomical tides (HAT)
- Land mapped as Biodiversity Values under the BC Reg. to the northeast of the Site, associated with the mangrove community immediately adjacent to the Site
- The Ramsar listed Towra Point Nature Reserve approximately 1.1km to the east along the foreshore and approximately 2km to the north on the opposite foreshore of the bay

Within the Site itself, the following mapped environmental layers occur:

- 'Proximity Area for 'Coastal Wetlands' under State Environmental Planning Policy (Resilience and Hazards) 2021
- 'Environmentally Sensitive Land – terrestrial biodiversity under the Sutherland Shire LEP.
- 'Restoration' under Sutherland Shire Council's Greenweb Strategy
- 'Threatened species buffer' under the Sutherland Shire DCP

The VMP applies to the revegetation of a foreshore buffer zone, which is located in the northeast of the Site. While physically separated from Woolooware Bay by security fencing and a shared public pathway, the proposed foreshore buffer zone is less than 10 m from and will provide an ecological extension of the bay into the terrestrial environment.

The revegetation of the foreshore buffer zone has been identified as an important development outcome by both Sutherland Shire Council (Council) and the Department of Primary Industries (DPI) Fisheries.

The VMP responds to Council's and DPI Fisheries requirements, which include:

- Council's requirement for the preparation of a landscape management plan (LMP) that details the creation of the vegetation buffer. The LMP must be prepared by a suitably qualified, experienced and accredited ecologist to ensure an appropriate buffer is implemented and important vegetation is retained and protected.
- DPI Fisheries' requirement to use local native riparian vegetation species across the buffer zone to improve riparian habitat values.

The VMP has been prepared in tandem with the Landscape masterplan (Habit8, 2023), which has addressed social, cultural, recreational, and educational opportunities within natural landscapes.

1.2 Site details

The Site is shown in Figure 1-2 and relevant site details are summarised herein.

Street address	13 Endeavour Road, Caringbah
Legal identification	Lot 2 in Deposited Plan 714965
Local Government Area (LGA)	Sutherland Shire Council
Local Environmental Plan (LEP)	Sutherland Shire LEP 2015
Zoning	B7 Business Park
Site area	12.39 hectares

The Site is irregular in shape and features a frontage to Captain Cook Drive to the southwest, Endeavour Road and more broadly the Taren Point/ Caringbah industrial precinct to the northwest, Solander Playing Fields to the southeast and Woolooware Bay to the northeast. A shared public pathway exists between the site and Woolooware Bay.

Figure 1-1 illustrates the Site's location in the context of Towra Point Aquatic Reserve, Taren Point, Towra Point Nature Reserve and Biodiversity Value Mapping.

The VMP applies to an area of 6,800 m^2 (0.68 ha), which is shown in Figure 1-2 and Table 1-1 summarises the existing landscape within the VMP.

Table 1-1. Existing VMP areas

Component	Area (m^2)	Area (ha)
Vegetation retained		
Established planted local native vegetation	397	
Established planted non-local native vegetation	296	
Established planted local/non-local native vegetation mix	440	
Subtotal establish native vegetation retained	**1,133**	**0.11**
Exotic vegetation being cleared		
Planted mix	237	
Turf	1,970	
Palm (x 1)	55	
Hedges	104	
Subtotal exotic vegetation clearing	**2,366**	**0.24**
Planted seedlings (existing VMP extent)	2455	**0.26**



0 280 560 1,120

m

Legend

- Site boundary
- Ramsar Wetland (Towra Point NR)
- Estuarine Saltmarsh
- High Biodiversity Value mapping
- Towra Point Aquatic Reserve

Coordinate system: MGA Zone 56 (GDA 2020)
Image source: Nearmap 31 May 2023

TripleTwoNine, Caringbah

Figure 1-1 Site context

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TripleTwoNine, Caringbah

Figure 1-2. VMP extent

Legend

- Site boundary
- VMP_extent
- Local native
- Local/non-local native mix
- Non-local native
- Native/exotic mix
- Existing VMP planting
- Exotic
- Turf
- Development footprint

N

Coordinate system: MGA Zone 56 (GDA 2020)

Image source: Nearmap 31 May 2023

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1.2.1 Existing VMP extent

The existing VMP extent was established as part of the Development Application (DA21/0777) for the partial re-development of the Site.

The associated VMP was prepared by ELA and finalised in 2022 (herein referred to as the ELA-VMP to avoid confusion with this VMP).

Council has an 8:1 tree replacement policy, which in existing commercial and industrial developments is extremely difficult to achieve. The DA21/0777 required the removal of 75 trees and therefore required 600 replacement trees (in line with Council's policy).

The ELA-VMP was designed to ameliorate the impacts of DA21/0777's tree removal, which was endorsed by Council in lieu of the required 600 trees.

The existing VMP extent is 0.26 ha and its implementation was commenced in early 2023 as shown in photo plates 1 to 6, the plantings are still in the establishment phase.



Photo plate 1. Pre-ELA-VMP implementation (20/11/2022)



Photo plate 2. ELA-VMP vegetation clearing evident (16.02.2023)



Photo plate 3. ELA-VMP soil preparation evident (30.03.2023)



Photo plate 4. ELA-VMP planting & irrigation evident (01.05.2023)





Photo plate 5 (left) and **Photo plate 6** (right): ELA-VMP area viewed from northeast, shared pathway and mangroves in background, electricity easement overhead (17.07.2023)

1.2.2 Current proposal

The current proposal involves the redevelopment of the remaining areas of the Site and will require the removal of 459 trees. The trees proposed to be cleared are predominantly located in garden beds surrounded by hardstand.

115 trees are palm species that are susceptible to fusarium wilt (i.e., Canary Island date palm, Washington palm and cocos palm), with numerous Canary Island date and Washington palms already exhibiting death and dieback suspected of this pathogen already.

Fusarium wilt is a serious fungal disease that affects a range of palm species across the world including Australia. There is no effective treatment for this disease, and infection will eventually kill the tree. Fungal spores lay dormant in the soil until they detect a host. Dormant spores may move through the soil profile with groundwater or through foot traffic or vehicle traffic, on tools and equipment and by birds and possums.

Figure 1-3 shows the location of trees suspected of being infected with Fusarium wilt, which suggests that the fungus is already widespread at the Site.

A reasonable estimate of tree clearing directly impacted by the proposal would be 344 (excluding palms). This would correspond to 2,752 replacement trees required in line with Council policy.

To achieve this quantity of tree plantings within the Site is not feasible and would be counterintuitive to the Site's zoning as B7 Business Park (i.e., intended to optimise the future employment-generating potential of underutilised industrial areas).

The proposed VMP and landscape masterplan (Habit8, 2023) will provide high quality landscaping and revegetation of the foreshore and exceed Council's offsite tree replacement value[1]. is anticipated to overcome these constraints.

[1] $416K (basedon $113.64 ex GST per tree x 3,664 trees) and QS landscaping estimate of $648K.



Figure 1-3. Location of disease infected trees

2. VMP approach

2.1 Site constraints

The main constraint to the establishment of a fully structured foreshore buffer zone is:

+ The transmission easement that traverses the northern portion of the Site, which limits the type and height of vegetation that can be established; and
+ The support structure (stanchion) located along the Site's north-northeastern boundary, which the development must enable access for inspections and maintenance.

The landscape masterplan (Habit 8, 2023) has considered these constraints through incorporating the following design features:

+ A decomposed granite pathway that will provide light vehicle access to the stanchion (in the northern most extent of the foreshore buffer zone);
+ A decomposed granite pathway for pedestrian connectivity to the adjacent playing fields and the foreshore shared pathway (in the eastern most extent of the foreshore buffer zone); and
+ Mass planting beds of lower growing shrubs and groundcovers within the easement and fully structured planting outside of the easement.

These features collectively provide for revegetation of the foreshore zone, passive recreational opportunities and accessibility to public areas for employees and visitors (see Figure 2-1).

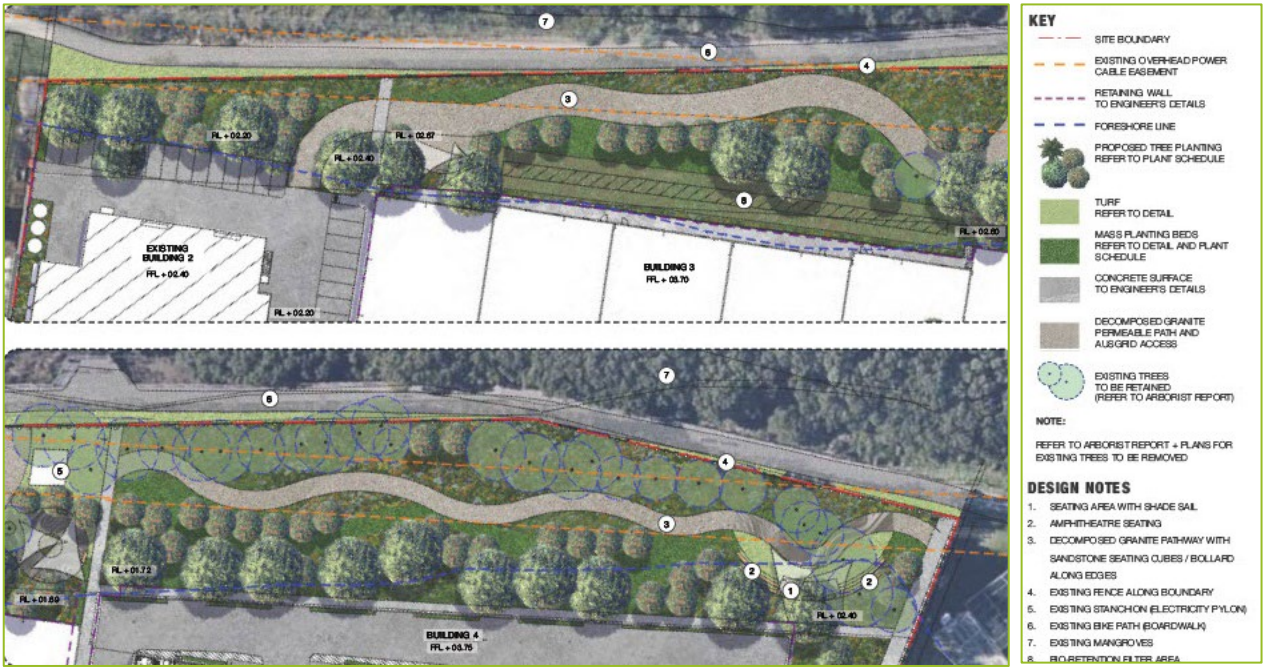


Figure 2-1. Extracts from the landscape concept plan for foreshore buffer zone (Habit 8, 2023)

2.2 VMP management zones

The total VMP area is approximately 0.68 ha as described in Section 1.2 and Table 1-1.

The proposed management zones (as shown in Figure 2-2) have been determined through consideration of site constraints and include the following:

1) Existing trees / shrubs being retained (approximately 0.11 ha)
2) Mass low growing plantings beneath the transmission line
3) Bioretention plantings
4) Tree, shrub and groundlayer plantings

2.1.1 Zone 1: Existing vegetation

Zone 1 (approximately 0.11 ha) contains a mixture of local and non-local planted native tree species, which are to be retained and include the following:

+ *Melaleuca quinquenervia* (broad-leaved paperbark)
+ *Acmena smithii* (lilly pilly)
+ *Cupaniopsis anarcoides* (tuckeroo)
+ *Ficus benjamina* (weeping fig)

This zone will require the installation of tree protection fencing around each tree's protection zone (TPZ) in accordance with the project arborists recommendations. It is assumed that this will be undertaken by the Civil Contractor as a part of the Site's clearing and earthworks activities.

2.1.2. Zone 2: Transmission easement planting

Zone 2 (approximately 0.16 ha) will be planted out with shrub and ground layer species specifically selected to remain at a compliant height beneath power lines and remain suitable for location adjacent access paths.

This zone comprises a portion of the ELA-VMP, which is being retained. An allowance has been made in this VMP for replacement planting and stabilisation should any direct or indirect impacts occur.

2.1.3. Zone 3: Bioretention basin

Zone 3 (approximately 0.05 ha) has been included in the VMP due its location within the foreshore buffer zone and the opportunity to incorporate naturally occurring grass, sedge and rush species into its establishment.

Due to its location in the foreshore buffer zone it is also logical that the establishment and initial maintenance of its plantings are included in the VMP. However, this will ultimately be determined by the Principal and Civil or other contractors as required.

2.1.4. Zone 4: Fully structured planting

Zone 4 (approximately 0.36 ha) is the largest zone and will comprise plantings from all canopy, shrub and ground layers.



Legend

- Site boundary
- VMP_extent
- Indicative_paths

VMP zones

- Zone 1. Existing vegetation
- Zone 2. Mass low plantings
- Zone 3. Bioretention
- Zone 4. All plantings

Coordinate system: MGA Zone 56 (GDA 2020)

Image source: Nearmap 31 May 2023

TripleTwoNine, Caringbah

Figure 2-1. VMP management zones

N

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3. VMP Implementation

3.1 Site Preparation

3.1.1 Civil works

Site preparation activities assume that the following components within the VMP extent will be undertaken by the Civil Contractor in accordance with the project's CEMP and relevant specialist sub-plans.

+ Protective fencing (ATF or similar) installation and signage denoting the VMP extent as a no-go and environmentally sensitive zone.

  This will need to be done in consultation with the Project Manager, Civil Contractor, VMP superintendent and the contractor engaged to implement the VMP, to ensure for the VMP work activities and to the electricity easement as may be required. Access will comprise unsealed tracks that will be excluded from the planting program.

+ Earthworks including removal of existing features, regrading works and clearing of vegetation.
+ Clearing of vegetation and earthworks in accordance with the project flora and fauna management plan (FFMP), which shall specify preclearance and clearance protocols, identification of habitat features and their reuse if appropriate, appropriate relocation sites for any displaced fauna.
+ Installation and ongoing maintenance of erosion and sediment controls in accordance with the and in the following locations at a minimum:
  - Generally, in accordance with the project's erosion and sediment control plan (ESCP), in particular that required surrounding the Site's boundary to the channel, adjacent bay and playing fields; and
  - At the base of protective fencing to protect the VMP zone.

NOTE: Where existing topsoil is not suitable for planting the civil contractor will need to introduce suitable topsoil at a depth to be determined by the VMP superintendent or Principal.

As the VMP extent has previously supported landscaping and turf, any requirement for topsoil introduction would be localised and minor in extent (e.g., areas where non-vegetated landscaped features are removed such as compacted gravel-base pathways, garden bed retaining walls or edging).

3.1.2 Photographic monitoring sites

Prior to the VMP's implementation suitable monitoring sites are to be established that are GPS measured and relocatable for ongoing photographic monitoring. Photographic monitoring shall be undertaken prior to the commencement of the following management activities:

+ Site preparation
+ Planting program
+ Practical completion of planting
+ Monthly over the duration of the establishment period
+ Thereafter three monthly over the duration of the maintenance period

3.1.3 Soil amelioration

With the exception of any areas that have been subject to compaction from construction activities, it is anticipated that existing soils will be suitable for revegetation without the need for amelioration (other than tilling/ripping of compacted soils).

It is anticipated that revegetation zones that are disturbed by construction activities will be made good by the Project's Civil Contractor.

3.1.2 Mulching

The higher elevated parts of VMP (zone 4) are to be mulched with a minimum 100mm layer of mulch to assist with weed suppression, improve soil water conservation and soil erosion control.

Mulch is to be placed to the required depth, clear of plant stems, and raked to an even surface flush with the surrounding finished levels. Mulch is to be spread so that after settling it is:

+ Smooth and evenly graded between design surface levels
+ Flush with adjacent finished levels
+ Of the required depths (100 mm depth)
+ Sloped towards the base of plant stems, but not in contact with the stem

Mulch may be used from chipped felled trees providing there is sufficient to stockpile mulch on the Site. Mulch brought into the Site shall only be accepted if appropriately certified.

Mulch shall not spread over planting areas without approval from the VMP superintendent or Principal (i.e., to validate soil preparation has been completed satisfactorily).

3.1.3 Jute matting

Jute matting shall be installed to the lower elevated part of VMP (Zone 2) to assist in weed suppression, and soil erosion control. Jute matting shall be 700gm pre-slitted jute matting.

3.2 Weed control

The extent of weed control will be dependent on both the extent and timing of construction and /or earthworks disturbance of the VMP extent.

The emergence of weeds will be at highest risk where soils are left exposed.

It is recommended that the Civil Contractor also be responsible for weed control during the period of time between completion of Civil works in the VMP zone and commencement of VMP's implementation.

3.3 Planting program

3.3.1 Plant procurement

Plant procurement involves the sourcing of plant species that are consistent with those provided in the Planting Schedule (provided in Appendix A) and sourced from the region.

Most commercial nurseries should be able to supply most species, however, at least four to six months advance notice will be required to ensure that the species listed the Planting Schedule (provided in Appendix A) are available for the intended commencement of planting.

Plant stock is to be inspected by the VMP superintendent (or otherwise appointed representative) at least one month prior to commencement of planting works and on delivery to the site.

Plants that are not: true to species; vigorous and healthy; with a well-developed root system; free from disease / pests; and are not without scars or dead wood; are to be rejected at delivery.

Planting shall be undertaken immediately after acceptance of plant delivery. If this is not possible: appropriate storage to keep the plants in good condition on the site, adequately protected from frost, wind, sun and vermin, and secured from vandals; shall be facilitated.

3.3.2 Planting procedure

Planting shall generally entail the following:

- Dig hole sufficient for root ball of plant. The removal from the container and the positioning of the plant is to be done with minimum disturbance to the roots.
- Slow-release native plant fertiliser (low phosphorous formulated native plant fertiliser tablet/granules) and water saving crystals shall be placed into the planting hole.
- After planting, the soil shall be replaced and carefully firmed, leaving a slight depression around each plant to allow for water collection. Soil is to be replaced in the hole so that the base of the stem is level with the soil surface, not set below the soil, or sitting above.
- All plants should be watered-in thoroughly after planting to settle any air pockets around the root ball of the plant and to give the plant a good initial supply of water.

3.3.3 Practical completion

Practical completion will be met at the completion of the planting program, with mulching completed, 100% of plants installed and watered.

3.3.4 Plant establishment

Plant establishment is to be achieved through watering, weeding, pest/disease control and replacing dead plant material over a 6 month period following Practical Completion.

The VMP Contractor shall make provision for watering of plants with all plants watered thoroughly on at least 4 to 6 occasions, during the establishment period and as required during prolonged dry and hot conditions.

Plant establishment inspections and works shall be undertaken at intervals not exceeding two weeks or less as required.

Failure to maintain the revegetation zone in a stable and healthy condition may result in the VMP superintendent arranging for the maintenance work to be carried out by others at the expense of the VMP contractor.

Practical Completion shall require a minimum 85 per cent survival rate of each species planted and a maximum of 5 percent weed cover.

3.3.5 Planting maintenance

The maintenance period will commence on completion of the plant establishment period and continue for a period of 12 months, which will include completion of the defects liability period (see Section 2.3.5).

Maintenance includes watering, weeding, replacing dead plant material and any other requirements necessary to ensure a stable and healthy condition the VMP zone.

Maintenance inspections and works shall be undertaken at intervals not exceeding one month.

Maintenance Inspection Reports shall be submitted to the VMP Superintendent (or Principal) within four (4) days of each maintenance inspection.

The report must:

a. include the date of visit, maintenance works completed, maintenance works in progress and maintenance works required;

b. give details of damaged, dead or missing plants and show their locations on site plans;

c. include photographs for all photo points with associated notes where required to illustrate issues, etc; and

d. include herbicide application records

3.3.5 Defects liability

The Defects Liability Period shall be in force for 18 months after Practical Completion of the works or until the Site is stable, whichever is the longer period.

Any defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or of any other cause, shall be removed and replaced at the VMP contractor's expense by work or materials of the required standard.

3.4 Performance measures

Performance targets are necessary to objectively measure the progress and the achievement of the VMP objectives. The anticipated timing of VMP management activities and related performance measures are outlined below and in Table 3-1.

