# Review of Environmental Factors

## Gosford Library Demolition

Central Coast Council

1 October 2024

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## Project Details

| | |
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| **Project Name** | Gosford Library Demolition |
| **Client** | Central Coast Council |
| **Client Project Manager** | Luke McWhirter |
| **Water Technology Project Manager** | Marion Huxley |
| **Water Technology Project Director** | Steven Molino |
| **Authors** | Marion Huxley |
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Suite 3, Level 1, 20 Wentworth Street
Parramatta NSW 2150
Telephone (02) 9354 0300
ACN 093 377 283
ABN 60 093 377 283

# ACKNOWLEDGEMENT OF COUNTRY

The Board and employees of Water Technology acknowledge and respect the Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of Country throughout Australia. We specifically acknowledge the Traditional Custodians of the land on which our offices reside and where we undertake our work.

We respect the knowledge, skills and lived experiences of Aboriginal and Torres Strait Islander Peoples, who we continue to learn from and collaborate with. We also extend our respect to all First Nations Peoples, their cultures and to their Elders, past and present.

*Artwork by Maurice Goolagong 2023. This piece was commissioned by Water Technology and visualises the important connections we have to water, and the cultural significance of journeys taken by traditional custodians of our land to meeting places, where communities connect with each other around waterways.*

*The symbolism in the artwork includes:*

- *Seven circles representing each of the States and Territories in Australia where we do our work*
- *Blue dots between each circle representing the waterways that connect us*
- *The animals that rely on healthy waterways for their home*
- *Black and white dots representing all the different communities that we visit in our work*
- *Hands that are for the people we help on our journey*

# EXECUTIVE SUMMARY

The Central Coast Council is proposing the decommissioning and demolition of the Gosford Library, located at 118 Donnison Street, Gosford NSW, Lot C/-/DP69497. This project is a key element of a broader urban renewal strategy aimed at revitalising the area and enhancing Kibble Park. The proposal included efforts to preserve significant vegetation, ensuring minimal impact on the park's environment.

The demolition will open up the space currently occupied by the library, facilitating a seamless connection between the new library facility and Kibble Park. This transformation will significantly increase the available space for community activities, enabling larger-scale events. The redesign aims to create a more cohesive and vibrant public space in the heart of Gosford.

An extensive Review of Environmental Factors (REF) has been conducted, confirming that the project complies with relevant environmental regulations and will not have significant adverse impacts. The REF has examined and considered the available information on matters likely to affect the environment by reason of the activity. It has established that the proposal described will have some environmental impacts, which could be ameliorated satisfactorily. With mitigation measures, it is not likely to significantly affect the environment.

The REF has concluded that there will be no significant impacts on matters of national environmental significance. As there were no threatened species found, a Test of Significance was not required. Consequently, no referral to the Australian Minister for the Environment under the EPBC Act is required. The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an Environmental Impact Statement to be prepared and approval to be sought from the Minister for Planning under the EP&A Act.

The project promises to enhance the functionality and appeal of Kibble Park, providing expanded recreational areas and improved services to meet the current and future needs of the community. The Central Coast Council's commitment to sustainable development is evident in its careful planning and consideration of ecological preservation throughout this project.

# CONTENTS

## APPENDICES



## LIST OF FIGURES



## LIST OF TABLES

# 1 INTRODUCTION

The Central Coast Council is proposing the decommissioning and demolition of the Gosford Library. The site is located at 118 Donnison Street, Gosford NSW at Lot C/-/DP69497. This site is zoned as RE1 – Public recreation. This site falls within the Central Coast Council Development Control Plan (DCP) 2022.

The planned demolition will involve removing the library building along with its associated stairs, ramps, and some trees, garden and vegetation beds. A buffer zone of 1-1.5 metres around the building will also be affected. Efforts will be made to preserve all vegetation wherever feasible, ensuring minimal impact on the surrounding Kibble Park. Significant native trees have been identified and garden and vegetation areas to be retained.

## 1.1 Purpose of This Review of Environmental Factors

This Review of Environmental Factors (REF) assesses potential environmental impacts of the demolition of Gosford Library and was prepared under Division 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) with the Central Coast Council both the proponent and determining authority.

The State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP) allows the proposal to be carried out without development consent. The proposal has also been considered against the matters listed in subsection 171 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation).

Division 17, of the TISEPP permits the Central Coast Council, as a public authority, to proceed without development consent. However, these works must be approved by a Council Officer under the Local Government Act 1993 which means they meet the definition of an activity under the Environmental Planning and Assessment Act 1979 (EP&A Act). Accordingly, their environmental impacts must be assessed by Council under Part 5 of the EP&A Act.

This Review of Environmental Factors (REF) documents the Central Coast Council's consideration and determination regarding those impacts in accordance with the requirements under Division 5.1 of the EP&A Act.

During demolition the potential environmental impacts of the proposal are typical construction impacts such as those on biodiversity, waterways, traffic, noise pollution, Aboriginal heritage, and non-Aboriginal heritage.