1) All weeds are to be continuously controlled on emergence using recognised appropriate bush regeneration methods in accordance with best practice.

2) All priority weeds and WONS are to be controlled on emergence and prevented from spreading.

3) Weed control and revegetation works are to be carried out by a qualified bushland regeneration contractor for a period of 2 years following practical completion.

4) Revegetation zones shall achieve a minimum 80%- 85% cover of native species planted (see Table 3-1).

Table 3-1. VMP implementation schedule

Task	Timing	Performance measure
Plant procurement	Minimum 4-6 mths pre-commencement of VMP implementation	Plants that are not: true to species; vigorous and healthy; with a well-developed root system; free from disease / pests; and are not without scars or dead wood; shall be rejected at delivery.
Completion of planting works	Practical Completion	• 100% of plants installed
Plant establishment	6 months	• Minimum 85% per cent survival rate of each species planted in all zones • Maximum 5% weed cover
Maintenance	6-18 months	• Minimum 85% per cent survival rate of each species planted in all zones • Maximum 10% weed cover
Defects Liability Period	18 months	

Task	Timing	Performance measure
Maintenance	18-24 months	• No patches of the VMP greater than 2m x 2m without any surviving natives or with significant erosion present
Handover	24 months	• The buffer zone will remain under the control and management of Aliro.

4. Planting schedule

Plant species selection is based on interrogation of Council's native plant selector tool for the Site's street address along with consideration of the following:

+ Removal of species generated from the tool that are not appropriate to the conditions at the Site (i.e., wetland plants and lower saltmarsh species that require inundation or wet soils); and
+ A successional approach that includes additional species to those generated by the tool that includes hardier smaller shrub and groundcover species that are fast growing and good stabilisers (equally happy growing in a dune system) and reasonably tolerant of saline conditions

Table 3-2 identifies plant selected for the various VMP zones, however this should not be considered a restrictive list.

Table 3-1. Planting species selection

Species name	Common name	VMP zones
Trees		
Acmena smithii	Lilly Pilly	4
Allocasuarina littoralis	Black She-Oak	4
Banksia integrifolia	Coast Banksia	4
Banksia serrata	Old Man Banksia	4
Causarina glauca	Swamp She-Oak	4
Eucalyptus botryoides	Southern mahogany	4
Eucalyptus robusta	Swamp Mahogany	4
Glochidion ferdinandi	Cheese Tree	4
Shrubs		
Acacia longifolia var sophorae	Coastal Wattle	2, 4
Acacia terminalis subsp angustifolia	Sunshine Wattle	2, 4
Alectryon coriaceus	Beach Bird's Eye	2, 4
Banksia spinulosa	Hairpin banksia	2, 4
Breynia oblongifolia	Coffee bush	4
Callistemon citrinus	Scarlet Bottlebrush	4
Correa alba	Coastal Correa	2
Correa reflexa	Natve fuschia	2
Kunzea ambigua	White Kunzea	2, 4
Leptospermum laevigatum	Coast Tea Tree	2, 4
Myoporum boobialla	Coastal boobialla	2, 4
Viminaria juncea	Native Broom	2, 4

Species name	Common name	VMP zones
Westringia fruticosa	Coastal Rosemary	2, 4
Leucopogon parviflorus	Coastal beard heath	2, 4
Grasses / Sedges / Grasslike		
Carex pumila	Dwarf sedge	2
Dianella caerulea	Blue flax-lily	2, 4
Dichelachne crinita	Longhair plume grass	2, 4
Ficinia nodosa	Knotted club-rush	2, 4
Imperata cylindrica var. *major*	Blady grass	2, 4
Juncus kraussii	Sea rush	2
Lomandra longifolia	Spiny mat-rush	2, 4
Oplismenus imbecillis	Basket grass	2, 4
Poa poiformis	Coast tussock-grass	2, 4
Spinifex sericea	Spinifex	2
Sporobolus virginicus	Salt couch	2
Herbs/Forbs		
Cakile maritima		2
Carpobratus glaucescens	Pigface	2
Dichondra repens	Kidney weed	2, 4
Pratia purpurascens	White root	2, 4
Scaevola calendulacea	Dune fan-flower	2, 4
Scaveola albida	Pale fan-flower	2, 4
Sesuvium portulacastrum	Sea purslane	2
Suaeda australis	Austral seablite	2
Tetragonia tetragonoides	New zealand spinach	2
Vines		
Cissus hypoglauca	Water vine	2, 4
Hardenbergia violacea	False sarsaparilla	
Hibbertia scandens	Climbing guinea flower	
Kennedia rubicunda	Dusky coral pea	
Stephanica japonica var *discolor*	Snake vine	

Table 3-3 identifies the proportions of each zone that requires mulching or jute mapping and Table 3-4 identifies the planting densities and quantities that are estimated for the various VMP zones.

Table 3-2. Pre-planting

Zone	Planting area (m^2)	Mulch %	Mulch (m^2)	Jute %	Jute area (m^2)
1) Existing vegetation retained	0	0	0	0	0
2) Transmission easement	1,645	50	820	30	495
3) Bioretention	510	0	0	0	0
4) All plantings	3,600	80	2,880	0	0
Subtotals	**6,890**		**3,700**		**495**

Table 3-3. Indicative planting densities and quantities

Zone	Area (m^2)	Trees ($1/5m^2$)	Shrubs ($1/3m^2$)	Groundlayer ($6/m^2$)	Vines ($1/5m^2$)	Subtotals
1)	1,133	0	0	0	0	0
2)	1,644	0	550	9865	330	12,389
3)	510	0	0	3000	0	3,510
4)	3,599	720	1200	21600	720	27,839
		720	**1750**	**34465**	**1050**	**43,738**



Appendix E Preliminary Construction Traffic Management Plan

Preliminary Construction Environmental Management Plan (CEMP)

TripleTwoNine Endeavour Road, Caringbah

Aliro Group Pty Ltd

SLR Project No.: 630.031866.00001

31 October 2024

Preliminary Construction Traffic Management Plan (CTMP)

TripleTwoNine Estates Development Application
13 Endeavour Road, Caringbah 2229

Aliro Group

Level 38, 1 Macquarie Place, Sydney NSW 2000

Prepared by:

SLR Consulting Australia

Level 16, 175 Eagle Street, Brisbane QLD 4000,
Australia

SLR Project No.: 630.031866.00003

15 October 2024

Revision: v1.0

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
v1.0	15 October 2024	D. Nguyen C. Seventekin	C. Seventekin B. Rheinberger	B. Rheinberger

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Aliro Group (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.

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Appendix B Curriculum Vitae – Brendyn Rheinberger
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1.0 Introduction

1.1 Context

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Aliro Group Pty Ltd (Aliro) to prepare a preliminary Construction Traffic Management Plan (CTMP) as part of the TripleTwoNine Estates Development Application (DA) for the construction of a mixed-use development located at 13 Endeavour Road, Caringbah NSW.

This preliminary CTMP has been prepared following a Request for Information (RFI) from the Sutherland Shire Council (Council) dated 03 May 2024 (provided in **Appendix A**) for the Development Application No. DA23/0721 (PAN-379298).

Table 1 provides a summary of the relevant items in Council's RFI letter.

Table 1 Council RFI to Accompany the Development Application

No.	Condition
1	**Construction and Site Management Plan:** A Construction and Site Management Plan is to be submitted to Council for review and approval and is to include a suitable Traffic Guidance Scheme. The revised proposal is to be accompanied by a Construction and Site Management Plan and include a suitable Traffic Guidance Scheme.

It is noted that some information documented within this preliminary CTMP may need to be revised once a detailed construction strategy is developed. A comprehensive CTMP will only be prepared following the approval of the DA to ensure the requirements of the Development Consent issued by the NSW Government's Department of Planning, Housing and Infrastructure (DPHI) are satisfied.

This preliminary CTMP has been prepared under the supervision of Brendyn Rheinberger, a suitably qualified and experienced person. Brendyn holds the following accreditation:

- Engineers Australia, Chartered Professional Engineer (CPEng).
- SafeWork NSW Traffic Control Work, Prepare A Work Zone Traffic Management Plan, Number: TCT1044529.
- Queensland Department of Transport and Main Roads, Traffic Management Designer (TMD), Number: OP 951.

Brendyn's CV is provided in **Appendix B** for further details.

1.2 Reference Documents and Stakeholder Consultation

Reference is made to the following documents, which have been previously prepared in relation to the DA:

- *Statement of Environmental Effects* dated 23 October 2023 prepared by Ethos Urban.
- *Operational Plan of Management* dated 23 October 2023 prepared by Ethos Urban.
- *Masterplan Traffic and Parking Impact Assessment of the Proposed Mixed-Use Development*, dated 06 October 2023 prepared by McLaren Traffic Engineering.

Further to the above, this preliminary CTMP has been prepared to meet the requirements, where possible, outlined in Appendix A and Appendix E, Section E.2 of the Transport for NSW (TfNSW) *Traffic Control at Work Sites Technical Manual* (Issue No. 6.1, February 2022).

Regarding the authority consultation, this document, the SLR Preliminary CTMP Version 1.0, has been issued to Sutherland Shire Council (Council), as the key stakeholder, for their review

and comment as requested in their RFI. Where a comment requires an amendment to this preliminary CTMP, this will be actioned and incorporated into a new version of the preliminary CTMP. Once all stakeholder comments have been addressed and incorporated into this preliminary CTMP, it will be issued to DPHI for approval by the Planning Secretary.

2.0 Development Overview

2.1 Site Location

The site is located at 13 Endeavour Road, Caringbah, NSW, formally identified as Lot 2 in DP 714965, approximately 24km south of Sydney CBD. The project is located within the Sutherland Shire Local Government Area (**LGA**) within the Caringbah precinct.

The site is a part of the larger TripleTwoNine Estate, which has a total area of approximately 12.4 hectares (ha). The site was formally owned and occupied by Toyota Motor Corporation Australia before its operations became redundant in 2014. The existing development currently comprises five (5) buildings and infrastructure associated with the previous users, which include:

- Building 1 (approx. 2.6ha) – comprising a number of separate tenancies (including Australia Post) and associated hardstand areas.
- Building 2 (approx. 0.2 ha) – unoccupied.
- Carparking.
- Internal roads.

The site is shown in the context of the surrounding area in **Figure 1**.

Figure 1 Site Location



2.2 Surrounding Road Network

Details of the key roads surrounding the subject site are provided in **Table 2**.

Table 2 Key Roads

Road Name	Classification	Description	Posted Speed
Captain Cook Drive	TfNSW [1]	Three (3) lanes in each direction with an east-west orientation. The carriageway is reduced to two (2) lanes in each direction east of the Gannons Road roundabout.	70km/h
Gannons Road	Council	One (1) lane in each direction with on-street parking permitted. Travels in a north-south orientation and intersects with Captain Cook Drive at the northern end, south of the subject site.	60km/h
Endeavour Road	Council	One (1) lane in each direction with on-street parking permitted and minimal line marking. The road fronts the western end of the subject site, with localised widening provided at bends in the carriageway.	50km/h [2]

[1] Captain Cook Drive is classified as a state road to the west of Gannons Road only.

[2] Unposted speed limit.

2.3 Proposed Development

The proposed development comprises a mixed-use warehouse and distribution centre, industrial tenancies, a childcare centre and a café in the broader TripleTwoNine Estate. The work involves the demolition of some existing buildings and the construction of eight (8) new buildings, facilitating a staged approach.

The broader masterplan for the proposed development is provided in **Appendix C**. At a high level, the broader estate comprises the following:

- Retention of existing Building 1, Building 2 and vehicular crossovers.
- Staged construction and operation of the following proposed buildings, with a total gross floor area of 38,048m^2:
  - Building 3 (GFA 4,942m^2).
  - Building 4 (GFA 8,925m^2).
  - Building 5 Block 1 and Block 2 (GFA 13,019m^2).
  - Building 5 commercial (GFA 1,884m^2), comprising of:
    - Commercial premises, including office space and a food & drink premise (café).
    - Childcare centre with an occupancy of 68 children and approximately 17 staff.
  - Building 6 (GFA 2,960m^2).
  - Building 7 (GFA 4,671m^2).
  - Building 8 (GFA 1,647m^2).
- On-site parking: 563 car parking spaces in a staged manner – 189 retained car parking spaces and 374 newly constructed car parking spaces.

The proposed development layout and external access arrangements are indicatively illustrated in **Figure 2**.

Figure 2 Proposed Estate Layout and Access Arrangements



3.0 Construction Phase Overview

3.1 Construction Activities and Staging

Planned construction activities comprise the following works:

- Site establishment.
- Demolition of all existing buildings and structures other than Building 1, Building 2 and some access crossovers.
- Bulk earthworks.
- Site preparation works, including drainage, electrical services and reconstruction of the Captain Cook Drive site entrance.
- Each building mentioned in **Section 2.3** will be built under a separate construction stage.
- On-site car parking.
- Complementary landscaping and offset planting.

Table 3 details the anticipated construction programme. This may change due to approval timeframes or inclement weather conditions.

Table 3 Anticipated Construction Programme

Construction Activity	Estimated Duration	Anticipated Timeline of Works
Stage 1: Site establishment, demolition and bulk earthworks and site preparation works.	Up to 6 months	18/11/2024 to 30/04/2025
Stage 2: Civil works, including the construction of each building and associated on-site car parking.	Up to 24 months	30/04/2025 to 12/04/2027
Stage 3: External pavements, landscaping, commissioning and handover.	Up to 3 months	12/04/2027 to 30/07/2027
Total Construction Period	**Up to 33 months**	**From Nov 2024 to Jul 2027**

3.2 Construction Hours

All construction works will be undertaken within the following hours:

- Monday to Friday: 7am to 6pm.
- Saturday: 8am to 1pm.

It is understood that no work will be undertaken on Sundays and public holidays. Works outside of these hours may be undertaken in the following circumstances:

- works that are inaudible at the nearest sensitive receivers.
- works agreed to in writing by the planning secretary.
- for the delivery of materials required outside these hours by the NSW police force or other authorities for safety reasons.
- where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.

Construction hours are also described within Section 2.2 of the Construction Environmental Management Plan (CEMP).

3.3 Site Contact Details

The nominated contact person during the construction activities is as follows:

- Andrew Whiteman, Development Manager (Aliro):
  - Mobile No.: 0421 642 922
  - Email: awhiteman@aliro.com.au

Following approval of the development by the Council and agreement of services with an appropriate building Contractor, the site contact person and details will be updated to reflect key personnel contact(s) supervising construction activities.

As stated in Section 2.4 of the CEMP, Project Managers and/ or relevant site supervisors will maintain an updated on-site list for the construction contact details of relevant site representatives and builders, specifying their roles, names and contact details.

3.4 Site Access

3.4.1 Construction Access Arrangements

Access is proposed to be provided for all construction vehicles via two existing crossover locations on Captain Cook Drive (Gate 1) and Endeavour Road (Gate 2). Both crossovers will be used for entry and exit. It is anticipated that the existing crossovers will be used to facilitate the construction of the separate buildings, as noted below:

- Gate 1 – Buildings 4, 5 (blocks 1 and 2 and commercial), 6, 7 and 8.
- Gate 2 – Building 3.

Figure 3 illustrates the anticipated construction vehicle access arrangements.

Figure 3 Proposed Construction Access Arrangements



3.4.2 Construction Vehicle Routes

Truck movements to/ from the proposed development will be restricted to the designated truck routes and confined to the arterial roads.

The designated routes are as follows:

3.4.2.1 Approach routes:

Gate 1

- Northern approach: Rocky Point Road, Taren Point Road, Captain Cook Drive.
- Southern approach: Princes Highway, Kingsway, Taren Point Road, Captain Cook Drive.

Gate 2

- Northern approach: Rocky Point Road, Taren Point Road, Captain Cook Drive, Endeavour Road.
- Southern approach: Princes Highway, Kingsway, Taren Point Road, Captain Cook Drive, Endeavour Road.

3.4.2.2 Departure routes:

Gate 1

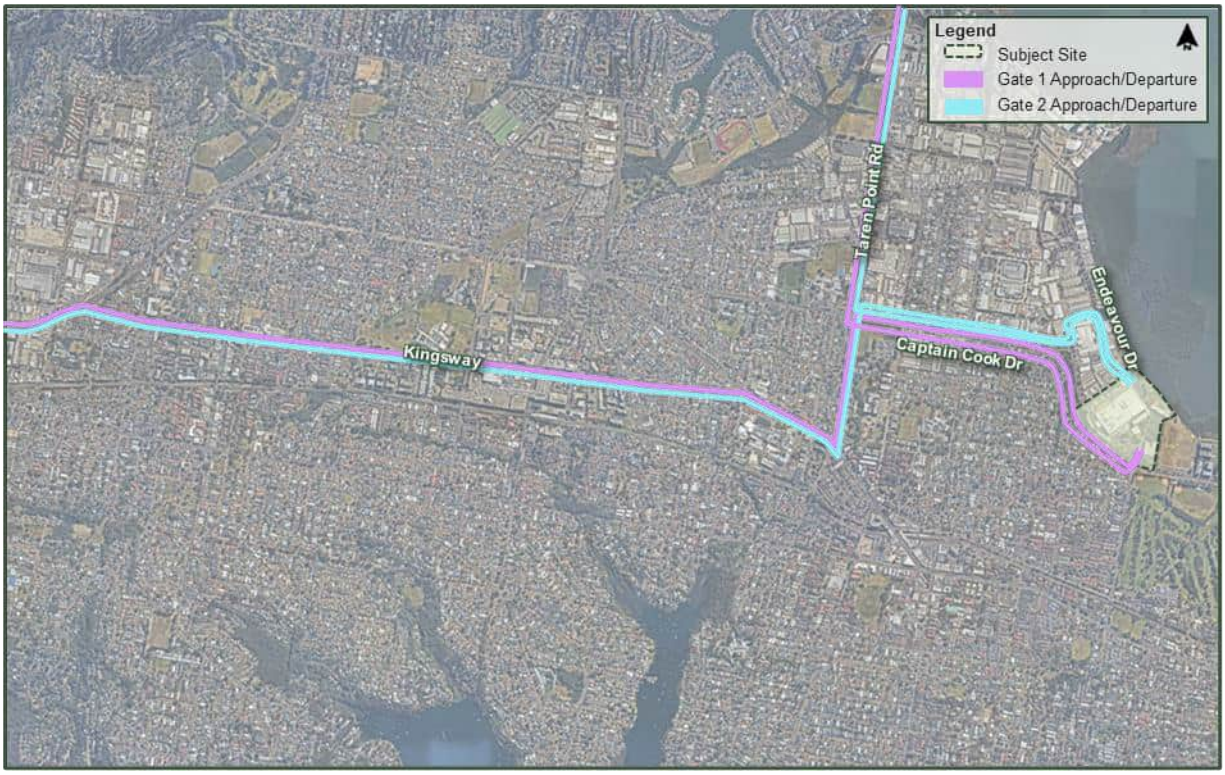
- Northern departure: Captain Cook Drive, Taren Point Road, Rocky Point Road.
- Southern departure: Captain Cook Drive, Taren Point Road, Kingsway, Princes Highway.

Gate 2

- Northern departure: Endeavour Road, Captain Cook Drive, Taren Point Road, Rocky Point Road.
- Southern departure: Endeavour Road, Captain Cook Drive, Taren Point Road, Kingsway, Princes Highway.

The anticipated routes to be utilised by all construction vehicles travelling to and from the site are also illustrated in **Figure 4**.

Figure 4 Construction Vehicle Routes to/ from the Proposed Development



3.4.3 Internal Circulation Road, Car Parking and Loading/ Unloading Areas

During the construction period, the following areas will be designated within the site boundary:

- An area for laydown shall be provided to facilitate loading/ unloading of heavy vehicles.
- An area for material stockpiling/ storage shall be provided within the site.
- All crane mobile locations within the site will vary but be contained within the site boundary.

It is anticipated that both light and heavy vehicles will use the existing internal carriageways to access the construction laydown areas/ compounds. In addition, the existing parking facilities will be used as required for light and heavy vehicles. Parking on surrounding streets will be avoided unless necessary.

3.5 Construction Phase Traffic Demands

This document is a preliminary CTMP that is prepared to support the DA. At the time of writing, there is no clear construction methodology and therefore construction phase traffic demands are not available.

4.0 Safety Assessment

4.1 Site Access

The construction activities associated with this project do not propose amending the existing road condition arrangements on Captain Cook Drive or Endeavour Road.

Construction vehicle access to the site will be via two (2) access points, as detailed in **Section 3.4.1**. The safety of vehicle and pedestrian movements will be managed at both access points by implementing site-specific Traffic Guidance Schemes (TGSs). This is further discussed in **Section 5.2**.

4.2 Emergency Vehicles

Emergency vehicle access to and from the site will be available at all times while the site is occupied by construction workers. There will be no disruption to emergency vehicles on any roads.

4.3 Closest Hospital/ Medical Centre

There are several Medical Centres located in proximity to the site. Perhaps the most accessible is the Sutherland Hospital (public) at the corner of Kingsway and Kareena Road, Caringbah. It is approximately 2.5km from the subject site.

5.0 Construction Phase Traffic Management Measures

5.1 Drivers Code of Conduct

It is anticipated that a Drivers Code of Conduct will be prepared by Aliro. This will be included in the future CTMP (post-approval).

5.2 Traffic Guidance Scheme

Site-specific TGSs have been prepared by SLR to manage the internal carriageway interactions between existing tenancies and construction vehicles. Refer to **Appendix D**, which contains these TGSs for review (prior to implementation) associated with the management of internal vehicle arrangements. Following implementation of this TGS (once approved), weekly inspections of the temporary traffic management (TTM) on-site shall be conducted as per **Section 6.3** herein.

5.3 Site Management

The following procedures are to be observed by all vehicle drivers accessing the subject site:

- The construction has a drug and alcohol policy which includes random testing.
- Drivers are to obey all site signage and the directions of site personnel.
- Vehicles are to use designated circulation roads within the site where possible.
- All heavy vehicles are to park and load/ unload within the site using designated parking and loading areas where possible. Vehicles are not to park or load/ unload within the public road reserve.
- All drivers are required to operate vehicles in a safe and courteous manner, within and external to the subject site.

5.4 Heavy Vehicle Management

5.4.1 General Requirements

All heavy vehicle drivers accessing the subject site must abide by the following:

- Undertake a site induction carried out by authorised site personnel or suitably qualified person under the direction of the site manager;
- All drivers must hold a valid driver’s license which is appropriate for the class of vehicle under their operation;
- All drivers are to ensure their load is legal, covered and secure before entering or exiting the site;
- All drivers must comply with Chain of Responsibility legislation;
- Vehicles entering the subject site are to be registered, roadworthy, and of sound mechanical condition. Site management may request to inspect any vehicle or request maintenance records for any vehicle and reserves the right to prohibit any vehicle from entering the subject site should there be any indication that the vehicle is not roadworthy or safe to operate;
- Any accidents, incidents, complaints, hazards, spillages or near misses must be reported immediately to the site manager. This includes incidents on the external road network.

5.4.2 Noise Management

To limit heavy vehicle noise associated with construction activities, drivers are expected to abide by the following:

- Heavy vehicles using Captain Cook Drive or Endeavour Road should limit the use of engine or compression braking systems where possible;
- Posted speeds on the external road network are to be observed, and vehicle speeds are anticipated to be restricted to 10km/h within the site;
- Vehicles are to be turned off when not in use.

5.4.3 Dust Management

To minimise the potential for dust protection within the subject site, drivers are expected to abide by the following requirements:

- Vehicles are anticipated to be restricted to 10km/h within the subject site;
- Vehicles are to use designated circulation roads within the site where possible;
- Drivers are to report excessive dust production from internal circulation roads to the site manager;
- Water trucks will be used to wet down internal circulation roads during dry conditions and when excessive dust production is reported to the site manager.

5.5 Mitigation Measures

The impacts of construction traffic and the anticipated mitigating measures to be implemented are outlined in **Table 4**.

Table 4 Mitigation Measures - Responsibility and Timing

Mitigation Measures	Responsibility	Timing
Construction Traffic on Endeavour Road/ Captain Cook Drive: Construction traffic will use the two (2) construction accesses to enter/ exit the site for the works. Construction traffic is anticipated to remain low to ensure the impacts to motorists within the area are kept to a minimum.	Site Engineer	Weekly
Management on deliveries: The site manager will manage deliveries to ensure that construction vehicle movements will remain low.	Site Manager	As required
Managing dirt on the public road network: The use of rumble grids positioned at the site's access points to Endeavour Road and Captain Cook Drive, as well as the use of water trucks and sweepers for both gates, shall ensure the existing network is free of dirt from the site.	Site Manager	As required
Safety during construction: Safety to motorists and the public throughout the area will be maintained during construction through the preparation and execution of site-specific TGSs. The TGSs will be implemented to manage and warn existing tenants for the presence of construction vehicles and activities within the site. The TGSs aims to identify all reasonably foreseeable hazards, assesses the hazards, and manages the hazards as best as possible by either eliminating or minimising the risks. The TGSs shall be monitored and updated accordingly where required.	Project Manager	Reviewed at each stage of construction

Mitigation Measures	Responsibility	Timing
Reporting: Reporting and monitoring of movements during peak periods are to be undertaken to ensure that drivers are adhering to restricted times, and to ensure that the approved traffic generation and subsequent impacts on the road network are in line with those approved.	Site Engineer	Weekly
Induction to Drivers Code of Conduct: Vehicle operators accessing the construction site shall be inducted onto the Drivers Code of Conduct (to be prepared by Aliro) on an as required basis, prior to entering the site. The Contractor is to maintain a register of inducted operators with evidence of induction by way of operator signatures being captured.	Site Manager/ Project Manager	As required

5.6 Risk Assessment

A risk assessment is intended to identify hazards and risks associated with the construction activities. The purpose is to determine the controls required for the protection of road workers and road users. A Risk Assessment associated with the construction works of this site has been completed and attached at **Appendix E**.

6.0 CTMP Monitoring/ Review & Improvement Process

6.1 Implementation

In accordance with "the anticipated conditions" of the Development Consent:

- Construction should not commence until the future CTMP has been approved by the Planning Secretary.
- The most recent version of the future CTMP, approved by the Planning Secretary, should be implemented during the construction.

6.2 Monitoring and Review

It is proposed that the future CTMP be reviewed monthly and updated accordingly. The on-site coordinator will undertake regular reviews during the implementation and execution of the future CTMP. Monitoring of the future CTMP shall also be included in the environmental checklists, along with any incidents reported within the weekly site meeting.

All and any reviews should be documented; however, key considerations regarding the review of the CTMP shall be:

- To ensure the implementation of the CTMP and TGSs is consistent with the intent of this report and that the most recent version of the CTMP and TGS (as approved by the Planning Secretary) is being implemented.
- Tracking deliveries against the volumes outlined in the future CTMP report (NOTE: volumes will be provided post-approval). Deliveries will be tracked against approved volumes, and a vehicle log—including vehicle registration and time of entry—will be maintained to assess the effectiveness of these monitoring programs.
- It is expected that the Contractor will undertake a truck and car count/ review to ensure volumes are within 'Condition Green' of **Table 7** and will be undertaken once a month. In addition, the Contractor is required to retain a log of all vehicles accessing the Site daily.
- To identify any shortfalls and develop an updated action plan to address issues that may arise during construction (parking and access issues).
- To ensure TGSs are updated (if necessary) by 'Prepare a Work Zone Traffic Management Plan' accredited personnel to ensure they remain consistent with the set-up on-site and comply with relevant standards and guidelines.
- Regular checks to ensure all loads are entering and leaving the site, as outlined in this CTMP.

As such, **Table 5** provides triggers to monitor and review this CTMP.

Table 5 CTMP Monitoring and Review - Triggers

Type of Review	Frequency	Considerations
Scheduled	The scheduled CTMP review must be undertaken monthly or as specified otherwise.	The scheduled CTMP review must consider the following: • CTMP and TGS(s) are approved. • Identify required variations to the TGS and ensure that they are updated, recorded, and approved. • Review any departures or variations of the CTMP and/ or TGS(s) to ensure they have been documented and approved.

Type of Review	Frequency	Considerations
		• Speed control effectiveness. • Construction vehicle entry/ egress suitability, with no queuing on the public road network at any time. • Construction vehicle daily/ peak hour movements comply with approved volumes, with monthly reviews of the Contractor's daily logbook of vehicles required. • Periodic checks of noise-generating items to ensure they are less than the prescribed noise limits.
Change Generated Review	The change-generated review must be undertaken when implementing new traffic stages, switches, or construction-based activities.	The change-generated CTMP review must consider the following: • The work site is operating safely. • Delineation is adequate with appropriate signage installed for changed conditions. • Safe passage is provided for all road users. • Road Safety Audits are arranged or confirmed as required. • Accountability for approval and inspection is well understood and documented.
Non-Compliance, Post Incident or Near Miss Review	The non-compliance, post-incident, or near-miss review must be undertaken following an incident or miss.	Any non-compliance must be reported immediately to the supervisor. A non-compliance is anything other than 'Condition Green' as outlined in **Table 7**. All workplace incidents must be reported immediately to the supervisor, who will determine the responsibility for investigating the incident. The incident and investigation must also be recorded in an incident reporting system. The post-incident or near-miss CTMP review must consider: • Casual factors. • Contributory factors or changes required. • Identified changes to TGS are completed, approved, recorded and communicated. For any incidents or near misses (where required), a safety alert must also be prepared and distributed by the Site Manager to share learnings with other work sites (as applicable).

The monitoring process is expected to form part of the monitoring plan required to be included as part of the overarching CEMP, of which this CTMP forms a part. The carriageway (including the footpath) must be serviceable for the duration of construction. At the direction of the Council, remedial treatments such as patching are anticipated to be undertaken at no cost to the Council.

6.3 Work Site Inspections, Recording and Reporting

Recording and reporting of the monitoring programs shall be done in accordance with Section E.3 (Weekly TTM inspection checklist), E.4 (Shift/ Daily TTM inspection checklist) and E.5 (Post completion inspection checklist) of the TfNSW *Traffic Control at Work Sites* Technical Manual Issue 6.1 (TCAWS 6.1). As such, the structure, schedule, and frequency of these activities have been considered and identified.

To inspect, review and audit the TTM arrangements implemented on-site, the actions presented in **Table 6** are proposed to be undertaken by suitably qualified personnel with TCAWS 6.1 requirements during all construction phases.

Table 6 Review of Activities - Example Template

Activity			Frequency or Details
Shift Inspections	☐ YES	☐ NO	
Regular Inspections	☐ YES	☐ NO	
CTMP Review	☐ YES	☐ NO	
Road Safety Audit	☐ YES	☐ NO	
Other	☐ YES	☐ NO	
Comments			

Given the anticipated duration of construction (33 months) and the fact that no regular works have been proposed externally to the site, monthly TTM inspections are considered sufficient.

6.3.1 Incident Management

For the purposes of this CTMP, an 'incident' is an occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance. Furthermore, a 'non-compliance' is an occurrence, set of circumstances or development that is a breach of the consent.

All incidents related to traffic, including those of the Principal Contractor, subcontractors, and/ or visitors that occur during construction works will be managed in conjunction with the requirements outlined in Aliro's Incident and Non-Compliance Handling Process procedure (outlined within the CEMP).

Whilst it is noted that key Contractors will be implementing their own environmental management system procedures and processes, Aliro will be responsible for ensuring that these systems and processes satisfy the requirements of the CEMP, including the incident management process.

Aliro's nominated Project Manager must be notified immediately of any environmental incident or near miss related to traffic. Such incidents may include, but are not limited to:

- Vehicle crash or injury resulting from construction traffic related to the project;
- Queuing onto Endeavour Road or Captain Cook Drive, in breach of the requirements set out under this CTMP;
- Spill of any dangerous goods or hazardous substance to ground or water;
- Substantial complaints received from members of the community, existing tenants or regulatory authorities relating to traffic management;
- Land-based off-site sediment loss to the environment, including sediment tracking onto the carriageway.

Aliro's nominated Project Manager will be responsible for all notifiable environmental incidents in line with the regulatory notification requirements (outlined in the CEMP).

All environmental incidents will be reported immediately to DPHI in writing via the Planning Portal after Aliro become aware of the incident, as per the Conditions outlined in the future Development Consent. Any notification to DPHI must identify the development, including the application number, and set out the location and nature of the incident.

In the event of a notifiable non-compliance incident arising, the Principal Contractor will notify the Aliro Project Manager immediately, who is then required to notify DPHI in writing (via the Planning Portal) within 7 days, as per the future Conditions. In addition, any notification to DPHI must:

- identify the development, including the application number.
- set out the condition of consent that the development is non-compliant with.
- the way in which it does not comply.
- the reasons for the non-compliance (if known).
- what actions have been taken, or will be undertaken, to address the non-compliance.

The CEMP also outlines procedures for incident and non-compliance response and handling within Section 3.5.

6.4 Contingency Plan

It is anticipated that a contingency plan shall be established by the Contractor and is to be included in the overarching CEMP. Notwithstanding, **Table 7** outlines an indicative plan for the Contractor to follow in the event that the monitoring program identifies the management plan as ineffective in managing the construction impacts.

A Compliance Report must be submitted to the Department reviewing the environmental performance of the development to:

- identify any trends in the monitoring data over the life of the development.
- identify any discrepancies between the predicted and actual impacts of the development and analyse the potential cause of any significant discrepancies.
- describe what measures will be implemented over the next year to improve the environmental performance of the development.

Table 7 Contingency Plan

Risk		Condition Green	Condition Amber	Condition Red
Construction Movements	Trigger	Both anticipated peak hour and daily Construction traffic volumes are in accordance with permissible volume and time constraints.	Construction traffic volumes exceed anticipated peak hour volumes but are within permissible daily volume constraints.	Construction traffic volumes exceed anticipated permissible volume and time constraints.
	Response	No response required.	Review and investigate construction activities, and where appropriate, implement additional remediation measures such as: • Review CTMP and update where necessary. • Provide additional training.	As per Condition Amber, plus: • If it is concluded that construction activities were directly responsible for the exceedance, submit an incident report to government agencies. • Stop all transportation into and out of the site.
Queuing	Trigger	No queuing identified.	Queuing identified within site, but not on to public road.	Queuing identified on the public road.

Risk		Condition Green	Condition Amber	Condition Red
	Response	No response required. Continue monitoring program.	Review the delivery schedule prepared by the builder. If drivers are not following the correct schedule, then they should be provided with additional training and an extra copy of the Driver Code of Conduct.	As per Condition, plus: • Review and investigate construction activities. • If it is concluded that construction activities were directly responsible for the exceedance, submit an incident report to government agencies. • Temporary halting of activities and resuming when conditions have improved. • Stop all transportation into and out of the site. • Review CTMP and update where necessary, provide additional training.
Noise	Trigger	Noise levels do not exceed imposed noise limits, as outlined within the approved CNVMP nor has there been a traffic noise related complaint.	Noise levels in minor excess (<10dBA) of imposed noise limits per the approved CNVMP, or receipt of a single noise complaint.	Noise levels greatly in excess (>10dBA) of imposed noise limits per approved CNVMP, or consistent noise complaints.
	Response	No response required.	Undertake all feasible and reasonable mitigation and management measures to minimise noise impacts.	As with Condition Amber, if noise levels cannot be kept below applicable limits, then a different construction method or equipment must be utilised.
Traffic Guidance Scheme (TGS)	Trigger	No observable issues (TGS implemented according to plan).	Minor inconsistencies with TGS to on-site operations (such as covered signs, missing signs, fallen cones, etc.).	Near miss or incident occurring regardless of/ as a result of the TGS being implemented.

Risk		Condition Green	Condition Amber	Condition Red
	Response	No response required.	An appropriately accredited and qualified Traffic Controller is to amend traffic management arrangements on-site to be consistent with the approved TGS, and to keep a log of all changes.	Stop work until an investigation has been undertaken into the incident. If warranted, amendments to the TGS by an appropriately qualified 'Prepare a Work Zone Traffic Management Plan' person are made (based on results of investigation) to ensure that the safety of all workers, students and civilians are catered for.
Dust	Trigger	No observable dust.	Minor quantities of dust in the air and tracking onto the road.	Large quantities of dust in the air and tracking onto the road.
	Response	No response required.	Review and investigate construction activities and respective control measures, where appropriate. Implement additional remedial measures, such as: • Deployment of additional water sprays. • Relocation or modification of dust-generating sources. • Check condition of vibrating grids to ensure they are functioning correctly. Temporary halting of activities and resuming when conditions have improved.	As per Condition Amber, plus: • If it is concluded that construction activities were directly responsible for the exceedance, submit an incident report to government agencies. • Implement relevant responses and undertake immediate review to avoid such occurrences in future.

6.5 Communications Strategy

It is anticipated that a communications strategy will be established by the Contractor. If required, a Communications and Community Liaison Representative (CCLR) can be nominated and shall be responsible for ensuring that the appropriate management response and handling procedures are instigated and carried through in the event of an environmental complaint.

All employees who are made aware of a verbal or written complaint are to immediately notify the Contractor's Project Manager, who will then contact the CCLR. Upon becoming aware of the complaint, the protocol outlined in **Table 8** will be followed.

Table 8 Response Strategy

Ref	Protocol	Action
1	Record and acknowledge	Any employee who takes receipt of a complaint, either verbal or written, are to immediately notify the Contractor's Project Manager who will then contact the CCLR. The Contractor's Project Manager will be available 24 hours a day, seven days a week and have the authority to stop or direct works. In the normal course of events, the first contact or complaints will usually be made in person or by telephone. The complainant's name, address, and contact details, along with the nature of the complaint, will be requested. If the complainant refuses to supply the requested information, a note will be made on the form and complainant advised of this.
2	Assess and prioritise	The CCLR will prioritise all complaints by severity for the risk to health and safety and will attempt to provide an immediate response via phone or email.
3	Investigate	An on-site investigation will be initiated in an attempt to confirm details relevant to the complaint and the cause of the problem. Any monitoring information and/or records at and around the time of the complaint will be reviewed for any abnormality or incident that may have resulted in the complaint.
4	Action or rectify	Once the cause of the complaint has been established, every possible effort will be made to undertake appropriate action to rectify the cause of the complaint and mitigate any further impact. The CCLR will assess whether the complaint is founded or unfounded and delegate the remediation of the issue to the Contractor's Project Manager for action, as required.
5	Respond to Complainant	The CCLR will oversee the rectification of the issue and respond to the complainant once the issue has been resolved. The complainant will be provided with a follow up verbal response on what action is proposed within two hours during night-time works (between the hours of 6:00 pm and 10:00 pm) and 24 hours at other times. Where a complaint cannot be resolved by the initial or follow-up verbal response, a written response will be provided to the complainant within ten days.
6	Record	It is imperative that an assessment of the situation is carried out and documented to minimise the potential for similar complaints in the future. On this basis, every complaint received is to be recorded in the Community Correspondence Register. A copy of the completed form will be maintained for at least five years
7	Preventative Action	Once the complaint has been suitably handled, appropriate measures will be identified and implemented to negate the possibility of re-occurrence. The Community Correspondence Register is not finalised until the preventative actions are completed and recorded on the form.

In addition to the above, the CCLR is to notify the community liaison representative when traffic is expected to exceed the parameters set within 'Condition Green' of **Table 7**. Notwithstanding, **Table 9** outlines an indicative communication strategy to ensure that adequate communication with key stakeholders has been met.

Table 9 Communications Strategy

Risk	Impact	Comms Channel
Wider Traffic Disruption	Wider community and stakeholders informed through local and wider advertising and notification	Stakeholder Meetings
Construction related traffic	Ensure construction crews use traffic routes identified in the Traffic Management Plan, and Ensure residents in area are notified in advance to any traffic changes that may affect them	Stakeholder email blast.

Furthermore, ongoing communication will be undertaken to ensure that all stakeholders are kept up to date of works and potential impacts.

Appendix A Council RFI

File Ref: DA23/0721
PAN-379298

3 May 2024

Aliro Group Pty Ltd
Level 38, Gateway ,1 Macquarie Place
SYDNEY NSW 2000

Attention: Mr. A Whiteman

Dear Sir,

Request for additional information

Development Application No. DA23/0721 (PAN-379298)

Proposal: Retention of existing buildings 1 and 2, demolition of existing structures, hardstands and tree removal, construction of 8 buildings in a staged manner with uses including warehouse and distribution, light industrial, industrial retail outlet, commercial, child care and cafe, provision of estate domain works including roads and footpaths, new car parking and landscaping works and operation of the site 24 hours per day 7 days per week

Property: 13 Endeavour Road, Caringbah

I refer to your development application that seeks approval for redevelopment of the land for the above-mentioned purposes.

Pre-lodgement advice for the proposal was provided on 28 June 2023. It is encouraging to see that many of the issues raised have been considered in preparation of the development application.

While a significant amount of information has been included with the application, environmental, landscape and design matters need further development to garner full support for the proposal. Officers are happy to meet with you regarding issues raised. It is recommended that you bring amendments / analysis to these meetings to ensure progression of the application.

Further analysis and amendment is required in terms of the design and siting of the development, the means of addressing the flooding affectation on the site and the means of disposal of stormwater from the site. The landscape and vegetation outcomes need to be heightened. The extent of tree removal is not supported. The siting of the warehouses and other structures and associated hard surfaces can be improved with the aim of retaining trees/vegetation and would improve the relationship with the environmentally sensitive Woolooware Bay, its shared pedestrian path, and other existing site amenity and environmental features.

It may be the case that further information can be furnished to support some areas of concern raised below. However, a more sensitive siting of building footprints across the site, including the deletion or significant redesign of Buildings 3, 4 and Building 6 to allow for retention of trees, and to address stormwater and flooding impacts will be critical in the success of this application.

The proposal has been reviewed by Council's Design Review Panel (DRP) who have raised significant concerns regarding the proposal. A copy of the DRP Report and recommendations

are provided at **Attachment 2**. These recommendations have been folded into officer advice in this correspondence.

Building Design, Layout, Stormwater, and Landscaping Matters

The relevant zone objectives and urban design considerations within Sutherland Shire Local Environmental Plan 2015 (SSLEP 2015) seek to ensure new development achieves high architectural and landscape standards, retains and enhances the natural environment, strengthens, enhances and integrates into the existing character of distinctive locations and contributes to the desired future character of the locality.

The proposal has not demonstrated that the design has been led by the unique character of the site and its surrounds nor the significant number of existing trees and landscaping elements present on the site. Key concerns include:

- The removal of a significant number of trees on site and the demolition of existing consolidated landscape areas. Although the proposal has sought to provide some replacement landscape and planting, the design and minimal replacement planting is not supported. It is strongly recommended that the proposal be amended to allow for retention of existing trees and significantly greater replacement planting, located in generous landscaped areas that allow for trees to achieve their maximum canopy spread. Deletion or significant redesign of Building 6 is essential to allow for the retention of trees. The landscape response must seek to retain as many existing trees as possible.

- Whilst the site's SP4 Enterprise Zone is acknowledged, the current layout and design places an unreasonably high level of primacy on vehicular movements over pedestrian (worker/visitors) and bicycle movements, creating unnecessary risk of pedestrian / vehicle conflicts. Insufficient setbacks are provided between all buildings, providing limited opportunities for landscaping and replacement tree planting. For example, the building separation between Buildings 1 and 3 is to be reconsidered to avoid duplication of vehicle circulation.

- The design and layout of the new buildings results in blank facades presenting to Solander Fields, Woolooware Bay and the adjacent shared path. This lack of passive surveillance and poor level changes creates significant design quality and CPTED risks that must be addressed in an amended proposal. Increased setbacks between Buildings 3 and 4 are to improve connection through the site and draw the landscape character of Woolooware Bay into the site.

- Insufficient space has been afforded at south-eastern side of Building 4 between Buildings 4 and 6, noting removal of Building 6 will assist (see comments below). This area will require redesign and enlargement to provide amenity, ensure a safe route with clear sightlines, and to allow for a visual landscaped corridor connected to the adjacent wetland.

- The proposed filling of the land will, in effect, direct existing flood waters off site. The proposal seeks to drain stormwater in a conventional matter (pipes, pits, and bio-retention basins) to a channel within Endeavour Road and surrounding lands which are already flood affected. Council will not accept any additional stormwater to this channel and an alternative solution will need to be prepared.

- The bio basins need to be coordinated between the Engineering and Landscape consultant teams so the quality of the landscape outcome can be properly assessed. Ideally the bio basins could be relocated, or another engineering solution proposed so as not to limit the landscape quality upon the Boulevard.

- The pedestrian spine with its swale is to be redesigned to benefit from greater width, with some consistent canopy trees, treated as a street that can organise the building elements

and their openings, creating a positive arrival experience, rather than a narrow walkway that is obviously secondary to vehicle movements.

- By locating Building 3 and 4 envelopes close to the foreshore building line, the outcomes for the proposed staff (and visitor) amenity areas have significantly reduced amenity than currently – this is in addition to the design and interface issues between the buildings and foreshore raised in this letter. As part of the general building re-design, the staff amenities should be reconsidered to ensure a good design outcome. Further, the application does not demonstrate how the detailed design within and adjacent to the Foreshore Building Line meets the requirements of Clause 6.9 (Limited development on foreshore area) of SSLEP 2015 P. Further justification (and potential re-design) is required to ensure the application meets the requirements of this Clause.

- The location of the childcare centre and café are to be reconsidered. They must be sited in high amenity parts of the site, rather than near areas of heavy vehicle traffic and logistics and warehousing uses.

As a result of the above, the proposal has not demonstrated that it has achieved the objectives of the SP4 Zone. In particular, it has not satisfactorily demonstrated that it will '*enhance the visual appearance of the employment area by ensuring new development achieves high architectural and landscape standards'* nor does it *'minimise the impact of development within the zone on areas of environmental or heritage significance'*.

Additionally, the proposal has not evidenced that it will result in an outcome that sufficiently addresses the objectives and requirements of 6.16 Urban Design of SSLEP 2015, as demonstrated in the detailed feedback provided by Council's DRP.

An amended scheme is required to sufficiently address the planning, environmental and design considerations relevant to the site. This should be reflected through both a written response and design changes. As a minimum it would be expected that the Building 6 footprint is deleted or fundamentally re-designed, and that the overarching scheme is considered within the principles of an improved landscaped outcome and a better balance of vehicular and pedestrian prioritisation.

Impacts on Traffic Network

Noting the submission received from Transport for NSW (TfNSW) and likely vehicle generation, and constraints of the existing road network, the proposal must be revised to ensure that sufficient mitigation measures are incorporated to offset likely vehicle impacts on the local road network.

In particular, the development must allow for upgrading of the intersections of Captain Cook Drive / Endeavour Road and Captain Cook Drive / Gannons Road.

Voluntary Planning Agreement (VPA)

Any future VPA will need to be accompanied by a letter of offer which clearly outlines the parties and works proposed.

With respect to land adjacent to the Gannons Road roundabout, it is noted that the proposal seeks a right of way easement and the dedication of land that falls within the existing roundabout. Advice in relation to this land has been sought from internal departments in order to guide Council's preferred outcome. Further advice in relation to this matter is not available at the time of preparing this letter. This will follow as soon this information is available.

Agency Submissions

Referrals received by TfNSW, Ausgrid and DPI Fisheries have identified additional matters to be addressed. Critically, TfNSW have advised that the current proposal is not supported due to

the likely impact on the road network and lack of mitigation measures proposed to offset likely impacts.

Responding to Issues
It is considered that the application can be amended to resolve the matters raised. A detailed list of all issues to be addressed is provided at **Attachment 1**.

The amended application will need to be accompanied by updates to all key assessment documentation, including a revised Statement of Environmental Effects, architectural and landscape diagrams and other relevant specialist reports.

An 'overlay' site plan showing the future proposed building envelopes overlaid on the existing is also required. This will need to be submitted for both the application as it has been currently lodged, and for a future amended application.

The information is required to be submitted within 28 days from the date of this letter (**31 May 2024)**. If you have difficulty meeting this time frame, please call me to arrange an extension of time which can be granted before this date.

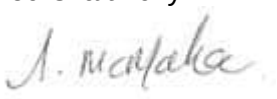
Additional information and amended plans must be submitted via the online Planning Portal, using PAN-159512. We are unable to receive the information any other way.

Where you choose to address only some of the matters or choose not to submit the information, your application will be determined based on the information submitted at the time of assessment and unfortunately, this may result in it being refused. Prior to the submission of any revised plans, it is strongly recommended that draft amendments are discussed with Council officers prior to submission, and we would support a meeting with officers, the applicant, and relevant experts.

If the information submitted results in changes to the proposed development that may affect adjoining property owners, the application may be re-notified. This will require you to pay an additional Neighbour Notification Fee in accordance with Council's Schedule of Fees and Charges.

If you need any further assistance in relation to the above matter, please contact David Sheehan on 9710 0965 or email dsheehan@ssc.nsw.gov.au and quote the application number in the subject.

Yours faithfully



Sue McMahon
Senior Manager Development Services

Attachment 1 – Assessment Issues

Issue	Required Solution
1. Building design	
Building Setbacks and Separation Buildings 6, 7, and 8 provide a large setback to Solander Field however this is dominated by the vehicle circulation with minimal opportunities for generous planting or landscaping. The relationship of these buildings to Solander Field is minimal with limited opportunities for passive surveillance or activation on this important edge. As detailed below, Buildings 3 and 4 effectively cut off Woolooware Bay from the rest of the site, by presenting a blank strong façade with limited activation or passive surveillance. The landscaped area between the edge of these buildings and the Bay are remnant left over spaces that are not activated and are a significant opportunity for the site, which haven't been optimised. This interface is further addressed below. Outside of the site edges, there is limited planting or landscaping, resulting in large expanses of hard surface. The limited landscaped areas between parking spaces and along the edges of buildings do not allow for significant tree growth, further reducing likely tree canopy. This is most obvious between Buildings 3 and 5, noting the dual circulation space. The separation between Buildings 4 and 5 is minimal with limited landscaping. Building separation between Building 3 and 1 is overly generous as it essentially provides for a dedicated service lane, when a revised and more efficient layout is possible which would allow for increased flexibility in the position of Building 3 in relation to the foreshore area. Additionally, the DRP has recommended that more room between Buildings 4 and 6 would also allow for a visual landscaped corridor	The proposal is to be revised address the following: • The south-eastern setback to Building 4 footprint is to be enlarged, ,to provide amenity, ensure a safe route with clear sightlines, and to allow for a visual landscaped corridor connected to the adjacent wetland. • Building 6 is to be either deleted or significantly redesigned to allow for retention of trees. • Increase the setbacks between Buildings 3 and 4 to provide for stormwater (see Point 4) and to improve the connection through the site and to draw the landscape character of Woolooware Bay into the site. • The site design, building footprints and landscape response shall seek to retain as many existing trees as possible. • The dedicated service road between Buildings 1 and 3 is be deleted and an alternative hardstand and access arrangement proposed which allows for the buildings to accommodate an increased landscape buffer / setbacks to Woolooware Bay • Response and treatment of interface between the site and Solander Field is to be reconsidered to allow for increased landscaping and to ensure compliance with Clause 6.9 of the LEP. • The pedestrian spine, with its swale is to re-designed with greater width, with some consistent canopy trees. The spine should be treated as a street that can organise the building elements and their openings, creating a positive arrival

Issue	Required Solution
connected to the adjacent wetland. Likewise, they have recommended widening the break between Building 3 and Building 4 to create a visual corridor that connects the staff facilities with the landscaped area.	experience, rather than a narrow walkway that is secondary to vehicle movements.
<u>Interface with Woolooware Bay</u> The northeastern boundary of the site adjoins a shared pathway along the southern edge of Woolooware Bay. Currently the proposal only allows for external landscaped spaces between buildings but presents an extensive continuous blank wall to the shared pathway, presenting poor design outcomes adjacent key community infrastructure and Crime Prevention Through Environmental Design (CPTED) risks. The DRP advice has identified significant concerns with the interface of the proposed buildings with the shared pathway. A greater degree of activation and passive surveillance towards Woolooware Bay is required. This is a significant asset for the site and one that marks a distinct opportunity that isn't capitalised in the current scheme. Given the proposed 24/7 hour operation of the site, this creates a strong opportunity for the passive surveillance and activation of both Solander Fields and Woolooware Bay (and the adjacent shared path). In addition to the above, the interface with Woolooware Bay is important in managing environmental impacts as it is identified as a riparian zone and wetlands buffer area.	The interface between the shared path and buildings along the northern elevation of the site is to be improved to ensure CPTED risks are minimised and the future interface is well designed between the site and adjoining environmentally sensitive land. An improved response towards Woolooware Bay is required. This should be achieved through: • Meaningful landscape treatment along this edge of the site, supported by buildings which address this frontage and create opportunities for staff recreation, whilst also ensuring compliance with Clause 6.9 of SSLEP 2015. • Potential location of the childcare and café spaces towards this edge / towards the north-eastern corner of the site is to be considered. • Increased openings and windows addressing the northern boundary must be included, which will activate the northern elevations of Buildings 3 and 4. • Increased separation between buildings is to incorporate landscaping and create a meaningful connection between the landscaped areas within, and outside, the site. • Buildings 3 and 4 are to allow for activation and passive surveillance of the shared path through increased opening / integration of staff facilities and outdoor areas.
<u>Location of Childcare</u> It is noted that the DRP raised significant concerns regarding the location of the childcare centre which are shared by Council.	The childcare centre is to be relocated to an area that experiences less heavy vehicle movements and has greater amenity.

Issue	Required Solution
The desire to have a childcare centre centrally located within the development is noted; however, consequently, the childcare centre is located in close proximity to several heavy traffic routes creating potential pedestrian / vehicle risks. It is strongly recommended that the childcare centre be relocated to a more appropriate part of the site so that it is capable of meeting both Council's controls and the requirements of the SEPP (Transport and Infrastructure) 2021 and planning for childcare guidelines. Concerns raised by the DRP also highlighted that the Childcare should be sited in a place with better amenity. It is proposed to be in a central location as noted, with play spaces set on roof tops overlooking a sea of cars. In a large precinct with parkland on two sides the childcare centre should be relocated, with an outlook to trees or parks rather than the carpark, and play spaces on natural ground level shaded by established trees.	The application can only seek approval for an overall childcare use, 'shell', and number of children. Any future childcare centre will require a detailed fit-out development application. The application still requires assessment against Council's controls and the SEPP (Transport and Infrastructure) and associated guidelines as they relate to early education and care facilities.
2. Visual appearance and placemaking	
<u>Responding to context</u> The position of the site next to Solander playing fields to the east, and the boardwalk alongside the mangroves of Woolooware Bay to the north, has not been seen as a benefit. The proposals layout does not establish a strong relationship between the main movement/ pedestrian spine of the precinct and the edges of the site. An improved circulation layout that capitalises on the visual and landscape amenity of Solander Fields and Woolooware Bay would drive a better design that acknowledges the unique location and its natural beauty, and a better connection to Country. The failure to recognise these opportunities, compounded by the loss of significant existing trees, lack of replacement planting and good landscaped outcomes results in the proposal failing to meet two key objectives of the SP4 Zone (Enterprise). These objectives are:	Changes are required to the scheme as detailed earlier in this letter, while also considering: • Retention of an established mature tree canopy which contributes to the character of the new development, rather than re-grading the site and removing all existing trees. Trees can also readily become focal points in the precinct, the centres of good amenity for staff break areas, the café, or the childcare centre. • Relocation of the childcare and café would provide for the creation of a strong sense of place through the locating of both uses in an area of high amenity. The current location of both uses is in close proximity to a path for heavy vehicle movements. • Within the electrical easement corridor, a number of breakout spaces or activity nodes exist. These spaces provide tables and

Issue	Required Solution
• *'To enhance the visual appearance of the employment area by ensuring new development achieves high architectural and landscape standards'*, and • *'To minimise the impact of development within the zone on areas of environmental or heritage significance'.* The proposed site layout has ignored the significant amount of trees and landscaping present on site. As identified in the landscaping section below and the DRP recommendations, trees that are significant and provide a positive contribution to the site should stay – the stand of trees located at Building 6 have been identified as the most valuable trees.	chairs and an amphitheatre for small events. There is an opportunity to integrate these areas throughout the development rather than trying to accommodate them in a 'left over' area which is back of house, cut off from the main public areas. • There is not a strongly defined pedestrian entrance way for the site, creating a lack of street presence or a defined front of house for the whole site, which must be resolved.
3. Landscaping and Trees	
<u>Tree removal</u> The site is uniquely located, adjacent to Woolooware Bay and Solander Playing Fields. Despite this setting, the proposal has not demonstrated that the proposals' location alongside Woolooware Bay and Solander Playing Fields has not been appropriately responded. The proposal seeks the removal of 459 trees on site, with proposed replacement planting of 337 new trees. The majority of this tree removal occurs as a result of the location of Building 3, Building 5 Blocks 1 and 2, Building 6 and various hardscape driveway and parking areas. The extent of this tree removal is significant, especially considering the low numbers of replacement planting, time taken for planted trees to reach maturity, extent of the hard surface area proposed for the site, and the likely impacts of urban heat island effect. Where vegetation is approved for removal, Council requires replacement planting at 8:1 for each mature tree removed. The proposal achieves a replacement ratio of 0.75:1, well below Council's mandated control. Whilst total compliance with the	The proposal is to be revised to achieve greater tree retention and significantly increase additional tree planting consistent with the advice throughout this letter. Additionally, any forthcoming response must be accompanied by: • A Tree Management Plan and a site-specific tree masterplan; • Detailed plans for all landscaped areas. • A detailed plan for the pedestrian entry point of the site. Council's Landscape Officer has provided extensive comments on the proposal regarding the trees proposed for removal and has provided a detailed series of suggestions that would allow particular trees to be retained. These comments are provided at **Attachment 3** and are to be adopted where they do not conflict with a wider site design change responding to other comments.

Issue	Required Solution
requirements of this part may not be possible, the current proposal's extent of non-compliance is not acceptable. The extensive amount of tree removal and lack of replacement planting results in a significant loss of the Greenweb Core, Support and Restoration. This is not supported and must be addressed in a revised application. Development must ensure a suitable transition to adjoining land, and limit impacts to adjoining wetlands, foreshore areas and threatened species. Under Chapter 39 (1.4(1)) of the Sutherland DCP 2015, the development must ensure that *through its siting, design and landscape treatment, maximise habitat values and minimise disruption to connectivity through:* *a. continuous canopy and understorey planting along one boundary, or* *b. retention and revegetation of remnant bushland elements.*	
<u>Landscape design</u> As identified by the DRP and Council's Landscape officer there are significant concerns with the proposed approach to the landscape areas. In particular, the DRP has recommended that the pedestrian spine with its swale would benefit from greater width, with some consistent canopy trees, treated as a street that can organise the building elements and their openings, creating a positive arrival experience, rather than a narrow walkway that is secondary to vehicle movements. Wayfinding should be clear and obvious to pedestrians and drivers.	The proposal is to be revised to address the built form and landscape matters described above. Additionally, any forthcoming response must be accompanied by: • A Tree Management Plan and a site-specific tree masterplan; • The plant schedules included in the landscape set allocated to the zones identified; • A site plan clearly overlaying the proposed building footprints on top of the existing; • Any future landscape plan must detail where future trees are located to ensure that sufficient space to allow the maximum canopy spread of the selected tree species is possible.

Issue	Required Solution
<u>Vegetation Management Plan</u> The submitted Vegetation Management plan provides insufficient details to adequately assess the proposal.	The Vegetation Management Plan is to be updated as follows: • To meet the requirements of NSW DPI Fisheries as well as Councils Greenweb – the VMP must be modified to specify that only locally indigenous species are planted within the foreshore buffer zone. • Planting species for Bioretention swales must be included. • Detail of proposed paths, seating areas and any other infrastructure proposed in the restoration foreshore area. • Table 3-3 Indicative planting densities and quantities, the subtotals column includes the area size in its calculations – please rectify. • Amend tree and shrub planting rates change to; Trees - 1/7m² (from 1/5m²) and Shrubs - 1/2m² (from 1/3m²). These rates closer mimic Council's Greenweb Specification planting rates and would reduce tree canopy cover so as to allow for more light penetration to the lower canopy species, assisting with establishment and growth of the lower growing plant species. The other planting rates are appropriate. • Table 3-2 Pre-planting, indicates that mulching (as well as jute matting) will only cover 80% of the planting area. Clarification is to be provided as to why this has not been proposed for 100% of the planting area. • The plan is to include a requirement that reports regarding progress and maintenance works are provided to Council. • The plant species Alectryon coriaceus is not native to the Sutherland Shire and may become invasive. This could be substituted with Alectryon subcinereus (Native Quince) which can be found in the Sutherland Shire and is also a shrub to small tree size.

Issue	Required Solution
4. Engineering Matters	
<u>Stormwater</u> Generally, the site is being filled pushing all existing flood waters off site and draining stormwater in a conventional matter (pipes, pits, and bio-retention basins) to Endeavour Road. The proposed drainage system flows most of the stormwater from the development to an open lined drainage channel to the north of the development site that traverses Lot 4 in Deposited Plan 714965 (known as No.477 Captain Cook Drive Caringbah). This channel and surrounding lands are already flood affected. Council will not accept any additional stormwater to this channel, in fact wishes to reduce stormwater flow to this channel from the Development. Bio retentions basins in the form of rain gardens consume nearly all the garden beds dedicated beside the pedestrian pathway. Bio basins to perform their intended function have specific requirements for planting densities and species, these are not detailed in the plan set. The engineering criteria to ensure functional performance of the bio basins to treat water on site may also limit the quality of landscaping as the volume and type of plant material can influence performance. The bio basins need to be coordinated between the Engineering and Landscape consultant teams so the quality of the landscape outcome can be properly assessed. Ideally the bio basins could be relocated, or another engineering solution proposed so as not to limit the landscape quality upon the Boulevard.	The design is to be amended to take as much stormwater flow as possible to the suggested overland flow path referenced in the following areas: • High worth is placed on the existing tree lines located between long strips of car parking bays (bays on a northeast - southwest alignment), as depicted on survey diagram No. SY074865.000.1.6 sheet 10. The existing surface levels are in the range of 1.82mAHD (north) to 2.3mAHD (south). Fill around these trees must be minimised. • If the land around these trees is left as is or similar, an overland flow path must be created to the Bay. A suggested strategy is to create a bio-retention basin / overland flow path along the existing “Overland Flow Path” shown on drawing No.SY074865.000.1.6 sheet 7 by Land Partners. This flow path will need to be widened to ensure the existing peak flow velocity over the northern boundary is similar. The existing bridge will need to be widened and strengthened for the Ausgrid maintenance trucks. • Council’s preference is to drain stormwater as much as possible along the abovementioned “Overland Flow Path”. • Floor space to be redistributed to other buildings to create an appropriate overland flow path between buildings 3 & 4 (further apart). Through addressing the “Overland Flow Path” suggestion, the resultant architectural response (redistribution of floor space and changing of proposed buildings) will require an amended flood study and stormwater drainage design.
<u>Flooding and Stormwater</u>	Depending on the amendments to the site layout, and to address stormwater feedback above, the proposal will need to be accompanied by an updated Flood Report.

Issue	Required Solution
The subject site is flood affected and the current proposed approach to managing flooding is highly dependent on the site layout not changing. The development assessed against Chapter 40 of SSDCP2015, Clause 5.21 of Sutherland Shire Local Environmental Plan 2015, the NSW Government Flood Prone Lands Policy, and the NSW Floodplain Development Manual 2005 (FDM). The FDM provides guidelines for the implementation of the NSW Government's Flood Prone Land Policy.	
<u>Construction and Site Management Plan</u> A Construction and Site Management Plan is to be submitted to Council for review and approval and is to include a suitable Traffic Guidance Scheme.	The revised proposal is to be accompanied by a Construction and Site Management Plan and include a suitable Traffic Guidance Scheme.
5. Traffic and Parking	
<u>Access to and from the site</u> The proposal approach for access to and from the site raises concerns with the proposed functionality of the intersection at Gannons Road and Captain Cook Drive. The assumption that west bound vehicles will choose to turn left from Endeavour Road into Captain Cook Drive and head west via a U-turn at Gannons Road is likely to be problematic and indicates a strong need to upgrade the intersection to support safe and efficient movements to and from the site. It is highly likely that upgrades at both the intersections of Endeavour Road/Captain Cook Drive and Gannons Road/Captain Cook Drive are required to ameliorate the associated traffic impacts and provide safe access to and from the site. <u>Car Parking Arrangements</u> It is noted that the proposal complies with the required amount of parking; however it is noted that many spaces are provided on the street in the internal road system, remote from individual tenancies.	The site layout must be revised to resolve potential safety issues between pedestrians/cyclists and parking/vehicle circulation layouts as identified in the detailed advice regarding car parking arrangements, and the internal shared pathway. The following additional documentation required to be submitted to Council as part of an amended application: • Details of the upgrading of Endeavour Road/Captain Cook Drive and Gannons Road /Captain Cook Drive is to form part of the proposal. • An updated Green Travel Plan to reflect Council's recent mode share targets for cycling and public transport specified within the Active Transport Strategy and Public Transport Strategy to 2030. • A preliminary parking management plan identifying what spaces are to be allocated to each tenancy. • Revised plans which accommodate adequate sight distances and / or slow points, noting this may require the loss of additional car

Issue	Required Solution
Noting the suggested amendments to circulation of the site and concerns raised regarding landscaping and overall site layout, this will need to be further considered and any revised application will need to be accompanied by a parking management plan. <u>Alternative Modes of Transport</u> Council's Bike Plan identifies a need for the installation of an off-road facility along the full Captain Cook Drive frontage of the site and this should be incorporated into the plans as a 2.5m shared path. This, along with other supporting works, would assist in encouraging the safe passage of vulnerable road users accessing Captain Cook Drive, which would support the provision of a Green Travel Plan. <u>Internal Shared Pathway</u> The internal shared path has potential safety issues where the path emerges between parked vehicles.	parking spaces. The revised arrangement is to ensure that access to the childcare, in any future location, can be appropriately managed to avoid vehicle risks with small children. **Note**: In responding to the matters raised in this request for further information, it is likely that the development will need to undergo significant amendments. Once a revised application is submitted, you are advised that a further detailed assessment of the vehicle movements will be undertaken which may raise additional matters for consideration.
6. Environmental Considerations	

<u>Acid Sulfate Soils</u>
 	
Clause 6.1 of SSLEP 2015 requires consideration of Acid Sulfate Soils. Whilst an Acid Sulfate Soils Management Plan (ASSMP) has been submitted in support of the application, this plan does not incorporate an acid sulfate soils assessment, and is required to inform of the presence and extent of acid sulfate soils within the site.
 	
Furthermore, the plan does not provide details of the location of test pits, or the location of the single sample which was subject laboratory analysis.
 	
The management procedures given within the ASSMP are general in nature and do not give specific information on the management of ASS at the site, for example:
	The following must be provided:
	
	• Submission of the Detailed Acid Sulfate Soils Assessment referenced within the ASSMP to be submitted as part of this DA, prepared in accordance with the following:
	  • Acid Sulfate Soils Management Advisory Committee (ASSMAC) Acid Sulfate Soil Manual (1998); and,
	  • Sutherland Shire Local Environmental Plan 2015;
	• The Detailed Acid Sulfate Soils Assessment must be prepared or reviewed by a suitably experienced and qualified environmental consultant, certified under one of the following schemes:
	  • EIANZ 'Certified Environmental Practitioner' (CEnvP); or,

Issue	Required Solution

• The volume of material to be excavated;
• The type of liming material and volume required;
• The liming method (skip bin or stockpile, mixing method etc.); and
• The location of the neutralisation works.
	• Soil Science Australia 'Certified Professional Soil Scientist' (SSA CPSS).
	• The Acid Sulfate Soils Management Plan is to be updated to include:
	  • Name, position titles, signature and relevant certification details of the author and reviewers of the report;
	  • Report prepared or reviewed by a suitably experienced and qualified environmental consultant, certified under one of the following schemes:
	  o EIANZ 'Certified Environmental Practitioner' (CEnvP); or,
	  o Soil Science Australia 'Certified Professional Soil Scientist' (SSA CPSS).
	  • Spatial data of acid sulfate soils assessment, including sample locations, locations of criteria exceedances and inferred extent of potential and actual acid sulfate soils.
	  • An itemised list of construction and operational phases of the development which may disturb acid sulfate soils and site-specific information pertaining to management of acid sulfate soils for each phase (may be submitted in separate reports), including but not limited to:
	  o The volume of material to be excavated;
	  o The type of liming material and volume required;
	  o The liming method (skip bin or stockpile, mixing method etc.);
	  o The location of the neutralisation works.

Issue	Required Solution

Contamination
 	
Under the Resilience and Hazards SEPP (2021), Council is required to be satisfied that the subject site is suitable, or can be made suitable following remediation, for the proposed land use (specifically including the sensitive childcare use). The Detailed Site Investigation (DSI) and Remedial Action Plan (RAP)are missing the necessary document control information required as per the *NSW EPA Contaminated Land Guidelines: Consultants Reporting on Contaminated Land (2020)* and Council requirements.
	The reports are to be updated to address the following matters:
	
	• Name, position titles, signature and relevant certification details of the author and reviewers of the report;
	
	• Report prepared or reviewed by a suitably experienced and qualified environmental consultant, certified under one of the following schemes:
	
	  • EIANZ 'Certified Environmental Practitioner – Site Contamination' (CEnvP – SC); or,
	
	  • Soil Science Australia 'Certified Professional Soil Scientist – Contaminated Site Assessment & Management' or 'Soil Survey' (SSA CPSS CSAM or SS).
	
	• The Remedial Action Plan is to be updated to address the following:
	
	  ○ Requirement for an unexpected finds protocol (UFP) to be placed on the site.
	
	  ○ If Option 3 for site remediation (as identified in the RAP) is selected:
	
	  ▪ Requirement for engagement of a NSW EPA Site Auditor to review all relevant environmental documentation;
	
	  ▪ Requirement for preparation of a Long-term Environmental Management Plan (LTEMP), as per Sutherland Shire DCP (2015) Ch. 40;
	
	  ▪ Requirement for a covenant on the land title, enforcing implementation of the LTEMP;
	
	  ▪ Any ongoing testing, monitoring and maintenance as required by the LTEMP and/or the site auditor; and

Issue	Required Solution
	○ If Option 4 for site remediation (as identified in the RAP) is selected, Section 5 will need to be updated to reflect new remediation methodology.
<u>Biodiversity Assessment Report</u> The Biodiversity Assessment Report identifies that some stands of Casuarina stated to be planted, may actually be natural regeneration.	Supplementary documentation is to be provided considering existing stands of Casuarina on site and whether these are natural regeneration or whether they are planted. Should the Casuarina stands be natural regeneration, an amended assessment is to be provided.
<u>Construction Environmental Management Plan (CEMP)</u> The submitted Biodiversity Assessment Report relies heavily on the implementation of a CEMP to mitigate potential impacts of the proposed development on the surrounding environment. Given the reliance on this document, the CEMP must be provided to Council during the assessment phase for consideration. It must incorporate the mitigating measures outlined in the submitted Biodiversity Assessment Report.	Revised proposal to be accompanied by a Construction and Site Management Plan.
<u>Acoustic and Air Quality</u> The air quality report prepared by JBS&G Consultants incorporated air quality modelling that considers a worst-case scenario at the site. Generally, the methodology undertaken is supported, however, the model results require further clarification as follows: • Are the receptor locations 1 and 2 the same as the air monitoring locations ML04/R001 and ML03/R002? If this is the case the model does not predict the air quality at the south eastern play area as the closest point monitored from Captain Cook Drive is 65m. This is important as it may influence the way the open space areas are managed on days where DPE air quality ratings are at tipping points between “Good, Fair and Poor”.	The air quality report is to be updated to address comments provided by officers in response to the JBS&G methodology. Given the location of the childcare centre, the high sensitivity and the potential impact on young children’s health, an Air Quality Management Plan is also required.

Issue	Required Solution
• The report needs to show the air quality isopleths arising from the modelling to help better understand the impacts associated with the proximity to Captain Cook Drive, assumptions regarding on-site car parking areas, truck access / delivery and idling at the adjacent warehouse and vehicular traffic on internal road network. • Tables 7.6 and 7.7 in the provided report need to be reviewed as it appears that they incorrectly reference the NSW EPA Criterion PM10 and PM 2.5. i.e. PM10 should be 50ug/m^3 and PM 2.5 25ug/m^3. The results would then suggest that PM2.5 levels are elevated and are likely to exceed NEPM standards more often when ambient conditions are at levels closest to "Poor" under the NSW EPA air watch system.	
7. Land use and future approvals	
<u>Future Fitout and Uses</u> Under the current planning framework, the site is not eligible for Complying Development Certificates under *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* as it is zoned SP4 Enterprise. Accordingly, the proposal seeks to allow for a diversity of land uses. Whilst the intent of the proposed approach is acknowledged, there are challenges in establishing a suitable set of parameters to adequately govern future uses through conditions of consent rather than new separate DAs for individual uses. The range of land uses proposed are diverse and significantly varied which may result in non-compliances with minimum parking controls and total GFA approved. It is not clear that the above approach is possible under the *Environmental Planning and Assessment Act 1979* and supporting Regulations, noting that it relies on a PCA to effectively be granting	The proposed childcare fit-out will need to be subject to separate approval. Legal advice on the ability of a Principal Certifying Authority to manage future tenancies and fit outs through a condition of consent is to be provided to Council for its consideration.

Issue	Required Solution
consent for fitout and ultimate uses. It is recommended that the application be further updated to address the above concerns and to also include legal advice on the permissibility of the proposed approach. The proposed approach for the childcare centre potentially exposes staff, visitors and children to significant and unacceptable risk inconsistent with the planning controls in the SEPP (Transport and Infrastructure) 2021 and planning for childcare guidelines. For these reasons, any future childcare centre, which is classified as a sensitive land use, will need to be subject to its own separate use and fit out DA.	
8. Voluntary Planning Agreement	
A formal letter of offer for the Voluntary Planning Agreement (VPA) is to be submitted to Council for consideration and to allow the progression of the planning agreement. Council does not support piecemeal or partial funding of infrastructure through a planning agreement process, as it may result in significant delay until such time as sufficient funds are available for the upgrading of the relevant infrastructure. Preliminary discussions with TfNSW has identified that a State VPA may not be required where Council is responsible for the collecting of funds and upgrading of state road intersections. This matter will need to be subject to further discussion between TfNSW, Council, and the applicant.	A letter of offer is to be submitted to Council to allow the further progression of the Voluntary Planning Agreement (VPA). This letter of offer is to clearly outline the proposed public benefit items.
9. Agency Referrals Several agency referrals have been received which have raised further matters to be considered. The full set of referrals are available on the Planning Portal, however referrals requiring action have been identified below.	

Issue	Required Solution
<u>DPI Fisheries</u> The referral from DPI Fisheries has identified that the site is upstream of a Priority Oyster Aquaculture Area (POAA) and adjacent to Towra Point Aquatic Reserve. DPI Fisheries has requested that the proposal adequately consider the State Environmental Planning Policy (Primary Production) 2021, the NSW DPI Oyster Industry Sustainable Aquaculture Strategy and the NSW DPE Healthy Estuaries Oysters Guidelines to ensure the proposed development has no net impact on downstream water quality and any consequential impact on the oyster industry.	The proposal is to be updated to consider State Environmental Planning Policy (Primary Production) 2021, the NSW DPI Oyster Industry Sustainable Aquaculture Strategy and the NSW DPE Healthy Estuaries Oysters Guidelines.
<u>Transport for NSW</u> Transport for NSW has provided a referral response and advised that they do not support the proposal as: • The DA is expected to result in additional traffic generation that will impact the operation of the classified road network, resulting in delays for other road users and future site tenants. • Intersections of Captain Cook Drive/Endeavour Road and Captain Cook Drive/Gannons Road are expected to be operating at or close to capacity without the proposed development following completion of Stages 3 and 4 of the Cronulla Sharks development. • There have been several recorded crashes at the intersection of Captain Cook Drive/Endeavour Road and Captain Cook Drive/Gannons Road. • Increases in traffic volume and average traffic delay on the nearby road network are expected to increase the risk of additional crashes occurring at Captain Cook	A revised Traffic and Parking Impact Assessment Report is to be provided. This is to include identification and detailing of appropriate road upgrades to the intersections of Captain Cook Drive/Endeavour Road and Captain Cook Drive/Gannons Road to address Council and TfNSW concerns. This must also identify how safe passage of vulnerable road users will be achieved.

Issue	Required Solution
Drive/Endeavour Road and Captain Cook Drive/Gannons Road. • The Applicant will be unable to provide a Green Travel Plan (GTP) that encourages sustainable transport options to the development as vulnerable road users such as pedestrians and cyclists road safety of the development has not been considered as no supporting works have been identified by the Applicant to encourage safe passage of vulnerable road users accessing Captain Cook Drive's existing public and active transport nodes.	
<u>Ausgrid</u> Ausgrid's submission identifies several matters which will need to be addressed including: • A preliminary enquiry is to be made regarding the capacity of the existing electricity network to address the likely site demands. This should consider whether substation may be required that may have spatial implications for the proposal. • The service mains that supply the site may not have sufficient clearance to the proposed construction. • There are existing overhead 132kv transmissions lines and Tower 49 near the site. Please make sure the access proposed to maintain the current tower and the tower 49 will be replaced with two steer poles. • Appropriate safety clearances as per the required standards will need to be maintained on site. Where this cannot be achieved, existing overhead mains may need to be relocated. • Demonstrate that the sites potential impact on the existing substation S9186 can be mitigated.	Additional information is to be provided detailing how the matters raised by Ausgrid have been addressed. This may warrant changes to the current proposal to appropriately respond to the matters raised.

Attachment 2 – Design Review Panel Report

Report and Recommendations of the Design Review Panel, Sutherland Shire Council Thursday, 7 March 2024

Panel Members:	Peter Hill (Chair), John Dimopoulos, Bruno Pelucca, Jared Phillips (Landscape)
Consultants / Council Staff:	Adrian Melo (The Planning Studio) / David Sheehan & Amanda Treharne (SSC)
Applicant Team:	Andrew Whiteman (Aliro P/L), Christopher Curtis (Ethos Urban), Javier Ferre (Architect - Watson Young), Online: Colin McDonald & Jesica Male (Aliro), Gordon Kirkby & Jethro Yuen (Ethos Urban), David Vago (Landscape Architect Habit 8)
DA No:	DA 23/0721
Project Address:	13 Endeavour Road, Caringbah
Proposal:	Eight new buildings for warehouse distribution / light industrial / industrial retail outlet / commercial / child care / café and associated site works

PREAMBLE

The site was visited by the Panel members prior to the meeting.

Although this type of development is not required to comply with SEPP 65 the proposal has been considered in relation to the Design Quality Principles of the SEPP as being well recognised minimum standards for the attainment of good design.

Issues considered relevant to the proposal are noted below.

COMMENTS

The Panel supports well-considered design and acknowledges that care has been taken in the preparation of the development proposal. However, good site planning and architectural design proceeds from a thorough understanding of the site context, and the site analysis provided as a basis for this design proposal is inadequate. There are certain aspects of the proposed design that the Panel recommends for further consideration, as outlined below:

Context and neighborhood character

Built form and scale

1. This expansive site has, over time, moved from the single ownership of Toyota to a potentially more open arrangement of light industrial and distribution functions. The large industrial building at the northwest of the site, Building 1 occupied by Australia Post and Woolworths, is to remain, together with Building 2. The remainder of the site is proposed to be:
    a. razed, with all other buildings removed, and nearly all trees removed;
    b. re-graded, with considerable amounts of fill across the site, to improve stormwater management; and
    c. constructed with a new layout of roads, buildings and some trees.

2. Significant areas of well-established landscaping exist throughout the site. The proposal removes most of the existing landscaping to accommodate different levels across the site, larger buildings and greater areas of impervious surfaces. There is an opportunity for the landscape design to drive the stormwater management and site planning to greatly enhance the overall design response.

3. In the precinct planning the position of the site next to Solander playing fields at the east, and the boardwalk alongside the mangroves of Wooloware Bay at the north, has not been seen as a benefit. The precinct is mostly closed to these edges. In the Panel's view, establishing a better relationship between the main movement/ pedestrian spine of the precinct and the edges of the site will create a better design that acknowledges the unique location and its natural beauty, and a better connection to Country. There are opportunities for a landscape design response to influence the overarching connectivity of the precinct.

4. In the landscape planning the significant stands of eucalypts in the centre of the site, planted to shade existing carparking spaces, have not been seen as a benefit; all of these trees are proposed to be removed; the only trees that are to remain are at the southern and eastern edges. In the Panel's view, certain trees that are significant and provide a positive contribution to the site should stay – the stand of trees located at Building 6 have been identified as the most valuable trees. Rather than re-grading the site and removing all existing trees there is an opportunity to retain an established mature tree canopy which contributes to the character of the new development. Trees can also readily become focal points in the precinct, the centres of good amenity for staff break areas, the café, or the child care centre.

5. The pedestrian spine with its swale would benefit from greater width, with some consistent canopy trees, treated as a street that can organise the building elements and their openings, creating a positive arrival experience, rather than a narrow walkway that is obviously secondary to vehicle movements. Wayfinding should be clear and obvious to pedestrians and drivers.

6. The new light industrial buildings proposed are mostly attractive examples of their different types, but they could be anywhere. Functions other than light industrial and distribution are limited to a small child care centre and a small café. These are located

near the site's main entry on Captain Cook Drive, ostensibly to remove the need for pedestrians and people unfamiliar with the precinct to be traversing the site and reducing the potential for encounters with heavy vehicles. While this strategy to manage vehicle movement makes some sense in maximising the industrial/ distribution functions, a light industrial site in this location should be able to provide a better response to its site while at the same time providing safe pedestrian pathways throughout. The potential for the layout of the precinct to provide more than a standard industrial site should not be lost.

7. Panel recommends that the unit mix and site planning be reconsidered to employ more of the multi-level units, which could allow the central spine to provide more space for pedestrian movements, and the site edges to be opened further. The multi-level units could be stacked closer to the centre of the site, near the large industrial building 1, which would free up the site's footprint and allow for a ring road system, as discussed, that should be explored further as an option to engage more with the site's edges, by either replacing or integrating with the spine solution.

Amenity

8. More space should be provided for comfortable external space for staff facilities, in more places with good amenity. The place at the junction of Building 4 and Building 6 should be made larger, and the route between buildings and site edges be made comfortable, accessible, and safe. More room between Buildings 4 and 6 would also allow for a visual landscaped corridor connected to the adjacent wetland. Likewise, it is recommended to widen the break between Building 3 and Building 4 to create a visual corridor that connects the staff facilities with the landscaped area.

9. The proposed child care centre is poorly designed, and should be sited in a place with better amenity. It is proposed to be in a central location as noted, with play spaces set on roof tops overlooking a sea of cars. In a large precinct with parkland on two sides the child care centre should be relocated, with an outlook to trees or park rather than the carpark, and play spaces on natural ground level shaded by established trees. Access to the child care facilities on the first floor is by way of a single lift or stair – as parents may be managing younger children in prams or strollers, an upper level facility should be avoided if at all possible.

10. Panel notes that the proposed location of the café is set very close to a path for heavy vehicle movements; consideration should be given to relocating the café to a place with better amenity.

11. Given the large population expected to occupy the site, consideration should be given to multiple break-out or gathering spaces that could be provided within and around the site. The Panel recommends that the applicant reconsiders the need for the regimented fencing around the site, as its removal would benefit the occupants by allowing them to engage with the park and the foreshore in a more immediate and direct way.

Sustainability

12. Although sustainable strategies were not discussed in detail at the meeting, the Panel recommends that a full suite of well-considered sustainability measures should be designed and integrated into the proposal during design development. As a minimum this proposal should provide rainwater reuse tanks for irrigation and WC flushing and truck washdown, electric systems rather than gas for HW. The large roofs provide good opportunities for solar PV cells. Consider battery storage, and EV charging stations throughout the carparking.

Landscape

13. The landscape response shall seek to retain as many existing trees as possible, improve or introduce existing or new breakout spaces and build on the existing established landscape character of the site and its surroundings.

14. The landscape scheme proposes a number of principles and objectives, although it is difficult to understand how these have achieved or influenced the design response. Diagrams would be useful to understand how the landscape scheme responds to the overarching principles and objectives.

15. Within the electrical easement corridor, a number of breakout spaces or activity nodes exist. These spaces provide tables and chairs and an amphitheatre for small events. There is an opportunity to integrate these areas throughout the development rather than trying to accommodate them in a left over area which is back of house, cut off from the main public areas.

RECOMMENDATIONS

The Panel does not support the proposal in its current form. The potential for the layout of the precinct to provide more than a standard industrial site should not be lost. The issues noted above should be taken into account in a revised proposal to realise an outcome that could be supported by the Panel.

Attachment 3 – Landscape Officer Comments and Recommendations

1. General:

The site is zoned SP4 'Enterprise' and mapped with the following environmental layers, Greenweb 'Restoration' and OEH Vegetation Communities Urban / Exotic Native. The northern periphery of site is within a buffer zone for the Endangered Ecological Community being the Coastal Salt Marsh and Estuarine Salt Mash as mapped by Councils DCP 2015. The adjoining Woolooware Bay is mapped as a Greenweb 'Core' area. The site has three key interfaces, north where the site is intersected by the Foreshore Building Line, Woolooware Bay and the shared pedestrian pathway, east to Solander playing fields and south to Captain Cook Drive. The proposal seeks to construct a new enterprise precinct including various industrial, retail, and commercial development as well as accompanying public domain works.

For the purposes of clarity in the referral I have undertaken the assessment in the following zones being the Northern VMP Area, Existing Building 2, Building 3, Building 4, Building 5 (North), Building 5 (South), Building 6, Building 7, Building 8, Eastern landscape setback, Central roadway and pedestrian path and the Southern Landscape Setback.

2. Existing Trees:

As described in the Arborist report the site is comprised of a mix of native and exotic planted specimens of varying significance with a general overall rating for the tree population being in fair-good health and fair structural condition. The Arborist has surveyed 844 trees on the site and in the road reserve, of which 459 trees are proposed to be removed and 384 trees are to be retained under the current proposal.

2.1 <u>The Foreshore</u>

I. The western portion of this area has recently been mulched and planted with appropriate shrubs and groundcovers as part of VMP works for stage 1.

II. One Pittosporum is proposed to be removed as it is beneath the AusGrid easement. This is a low value specimen.

III. Trees located upon the northern boundary flush against the existing fence, shall be successfully retained under the current proposal and exist outside of the Ausgrid easement. These trees are also sufficiently distanced from proposed construction works and shall not be influenced by them.

2.2 <u>Existing Building 2</u>

The stand of trees 685-694 to be removed to site the carparking north of the existing building is comprised mostly of Cocos palms which are exempt specimens under Councils DCP Chapter 39 and best removed from within the proximity of the VMP area and waterway.

2.3 <u>Building 3</u>

The stand of trees 695-741 are comprised predominately of Palms and Callistemon which are low value specimens, these are located wholly within the footprint of Building 3. There is three specimen plantings of Angophora costata intermixed

however their location and size make them unviable for retention.

2.4 Building 4

I. Trees 784 – 804 are comprised predominately of Palms located wholly within the building footprint, their location makes them unviable for retention.

II. Trees 216 – 227 are a row of Washingtonia palms located wholly within the building footprint, their location makes them unviable for retention.

III. Trees 770 -782 are required to be removed to site the building and ancillary works. Of this group Trees 774 – 782 comprised of Meleleuca quinquenervia and Washingtonia robusta are worthy of retention. These trees are currently proposed for removal due to approximately 300mm of proposed 'Fill' and as the Arborist notes a proposed retaining wall.

Recommendation: To see this stand retained, the fill proposed could be removed as it exists outside of the building footprint and within a designated landscape area. The retaining wall noted by the Arborist as a 'primary impact' and cause for removal of these trees finishes in line with the eastern edge of the building, so should not interfere with these existing trees. Refer Architectural plans (Sheet 400). The retention of these specimens around the new 16m high building will provide some immediate relief in scale, whilst the proposed landscaping establishes.

2.5 Building 5 (Block 1)

I. Trees 358 – 382 are a mix of well-established planted specimens forming boarders to the existing carparking including Magnolia grandiflora, Corymbia citriodora and Washingtonia robusta. Their location makes them unviable for retention when compared to the proposed built form.

II. Trees 382 – 444 are a mix of well-established planted specimens forming boarders to the existing carparking including Cupaniopsis ancardioides and Banksia integrifolia, these are the most botanically significant trees on site given the Greenweb 'Restoration' Zoning. Their location makes them unviable for retention when compared to the proposed built form. Should the Building require redesign the retention of this significant stand of trees should be prioritized.

2.6 Building 5 (Block 2)

I. Trees 313 – 341 are a mix of well-established planted specimens forming boarders to the existing carparking including Magnolia grandiflora, Corymbia citriodora and Washingtonia robusta. The location of these existing specimens around the existing road leaves them unviable for retention when compared to the proposed built form.

II. Trees 343 - 355 are a mix of native and exotic trees and palms. They exist as part of an established garden bed and rest area. Particularly native trees 343, 348 and 353 Cupaniopsis ancardioides 'Tuckeroo' provide great shade an amenity and exist on the periphery of the proposed built form.

Recommendation: This stand exists in a garden bed surrounded by asphalt /

concrete, so if the current extent of the garden bed were retained it would encompass the Tree Protection Zones of all 12 specimens. Fill is proposed to raise the FFL of the proposed building, but the trees could be retained at a lower level. It is recommended the hardstand and northwest corner of the building is redesigned to accommodate this group of trees. This group of trees could form a part of a 'Communal Open / Area' as is proposed at Building 5 (Block 1).

2.7 Building 6

Trees 122 – 146 & 209 – 302 are a significant stand of planted canopy trees and palms and sub canopy trees comprised of Magnolia grandiflora, Corymbia citriodora and Washingtonia robusta. This is the largest and most dense stand of trees onsite and provides great shade amenity.

Recommendation: The proposed building footprint encompasses the entirety of this stand of trees currently. It is recommended that Building 6 is amalgamated with Buildings 7 & 8 to enable all or part of this stand to be retained. This group of trees exists in a garden bed surrounded by asphalt / concrete, so if the full or partial extent of the garden bed were retained it would encompass the Tree Protection Zones of all or part of the stand of trees.

Should this stand of trees be retained as part of the proposal, its central location would make it an ideal gathering place for onsite occupants and visitors alike. The location addresses the Boulevard and is a central point providing access to Solander Fields and the the Foreshore. As the site is proposing retail tenancies and a café these could be accommodated in a smaller building(s) in this area amongst the stand of trees, so it remains a viable use of space for the development. This area could also serve as the primary 'Open Space' for the onsite occupants and visitors allowing the removal of the two communal areas from within the dedicated VMP area.

2.8 Building 7

Trees 303 – 308 are an avenue of established Magnolia grandiflora, which conflict with the western façade of Building 7. The realignment of the new boulevard and proposed geometries of the buildings makes these trees unviable for retention.

2.9 Building 8

Trees 36 – 48 are a line of large native Corymbia maculata / citriodora these are some of the largest trees on the site as they are planted as individual specimens rather than in a stand. They form a perimeter planting to the existing road and are local landmarks upon the site and could provide immediate relief, in terms of scale to built form and shade amenity. The current design proposes removal of these trees due to fill, carparking and infrastructure. Trees 43- 48 are within the footprint of Building 8.

Recommendation: Trees 36-42 currently exist in a large turf area and if they were to be retained in the new scheme their locations would be within a designated landscape area. This landscaped area would encompass the tree protection zones of trees 36-42 with the rationalization of some parking spots. Fill is proposed to raise the FFL of the building, but the trees could be retained at a lower level and the

hardstand could ramp up to meet the built form. The footprint of building 8 could be rationalized or amalgamated with Building 7 to retain trees 42-48 which would see the 16m high building mass setback further from the road and screened further with existing trees.

2.10 Eastern landscape setback

Trees 71 - 116 & 160 -169 these trees exist in a garden bed beside the asphalt carparking area and are bound by a concrete kerb. These trees are proposed for retention and despite proposed filling shall be suitable to be retained. The trees have an asymmetrical Tree Protection Zone, as beyond the kerb the asphalt carparking area is not conducive to house roots. The root mass extends east into the grassed bank of Solander Playing Fields, which will remain undisturbed. There is potential that some of these specimens may require pruning during or post construction, but this is expected to be very minor and less than 10% of the canopy volume in accordance with Councils DCP.

2.11 Central roadway and pedestrian path

Trees 228 – 308 located on the east side and trees 320 – 459 are located on the western side of the existing main boulevard within the site. They are comprised of an avenue Magnolia grandiflora and Corymbia citriodora. The realignment of the new boulevard and proposed geometries of the buildings makes these trees unviable for retention.

2.12 Southern Landscape Setback

I. Trees 456 – 489 are comprised almost exclusively of palms, some of which are exempt specimens in accordance with Councils DCP. There is a 1m+ of fill in this area to site the new building and hardstand, these specimens are not of great enough environmental significance to warrant redesign and retention.

Recommendation: Despite the above there is potential to retain the cluster of palms 460-465 beside the entrance to provide some immediate amenity. Palms have small root balls and Tree Protection Zones <1m radius and are conducive for retention around development works. Again, the palms could be retained at a lower level and the hardstand be filled to a higher RL.

II. The remaining specimens located upon the Council verge are proposed for retention. A 3m landscape setback is proposed on this boundary which will contain the fill proposed inside the boundary and preserve the northern side of the Tree protection Zones of Council trees.

2.13 General Notes regarding Tree Retention and Protection

I. Architectural redesign in conference with the site Arborist should be undertaken to prioritise the retention of the following tree and palm stands. Trees 774 – 782, 460-465, 343 – 355, 209 – 302 & 122 – 146 (All or part of stand) and 36 – 48.

II. The site has a large number of Washintonia robusta and Magnolia grandiflora specimens. Both species are readily transplantable and could be managed during different stages of construction and reincluded in the landscape design. The reuse

of these specimen plantings at mature sizes would bring immediate shade amenity, scale to new buildings, and restore the pre-existing character.

III. Trees stands in existing garden beds or bordered by concrete or asphalt hardstand are more conducive to tree retention as roots have unlikely spread outside of the garden bed. These trees can be retained at a lower level and fill can be placed around without hindering the trees health and vigour.

IV. A Tree Management plan should be submitted with a revised application.

3. Proposed Landscape:

The landscape proposal has been assessed against the Objectives, Controls and Assessment Principles set out in Chapter 27: B7 Business Park Zone of the SSCDCP. For clarity I refer to the following zones labeled in the landscape package on Page L02.

3.1 <u>The Boulevard</u>

I. The entries at the north and south of site for the central pedestrian pathway running adjacent the Boulevard lacks clear definition in the landscape. The southern entry is located beside large ancillary structures ie. The pump house and is immediately transected by the road servicing Building 8 and Building 7. Its position appears to be an afterthought to the built form and carparking rather than a primary driver to create a user-friendly path.

Recommendation: As this is the main pedestrian spine the proposed width of 2.5m could be increased to create a wider shared path for pedestrians and cyclists whom are both expected to utilize the path. The path should have appropriate line marking and delineation and way finding. The beginning of the path should be located as such to make it clearly identifiable and safe for pedestrians to cross.

II. The landscaping adjacent the pathway which separates it from the road is again cluttered by services and ancillary development ie. The substations adjacent Building 7.

Recommendation: Ancillary structures and services should not dominate the edges or entries to the main pedestrian pathway; these should be relocated out of sight or below ground where possible and the areas designated for wayfinding and landscaping.

III. The pedestrian pathway does not afford a pedestrian crossing directly to the Café apart of Building 5.

Recommendation: For the safety and amenity of pedestrians the Café would be better relocated upon the eastern side, or another Café area could be provided. A single Café tenancy servicing the entire sites tenancies appears to be significantly inadequate in providing ease of amenity for on site occupants and visitors. For example, those occupants in existing Building 2 and proposed Building 3 have 300-meter walk and multiple crossings to reach the café as currently proposed.

As previously mentioned, the area in which Building 6 is proposed is ideal for a central gathering place for onsite occupants and visitors alike, addressing the

'Boulevard' whilst providing access to Solander Fields and access to 'The Foreshore'. As the site is proposing retail tenancies and a café these could be accommodated in a smaller building(s) in this area amongst the stand of trees, so it remains a viable use of space for the development.

This area could serve as the primary 'Open Space' for the on-site occupants and visitors allowing the removal of the two communal areas from within the dedicated VMP area. This location also provides the best solar amenity on the site with an eastern vantage and the majority of the building mass in close proximity to the area located on the southern side.

IV. The landscape plans identify large canopy trees to be planted along side the pathway in the garden beds and bioretention basins. The endemic canopy trees proposed as per the schedules provided in the landscape package can spread up to 15-20m wide. Their locations as proposed with a 4m setback to building façade is inadequate to house the trees. The trees cannot be expected to reach their full potential due to the clashes they will have with the built form. These trees proposed will be vital in restoring canopy upon the site and providing shade and amenity especially amongst the expanse of built form and hardstand.

Recommendation: The buildings should be setback to a minimum of 7.5m where proposed beside canopy trees to ensure the canopy at maturity can be accommodated.

V. Bio retentions basins in the form of rain gardens consume nearly all the garden beds dedicated beside the pedestrian pathway. Bio basins to perform their intended function have specific requirements for planting densities and species, these are not detailed in the plan set. The Engineering criteria to ensure functional performance of the bio basins to treat water on site may also limit the quality of landscaping as the volume and type of plant material can influence performance.

Recommendation: The bio basins need to be coordinated between the Engineering and Landscape consultant teams so the quality of the landscape outcome can be properly assessed. Ideally the bio basins could be relocated, or another engineering solution proposed so as not to limit the landscape quality upon the Boulevard.

3.2 <u>The Foreshore</u>

I. The Foreshore is intended to be a dedicated area for the VMP to offset the extensive canopy loss upon the site. It is now burdened by stormwater infrastructure, communal open areas and a large access pathway / road, the quality of this VMP area is eroded by competing uses.

Recommendation: The Foreshore area should as originally intended be designated to restoring canopy and biodiversity on the site. The other competing uses should be relocated outside of this area. Having this area accessible by site occupants and visitors is encouraged, though seating and pathways should be informal and compliment the natural quality of the adjacent Mangroves.

II. The Foreshore area is disconnected from the greater site and is not easily accessible for visitors and site occupants. The northern façades of Buildings 3 and 4 are defensive and provide no glazing to overlook the Foreshore or utilize the

northern aspect. The filling required to site the built form has required a retaining wall to run along the northern edge of Building 3 and Building 4 beside the egress path. Whilst there is a single door from each Ground floor tenancy to this path it is disconnected by the level change.

Recommendation: The Foreshore area should be easily accessible both physically and visually, so it does not become forgotten upon the site. Clearly defined pathways should lead to it and glazing should be incorporated on the building facades to ensure it remains a key feature upon the site. Breaks in built form of Buildings 3 and 4 with connecting pathways or connections via designated internal pathways or lift wells would vastly improve accessibility to the space and ensure it remains relevant and well maintained.

3.3 The Edges

I. The landscape setback to Captain Cook drive of 3m wide is supportable as the batter to the proposed retaining wall will ensure the preservation of trees in the Council Road reserve. 3m is the required setback as nominated in the DCP controls. The batter appears at its steepest at 1 in 3 which is supportable and the limit to ensure ease of maintenance.

II. The eastern setback to Solander Fields can be embellished in shrubs and understory planting as is proposed.

Recommendation: The proposal whilst achieving the minimum requirement for setbacks and designated landscape area could certainly be improved upon, the edges and setbacks could be embellished given the size of the site. The rationalization of hardstand areas built form and carparking requirements could certainly provide more landscape area and in turn create a improved landscape setting and greater amenity.

3.4 Building Frontages and Carparking

I. The landscaping proposed amongst the built form is very limited and will not provide any significant visual or cooling amenity to the site. The garden beds proposed are very small and it is likely that the reflective heat from the surrounding hardstand and built form will dry these small garden beds out and burn plants.

Recommendation: To provide greater visual amenity and natural cooling to the site landscaping between the built form should be significantly increased. Garden beds should be redesigned to be significantly larger to accommodate tree planting. These planter beds proposed between buildings must be irrigated. To improve the amount and quality of landscape around building frontages the vehicular movements and parking requirements should be tested upon the plans to test whether hardstand can be substituted for landscape area.

II. The proposal satisfies the controls pursuant to tree planting between car spaces.

Recommendation: Again, to improve the amount of tree planting, canopy replacement and quality of landscape across the site, parking requirements should be tested to understand whether hardstand can be substituted for landscape area

and further tree planting. Planter beds housing trees must be irrigated and have a substrate comprised of a Soil Vault System like ‘Stratacell’ to ensure their successful establishment and longevity.

3.5 Entry Area

A detail plan of the proposed Entry area should be provided for assessment.

Recommendation: A significant specimen planting such as Ficus rubiginosa should be provided to create a focal point and to compliment the Magnolia grandiflora in the round about opposite. The retention of the stand of palms known as trees 460-465 as referenced above in 2.12.I will also provide value to the entry.

4. Other matters

The plant schedules included in the landscape set should be allocated to the zones identified. A site specific tree masterplan should also be provided.

Appendix B Curriculum Vitae – Brendyn Rheinberger

Brendyn is a highly dedicated and driven Traffic and Transport Engineer who thrives on working in a complex, challenging and problem-solving environment. Brendyn has extensive professional experience with over 15 years working in traffic and transport engineering, civil engineering, and project management roles in both public and private contexts throughout Queensland and NSW.

Skilled in integrated transport planning, traffic analysis, construction traffic management, traffic signal design, road network operations, road safety, car park design and project management. Brendyn has a proven ability to develop and foster strong relationships with organisations and authorities, through communication, honesty, and integrity.

Education and Qualifications

- Master of Engineering (Engineering Management), Griffith University (2015)
- Bachelor of Engineering (Civil), Griffith University (2012)
- Chartered Professional Engineer of Australia (CPEng)
- Professional Engineer of Queensland (RPEQ)
- Professional Engineer of Victoria (RPEV)
- Traffic Management Design (TMD) accredited, Department of Transport and Main Roads
- Prepare Traffic Management Plans and Traffic Guidance Schemes (TCT1044529), NSW Government
- Road Safety Auditor (RSA), Department of Transport and Main Roads

Project Experience

Springwood to Browns Plains Passenger Transport Corridor Study, TMR (2020)**
Brendyn and his team were commissioned by the Department of Transport and Main Roads to investigate public transport demands and infrastructure requirements between Springwood and Browns Plains to support future growth and improved multi-modal transport outcomes.

Brendyn was involved in the review of the existing bus network, setting strategic objectives and developed the options analysis framework for assessing proposed corridors.

Lae Drive, Runaway Bay Corridor Master Plan, CoGC (2020)**
Brendyn and his team were engaged by City of Gold Cost (CoGC) to provide a multi-modal corridor master plan for the Lae Drive corridor in Runaway Bay. The corridor includes numerous signalised and unsignalised intersections and roundabouts which were assessed, and intersection upgrades proposed as part of the project. The solutions for the corridor included individual intersection upgrades as well as corridor connections to suit the demographics and user profile of the corridor. The team prepared three briefing notes, a technical summary report and a graphically designed corridor master plan for public issue.

Brendyn oversaw the investigations into both the active and public transport networks for the corridor and provided guidance on intersection analysis using SIDRA intersection performance software.

Brendyn led workshops internally with the project team to determine individual mode-based solutions and derive the most suitable options using a SWOT analysis methodology.

Mackay Waterfront PDA Transport Model Analysis, MRC (2020)**
Brendyn and his team were engaged by Mackay Regional Council (MRC) to undertake an options analysis on the Sydney Street/River Street intersection located near the Pioneer River in the Mackay CBD. MRC and the Department of Transport and Main Roads identified

an issue with connectivity for the Blue Water Trail, an active transport shared path that travels along the Pioneer River coastline predominantly used for recreation. The existing intersection configuration of Sydney Street/River Street forced pedestrians and cyclists travelling along the trail to cross in two stages resulting in significant delays. The project investigated various options to modify the intersection and surrounding Blue Water Trail alignment to improve connectivity for pedestrians and cyclists. The project resulted in providing MRC with three preferred options suited to three differing timeframes for implementation, as well as enabling each option to be built upon one another as a progression of sorts towards an end vision for the Waterfront PDA.

Brendyn managed the project's budgetary and time requirements and was the key contact representing his project team. He oversaw the options development, intersection analysis and provided guidance on concept designs.

Brisbane Metro Program Management, TransLink (2019-2021)**
Brendyn undertook a role in representing Queensland Government for the Brisbane Metro project. He was responsible for coordinating design reviews of all design packages under Brisbane Move's scope. He was also responsible for briefing TransLink's executive team on upcoming bus service disruptions as a result of planned construction activities. Brendyn was a liaison for TransLink within several working groups and interfaced with BCC, the Project Verifiers and Brisbane Move representatives.

Kellyville Station Bus Interchange Concept Design, Sydney Metro (2019)**
Brendyn was the project manager for the concept design of the bus interchange at Kellyville station. This involved developing several options for buses to circulate through the station precinct including providing provisions for bus stop and bus priority infrastructure. Brendyn was in constant communication with Roads and Maritime, Transport for NSW and The Hills Shire Council in regard to road operational impacts, bus route service planning, bus lane enforcement and parking and signage changes. The work Brendyn performed was pivotal to all stakeholders coming to agreement and deciding on a preferred option to be added to the Station Precinct Design Plan.

Sydenham Temporary Bussing Optioneering, Sydney Metro (2019)**
Due to the proposed changes to the surrounding road network of Sydenham station as part of Metro upgrade works, new rail replacement bus routes and stop locations were required as a result of impacts to the existing Sydney Trains bus specifications during rail possessions. Brendyn developed eight different options for bus routes and stop locations and assessed each against a common set of criteria as part of a multi-criteria analysis. Through this process Brendyn was able to determine a preferred option and presented the findings of this optioneering assessment numerous times to Roads and Maritime, Sydney Coordination Office, Transport for NSW, Sydney Trains and Inner West Council. Brendyn ascertained in-principle support and approvals from the relevant stakeholders which was instrumental in implementing the preferred option.

Kellyville Park N Ride Demand Investigation, Sydney Metro (2019)**
Brendyn provided support to the investigation of the Park n Ride facility at Kellyville. This multi-storey car park consists of 1350 spaces and it was Brendyn's responsibility to assist with providing comparative findings of the forecasted demands versus the observed demands of the facility during peak traffic periods. These findings informed the traffic analysis that Brendyn managed for the precinct streets of Kellyville station and the surrounding key intersections. By understanding the demand profile of traffic volumes entering and exiting the Park n Ride facility, Brendyn was able to accurately stress test the local road network to determine its current design life before requiring capacity upgrades.

Sydenham To Bankstown Integrated Transport Planning, Sydney Metro (2019)**
Across the ten future southwest Metro stations, Brendyn's role was to oversee the identification of potential improvement opportunities to pedestrian and cyclist facilities, bus

stops and kiss n ride spaces surrounding the station precincts. Improvements included undertaking pedestrian capacity assessments, surrounding land use investigations, identifying pedestrian desire lines, a walking and cycling strategy, traffic modelling, concept designs and bus stop operational assessments of which Brendyn facilitated. Brendyn organised workshops to further develop concept designs and presented the recommended improvements to relevant stakeholders for in-principle agreement prior to the submission of a technical report for final approval. The improvement opportunities were selected to align with Transport for NSW's Movement and Place Framework.

Bankstown Line Temporary Transport Plan, Sydney Metro (2019)**
This project involved the development of a temporary transport plan designed to be implemented during the possession of the existing Bankstown heavy rail line to facilitate conversion works. Across a three week period, rail replacement bus services are planned to be in operation to transport rail customers inconvenienced by the Bankstown line rail possession. As Traffic Manager, Brendyn was responsible for assessing the road network planned to be utilised by rail replacement buses. The main objective of Brendyn's role was to ensure reliability and to improve bus travel time through a congested road network. Through traffic modelling, Brendyn was able to effectively identify locations suitable for temporary changes to on-street parking, traffic signal phasing modifications and locations for pedestrian management, all to support the temporary bus services. Finally, the list of recommended modifications and the justification behind each was presented as part of a handover by Brendyn to members of the Sydney Coordination Office and Transport Management Centre, who were tasked with operating the TTP.

Traffic Engineer, Sydney Light Rail Project, Acciona Infrastructure (2016-2018)**
This project involved the construction of a light rail network travelling through the Sydney CBD and extending through Surry Hills, Randwick, Kensington and Kingsford suburbs. The project addressed the capacity issues on the south eastern suburbs bus network by providing a high frequency 'turn up and go' service connecting the inner west suburbs with the south eastern suburbs through 12km of light rail network. As a Traffic Engineer on this high profile project, Brendyn's primary role was to prepare site-specific traffic management plans to facilitate construction of various utility and civil components throughout the Randwick, Kensington and Kingsford sections. In designing each TMP, Brendyn had a strong focus on pedestrian and cyclist safety as these facilities were designed in a temporary configuration in the vicinity of construction vehicle movements and activities. Overseeing all aspects of TMP development and obtaining approvals from state and local authorities was Brendyn's ultimate objective and was vital for construction activities to proceed.

Safer Roads Sooner Program, TMR (2016)**
As part of the south coast region for Transport and Main Roads, Brendyn oversaw the determination of potential road improvement projects where deficiencies in safety were evident due to historical accident data and trends being identified. Brendyn was responsible for undertaking cost benefit analysis for each potential project to develop a short list for submission to the Land Transport Safety team within TMR. For each of the short listed road improvement projects, Brendyn prepared a business case which highlighted the justification and benefits the projects would provide to the state controlled road network. These business cases were submitted to the Land Transport Safety team to determine funding allocations for the south coast region under the Safer Roads Sooner program.

M1 Motorway Exit 54 Interchange Upgrade, Traffic Signal Operational Support, TMR (2015-2016)**
As part of the Network Optimisation team within Transport and Main Roads, Brendyn provided traffic signal design and operational support to the contractor during each stage of construction of the Exit 54 interchange upgrade. This involved developing traffic signal plans that dictated the cycle times and phasing for the varying traffic demands throughout each day. Brendyn monitored the live traffic utilising a combination of permanent and temporary

CCTV cameras during the critical AM and PM peak periods to ensure queuing did not exceed the capacity of the on and off-ramps to the M1 motorway. Brendyn attended meetings with the contractor regularly and provided advice on construction staging in regard to traffic signal operations.

Metricon Stadium Venue Transport Planning, TMR (2020)**
Brendyn provided support to the Gold Coast Suns AFL club in regard to the operation of traffic signals as part of the Metricon Stadium transport planning for AFL game days. Liaising with the Gold Coast Suns, Queensland Police, QLD Ambulance, QLD Fire and Emergency, City of Gold Coast and the Traffic Management Centre, Brendyn was able to develop game day specific traffic signal plans for Nerang Broadbeach Road that catered for the needs of each stakeholder. This included the coordination of the corridor to support the major direction of traffic flow, extending pedestrian crossing times at key locations which would be supported by on-site traffic controllers, and providing bus priority signal phasing to assist with transporting spectators to and from games.

Memberships and Associations

- Member of Institution of Engineers Australia (MIEAust)
- Member of Australian Institute of Traffic Planning and Management (AITPM)

Appendix C Proposed Development Masterplan





LEVEL 1

BUILDING 4

NOTES

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890
(5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum) LEVELS SHOWN ARE INDICATIVE ONLY AND SUBJECT TO FURTHER CIVIL DETAIL DESIGN. THESE MIGHT VARY +/- 1000 mm

EXTENT OF RETAINING WALLS SHOWN AS INDICATIVE ONLY SUBJECT TO CIVIL REVIEW

GROSS LETTABLE AREA (GLA) IS THE TOTAL FLOOR AREA OF A BUILDING, MEASURED FROM THE OUTSIDE OF EXTERNAL WALLS OR THE CENTRE OF PARTY WALLS AND INCLUDES ALL ROOFED AREAS

5% OF CARPARKING SPACES PROVIDED TO BE DEDICATED AS CAR SHARING BAYS
5% OF CARPARKING SPACES PROVIDED TO BE DEDICATED AS ELECTRICAL VEHICLE BAYS

DEVELOPMENT ANALYSIS

USE		GFA (EXCLUDING EXEMPTIONS)
BUILDING 3		
WAREHOUSE	3A	649 m²
WAREHOUSE	3B	676 m²
WAREHOUSE	3C	677 m²
WAREHOUSE	3D	677 m²
WAREHOUSE	3E	698 m²
WAREHOUSE	3F	805 m²
OFFICE	3A	126 m²
OFFICE	3B	127 m²
OFFICE	3C	127 m²
OFFICE	3D	127 m²
OFFICE	3E	127 m²
OFFICE	3F	126 m²
TOTAL AREA		4,942 m²
BUILDING 4		
WAREHOUSE	GROUND LEVEL	4,132 m²
WAREHOUSE	LEVEL 1	3,028 m²
OFFICE MEZZANINE	GROUND LEVEL	841 m²
OFFICE MEZZANINE	LEVEL 1	924 m²
TOTAL AREA		8,925 m²
BUILDING 5 BLOCK 1		
WAREHOUSE	5A	1,071 m²
WAREHOUSE	5B	3,048 m²
WAREHOUSE	5C	2,163 m²
OFFICE	5A	333 m²
OFFICE	5B	431 m²
OFFICE	5C	403 m²
TOTAL AREA		7,449 m²
BUILDING 5 BLOCK 2		
WAREHOUSE	5D	2,732 m²
WAREHOUSE	5E	2,023 m²
OFFICE	5D	424 m²
OFFICE	5E	391 m²
TOTAL AREA		5,570 m²
BUILDING 5 COMMERCIAL		
CAFE		76 m²
CHILDCARE		648 m²
CHILDCARE OUTDOOR		571 m²
COMMERCIAL		554 m²
COMMON AREAS		13 m²
ESTATE OFFICE		22 m²
TOTAL AREA		1,884 m²
BUILDING 6		
WAREHOUSE	6A	354 m²
WAREHOUSE	6B	597 m²
WAREHOUSE	6C	594 m²
WAREHOUSE	6D	920 m²
OFFICE	6A	89 m²
OFFICE	6B	118 m²
OFFICE	6C	117 m²
OFFICE	6D	171 m²
TOTAL AREA		2,960 m²
BUILDING 7		
WAREHOUSE	7A	698 m²
WAREHOUSE	7B	647 m²
WAREHOUSE	7C	644 m²
WAREHOUSE	7D	694 m²
WAREHOUSE	7E	647 m²
WAREHOUSE	7F	644 m²
OFFICE	7A	117 m²
OFFICE	7B	118 m²
OFFICE	7C	117 m²
OFFICE	7D	110 m²
OFFICE	7E	118 m²
OFFICE	7F	117 m²
TOTAL AREA		4,671 m²
BUILDING 8		
WAREHOUSE	8A	736 m²
WAREHOUSE	8B	642 m²
OFFICE	8A	139 m²
OFFICE	8B	130 m²
TOTAL AREA		1,647 m²
GRAND TOTAL GFA		38,048 m²

SITE COVERAGE	
TOTAL SITE AREA	123,898.129 m²
BUILDING 3 - 8 FOOTPRINT	31,903 m²
BUILDING 1 & 2 FOOTPRINT APPROX.	27,878 m²
SITE COVERAGE APPROX.	48.25%
LANDSCAPING	14.02%

LEGEND

- ESTATE BOUNDARY
- FORESHORE LINE BOUNDARY
- TRANSMISSION EASEMENT
- LANDSCAPE SETBACK
- BUILDING SETBACK
- 2.5 m BICYCLE & PDESTRIAN SHARED PATH
- PEDESTRIAN CONCRETE FOOTPATH
- PERMEABLE HARD SURFACE
- PYLON SIGN
- RW RETAINING WALL
- OA OUTDOOR AREA
- RWT RAIN WATER TANK
- W WASTE AREA
- MSB MAIN SWITCH BOARD
- PL PARCEL LOCKERS
- BG BOOM GATE
- RPC RAISED PEDESTRAIN CROSSING
- DP DELIVERY PARKING BAY
- SP SHARED PARKING BAY (5%)
- EV ELECTRICAL VEHICLE BAY (5%)
- EXISTING TREE PROTECTION ZONE
- PROPOSED TREE
- BIORETENTION BASIN / RAIN GARDEN

PARKING PROVISION

PARKING ALLOCATION SHOWN AS INDICATIVE ONLY

		CARS	BICYCLES
Building 1A		51	-
Building 1B		81	-
Building 1C		12	-
Building 1D		35	-
Building 1E		10	-
Building 2		12	-
Building 3		19	12
Building 4		131	64
Building 5	Block 1	48	12
Building 5	Block 2	19	8
Building 5	Childcare	17	4
Building 5	Commercial	15	8
Building 6		29	8
Building 7		62	12
Building 8		22	4
TOTAL		563	132
MOTORBIKES			26

No.	DATE:	REVISION:	BY:	CHK:
P13	25.08.2023	90% DA	AS	JF
P14	06.09.2023	ISSUE FOR APPROVAL	AS	JF
P15	12.09.2023	ISSUE FOR APPROVAL	AS	JF
A	28.09.2023	FOR LODGEMENT	AS	JF
B	13.11.2023	FOR LODGEMENT	AS	JF

All areas indicated are indicative for design and planning purposes only and should not be used for any contractual reasons without verification by a licensed surveyor or further design development being completed.

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PROJECT:
CARINGBAH MASTERPLAN
13 ENDEAVOUR ROAD, CARINGBAH NSW 2229

TITLE:
ESTATE MASTERPLAN

TRUE NORTH

CLIENT: Aliro

DATE: SEPTEMBER, 2023
DRAWN BY: AS
SCALE: 1:1000 @ A1
SCALE: 1:2000 @ A3

JOB NO: 22366
DRAWING NO: 005
REVISION: B

watson young

Appendix D Traffic Guidance Schemes

TripleTwoNine Estate Development
13 Endeavour Road, Caringbah NSW 2229

Gate 1 & Gate 2 Site Access
Traffic Guidance Scheme

SHEET NO.	DRAWING TITLE
1	Gate 1 & Gate 2 Cover Page
2	Gate 1 Site Access
3	Gate 2 Site Access



Prepared by

SLR

Prepared for

Aliro

Notes

- Existing signage conflicting works shall be covered as required.
- Pedestrian access and property access shall be maintained at all times.
- All construction vehicles are required to operate flashing yellow lights at all times while on-site, entering the site and existing the site.
- This Traffic Guidance Scheme (TGS) has been prepared in compliance with AS1742.3, AGTTM and QGTTM standards and guidelines.
- Temporary signage is to be installed at locations that are clear of obstructions (e.g. vegetation).
- Construction hours are between 7am to 6pm Mon to Fri and 8am to 1pm Sat. Outside of these hours, all temporary signage are to be covered or removed (unless specified otherwise).

Issue	Description	Date	Auth.
A	Initial Issue	XX.XX.XX	

Drawn DN

Design xx

Checked xx

Scale NTS

Project Title
TripleTwoNine Estate Development
13 Endeavour Road, Caringbah

Design Status
CONCEPT

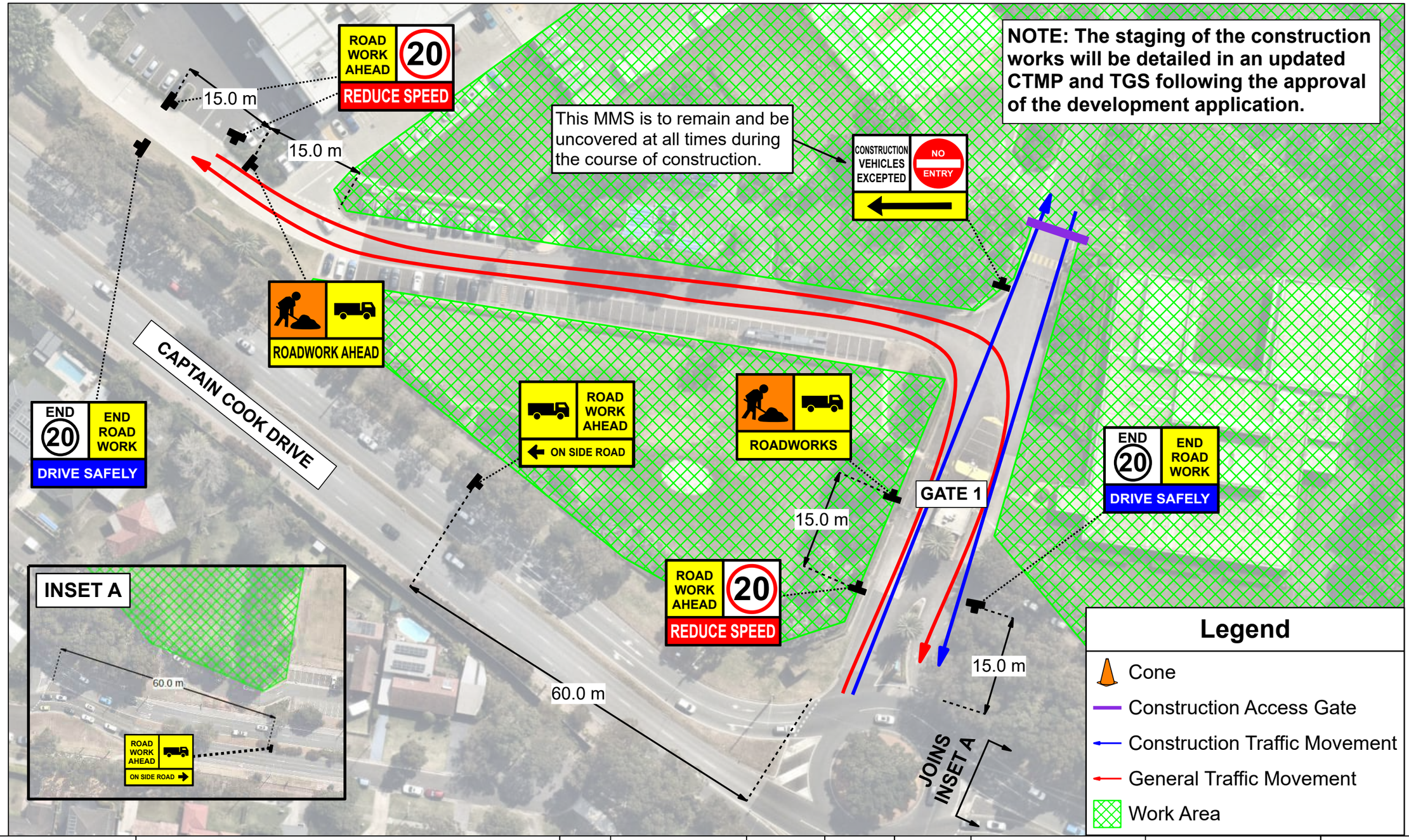
Drawing Title
Gate 1 & Gate 2 Cover Page
Traffic Guidance Scheme

Project No. 630.031866

Drawing No. TGS-001

Sheet 1 of 3

Rev. A



Prepared by

SLR

Prepared for

Aliro

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Issue	Description	Date	Auth.
A	Initial Issue	XX.XX.XX	

Drawn DN

Design xx

Checked xx

Scale NTS

Project Title

TripleTwoNine Estate Development

13 Endeavour Road, Caringbah

Design Status CONCEPT

Drawing Title

Gate 1 Site Access

Traffic Guidance Scheme

Project No. 630.031866

Drawing No. TGS-001

Sheet 2 of 3

Rev. A

NOTE: The staging of the construction works will be detailed in an updated CTMP and TGS following the approval of the development application.

25.0 m

30.0 m

30.0 m

30.0 m

ROAD WORK AHEAD
ON SIDE ROAD

ROAD WORK AHEAD
ON SIDE ROAD

GATE 2

Cones at 2m spacing are to be implemented to restrict parking at this location.

Existing bollards are to be removed here to facilitate construction heavy vehicle turning movements into the site access.

CONSTRUCTION VEHICLES EXCEPTED
NO ENTRY

This MMS is to remain and be uncovered at all times during the course of construction.

ROADWORKS

ROAD WORK AHEAD
20
REDUCE SPEED

ENDEAVOUR ROAD

Additional controls may be required at this location subject to a construction vehicle swept path assessment confirming two-way flow can be accommodated.

Legend

- Cone
- Construction Access Gate
- Construction Traffic Movement
- General Traffic Movement
- Work Area

Prepared by

SLR

Prepared for

Aliro

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Issue	Description	Date	Auth.
A	Initial Issue	XX.XX.XX	

Drawn DN

Design xx

Checked xx

Scale NTS

Project Title
TripleTwoNine Estate Development
13 Endeavour Road, Caringbah

Design Status
CONCEPT

Drawing Title
Gate 2 Site Access
Traffic Guidance Scheme

Project No. 630.031866

Drawing No. TGS-001

Sheet 3 of 3

Rev. A

Appendix E Risk Assessment

SLR Consulting Australia
Level 16, 175 Eagle Street, Brisbane QLD 4000, Australia

TripleTwoNine Estate CTMP

13 Endeavour Road, Caringbah

RISK ASSESSMENT AND COMMUNICATION TOOL

Project Number	630.031866.00003
Project Name	TripleTwoNine Estate CTMP
Site Location	13 Endeavour Road, Caringbah, NSW
Date of Assessment	15 October 2024
Revision	Issue 1

Name	Company	Title

Document Control

Date Issued	Revision	Issued By	Checked By
10 October 2024	Draft	D. Nguyen	C. Seventekin/ B. Rheinberger

Risk Evaluation Matrix		**Consequences**					
Risk Ratings: Very high = **VH**; High = **H**; Medium = **M**; Low = **L**		Insignificant	Minor	Moderate	Major	Severe	Catastrophic
		C6	C5	C4	C3	C2	C1
Almost certain	L1	**M**	**H**	**H**	**VH**	**VH**	**VH**
Very likely	L2	**M**	**M**	**H**	**H**	**VH**	**VH**
Likely	L3	**L**	**M**	**M**	**H**	**H**	**VH**
Unlikely	L4	**L**	**L**	**M**	**M**	**H**	**H**
Very unlikely	L5	**L**	**L**	**L**	**M**	**M**	**H**
Almost unprecedented	L6	**L**	**L**	**L**	**L**	**M**	**M**

Consequence Rating	Description
Insignificant	• Illness, first aid or injury not requiring medical treatment. • No lost time.
Minor	• Minor injury or illness requiring medical treatment. • No lost time post-medical treatment.
Moderate	Minor injuries or illnesses resulting in lost time.
Major	1 to 10 serious injuries or illnesses* resulting in lost time or potential permanent impairment.
Severe	Single fatality and/or 11 to 20 serious injuries or illnesses* resulting in lost time or potential permanent impairment.
Catastrophic	Multiple fatalities and/or more than 20 serious injuries or illnesses* resulting in lost time or potential permanent impairment.

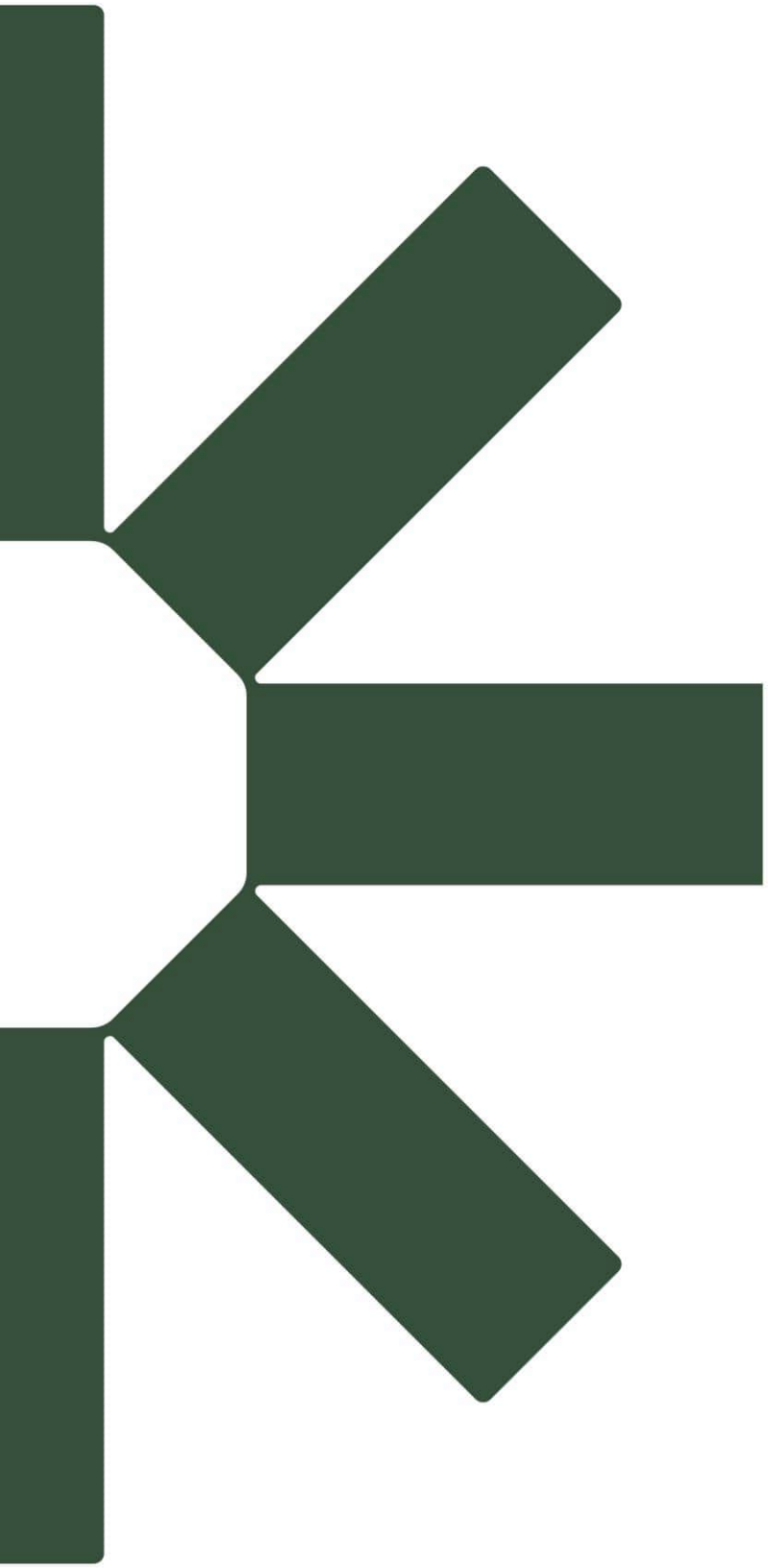
* Serious injury or illness is defined by the WHS Act section 36

Likelihood Rating	Description
Almost certain	• Expected to occur multiple times (10 or more times) during any given year. • Expected to occur at least 1 in every 4 times the event or action occurs (more than 25% chance of occurrence). • This risk is known to occur frequently.
Very likely	• Expected to occur occasionally (1 to 10 times) during any given year. • Expected to occur between 1 in 4 and 1 in 10 times the event or action occurs (10 to 25% chance of occurrence). • This risk is known to occur often.
Likely	• Expected to occur once during any given year. • Expected to occur between 1 in 10 and 1 in 100 times the event or action. • occurs (1 to 10% chance of occurrence). • This risk is known to have occurred on occasions.
Unlikely	• Expected to occur once every 1 to 10 years. • Expected to occur between 1 in 100 and 1 in 1,000 times the event or action occurs (0.1 to 1.0% chance of occurrence). • This risk could occur but not often.
Very unlikely	• Expected to occur once every 10 to 100 years. • Expected to occur between 1 in 1,000 and 1 in 10,000 times the event or action occurs (0.01 to 0.1% chance of occurrence). • It is unusual that this risk occurs, but it has happened.
Almost unprecedented	• Not expected to occur in the next 100 years (less than once every 100 years). • Expected to occur less than 1 in 10,000 times (if ever) the event or action occurs (less than 0.01% chance of occurrence). • Any risk can occur, but it is very improbable that this risk will occur within a large number of events.

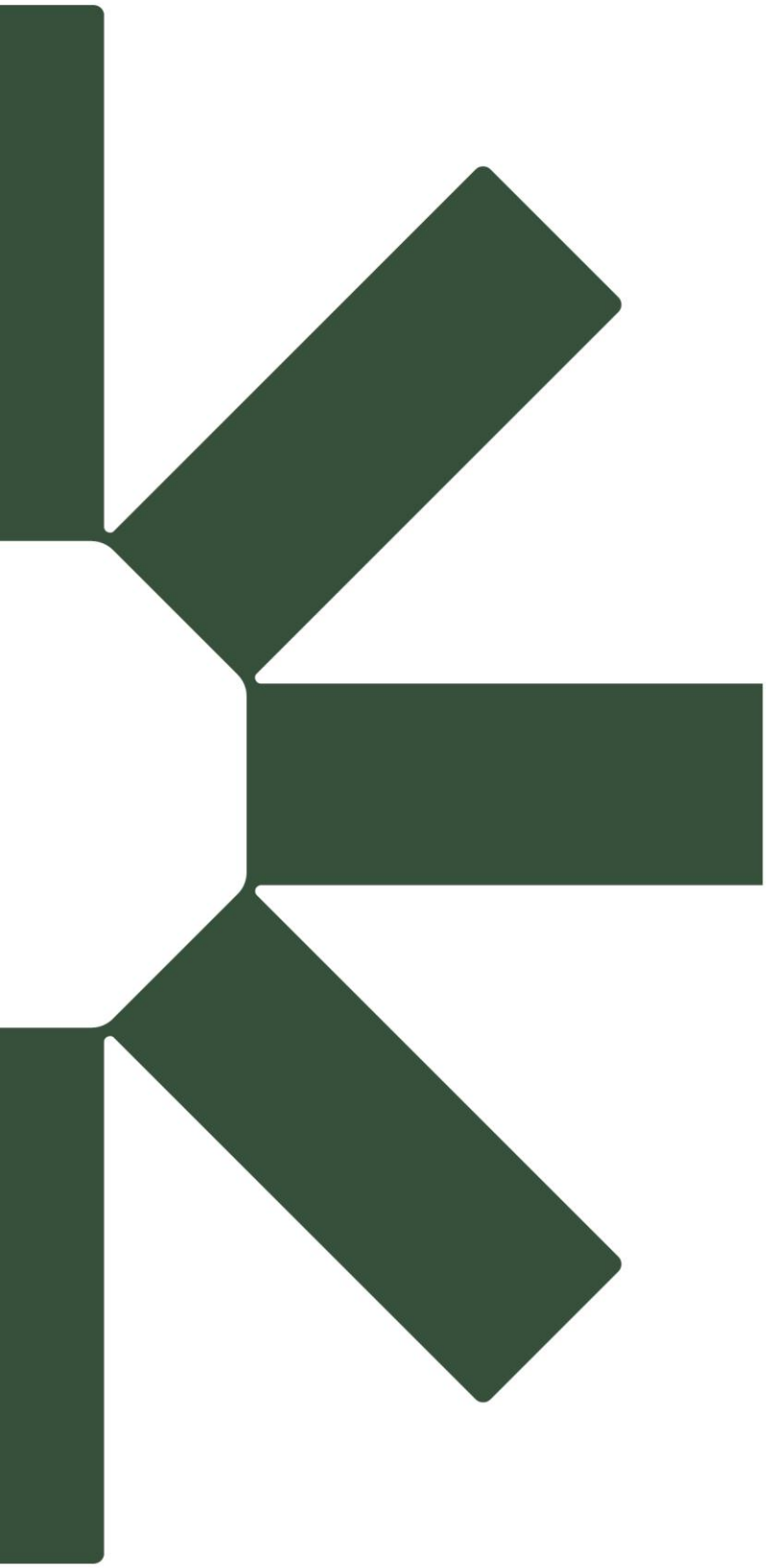
RISK ASSESSMENT AND COMMUNICATION TOOL

ID. Ref	Risk and/or Hazard	Risk Description	Location	Existing Control	Initial Risk Rating			Design Response to risk and/or hazard	Status of Risk	Assignment of risk or hazard	Residual risk rating		
					C	L	RR				C	L	RR
1	Unauthorised access to the site.	Site entry controls fail to prevent unauthorised access.	Entire site.	Nil.	3	3	High	Temporary site fencing will be provided from site establishment to provide a defined separation between construction and work areas. In addition, clear communication will be undertaken with existing tenants to ensure they are aware of construction activities present.	Design solution.	Main Contractor.	4	5	Low
2	Interaction between pedestrians and vehicles.	Uncontrolled vehicle and pedestrian conflict points.	Entire site, car park and access road.	Nil.	2	3	High	Dedicated footpaths, pedestrian crossings and additional signage shall be provided to separate vehicles and pedestrians where required.	Design solution.	Main Contractor.	4	4	Medium
3	Potential vehicle conflict points.	Vehicles can crash with each other while manoeuvring through the site.	Entire site, car park and access road.	Nil.	3	3	High	Roadways are capable of two-way flow. Nevertheless, advanced warning and directional signage for construction vehicles (per approved TGS) will be implemented to ensure existing tenants and public users are aware for the presence of construction vehicles. Low speeds throughout the site also reduce the likelihood and severity of crashes.	Design Solution.	Main Contractor.	4	5	Low
4	Fatigue.	Injury caused by fatigue.	Entire site.	Nil.	2	3	High	Toolbox meetings and regular breaks (in line with WHS practices) to minimise fatigue.	Administrative Control.	Main Contractor.	2	5	Medium
5	Fall risks.	Injury due to falls (in general).	Entire site and car park area.	Nil.	4	4	Medium	Ensuring level changes across the site to be minimised as best possible, with additional black & yellow hazard tape/ marking being installed where appropriate. Installation of handrails where level changes/ ramp grades are significant.	Design Solution.	Main Contractor.	4	5	Low
6	Misdirected access into neighbouring site.	Vehicle in unsafe locations.	Entire site.	Nil.	4	4	Medium	Ensuring appropriate directional signage has been provided to ensure vehicles do not access the wrong construction site, which could create potential safety breaches and hazards for all parties.	Design Solution.	Main Contractor.	4	5	Low
7	Conflicting traffic management.	Coordinating Traffic Controllers could create misleading and wrong advice.	Entire site.	Nil.	2	3	High	Toolbox meetings, regular liaison with all construction teams and review of signage plans on-site in order to minimise contradicting signage.	Design Solution.	Main Contractor.	2	5	Medium
8	Workers on-foot.	Exposure of workers to construction vehicle movements.	Work area.	Nil.	2	3	High	Toolbox meetings, regular liaison and inductions with all construction teams to ensure appropriate working protocols are understood and complied to.	Administrative Control.	Main Contractor.	2	5	Medium

ID. Ref	Risk and/or Hazard	Risk Description	Location	Existing Control	Initial Risk Rating			Design Response to risk and/or hazard	Status of Risk	Assignment of risk or hazard	Residual risk rating		
					C	L	RR				C	L	RR
9	Adverse weather conditions affect the worksite.	Potential for accidents in low visibility conditions.	Entire site.	Nil.	2	2	Severe	Weather forecast will be obtained prior to start of the shift and inclement weather will be monitored where possible. Works are to be cancelled or rescheduled in the event of adverse weather events. If works have already commenced, all site crews are to follow the instructions of the Project Manager/ Site Supervisor.	Administrative Controls.	Main Contractor	3	5	Medium



Making Sustainability Happen



Making Sustainability Happen