This REF certifies that its contents:

- examines and takes into account all matters affecting or likely to affect the environment as a result of activities associated with the proposal
- is accurate and does not omit any material information
- finds that, subject to the implementation of the safeguards, it is unlikely that there will be any significant environmental impacts associated with the proposal
- considers the proposal in accordance with the principles of Ecological Sustainable Development
- will be adhered to by the Council, including undertaking the proposal as described, implementing the safeguards, and managing demolition risks

The Central Coast Council is the proponent and determining authority for the proposal. Under section 5.5, of the EP&A Act, the Central Coast Council must examine all matters likely to affect the environment from this activity.

The construction/demolition company will make sure the proposal is carried out as described in this REF. If the scope of work or work methods, described in this REF, change significantly following determination, an additional environmental impact assessment, or REF Addendum, may be required.

## 1.1 Project Justification

The demolition of the existing Gosford Library building is part of a broader urban renewal strategy. This site will be integrated into the expanded Kibble Park Place, as outlined in the new Concept Plan (2020). By removing the current library structure, the area will open up, creating a seamless connection between the new library facility and Kibble Park. This transformation will significantly increase the available space for community activities, allowing for larger-scale events. The redesign aims to enhance the park's functionality and create a more cohesive, vibrant public space in the heart of Gosford.

## 1.2 Options

**Option 1 – Do Nothing:** The current library will continue to become dilapidated and outdated. Also, the area will not extend Kibble Park.

**Option 2 – Implement Project Proposal: (Preferred option)** Kibble Park will be enhanced by providing more recreational areas for the local community. By providing enhanced services and spaces, the new proposed Gosford Regional Library aims to meet the current and future needs of the community.

## 1.3 Consideration of Ecologically Sustainable Development

The proposal has been considered against the principles of ecologically sustainable development (ESD) (refer to Table 1-1).

*Table 1-1 Consideration of principles of ecologically sustainable development (ESD)*

| ESD Principle | Consideration in REF |
|---|---|
| Precautionary principle | The proposal will not result in serious or irreversible environmental damage and there is no scientific uncertainty relating to the proposal. |
| Intergenerational equity | The proposal will help to meet the needs of future generations by providing an increased aesthetic within Kibble Park, which can be used for future generations. |
| Conservation of biological diversity and ecological integrity | The proposal will not significantly impact on biological diversity or impact ecological integrity. |
| Improved valuation, pricing and incentive mechanisms | The proposal will provide cost efficient use of resources and provide optimum outcomes for the community, environment and with respect to financial cost. |

# 2 STATUTORY PLANNING AND OTHER APPROVALS

## 2.1 Environmental Planning, Assessment Act 1979 and Local Government Act 1993

Planning and development within NSW is regulated by the *Environmental Planning & Assessment Act 1979* (EP&A Act).

The proposed works are permitted without consent under the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TISEPP), as discussed further in Section 2.2.

Where works do not require development consent but require approval of a Government organisation under any legislation, then they are defined as an activity under Part 5 of the EP&A Act. Division 5.1 and Section 5.7 of the EP&A Act requires any such Government body to determine whether the impacts of the activity are likely to be significant. A review of environmental factors (REF) is used to document that determination.

A REF is prepared to meet the requirements of Clause 171 of the *Environmental Planning and Assessment Regulation 2023*.

## 2.2 State Environmental Planning Policies

### 2.2.1 SEPP (Transport and Infrastructure) 2021

The *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TISEPP) provides for the efficient provision of public infrastructure in NSW. The aim of this Policy is to facilitate the effective delivery of infrastructure across the State by:

- improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services
- providing greater flexibility in the location of infrastructure and service facilities
- allowing for the efficient development, redevelopment or disposal of surplus government owned land
- identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development)
- identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development
- providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing

Division 12 Parks and Other Public Reserves Clause 2.73(3)(c) states:

> (3) Any of the following development may be carried out by or on behalf of a public authority without consent on land owned or controlled by the public authority—
>
> (c) demolition of buildings (other than any building that is, or is part of, a State or local heritage item or is within a heritage conservation area).

According to the Land Information Authority Council Land Register the library sits on land which is classified as Community Land under the *Local Government Act, 1993* and the library and the surrounding park are listed as a public reserve. A search of State and Local heritage registers shows that the library is neither a listed heritage item nor is it within a heritage conservation area. Therefore, development consent for the proposed demolition is not required.

Clause 2.7 of the TISEPP states:

(1) Except as provided by subsection (2), if there is an inconsistency between this Chapter and any other environmental planning instrument, whether made before or after the commencement of this Chapter, this Chapter prevails to the extent of the inconsistency.

(2) Except as provided by subsections (3) and (4), if there is an inconsistency between a provision of this Chapter and any of the following provisions of another environmental planning instrument, the provision of the other instrument prevails to the extent of the inconsistency—

(a) clauses 10, 11 and 19 of *State Environmental Planning Policy (Coastal Management) 2018*,

(b) all of the provisions of *State Environmental Planning Policy (State Significant Precincts) 2005*.

(3) Section 2.54 of this Chapter prevails over clauses 10 and 11 of *State Environmental Planning Policy (Coastal Management) 2018* to the extent of any inconsistency.

Accordingly, clauses 10, 11 and 19 of *SEPP (Coastal Management) 2018* and all of the provisions of *SEPP* (State Significant Precincts) 2005 need to be checked for consistency with the provisions of Clause 2.73(3)(c) of the TISEPP. However, following consolidation of all SEPPs in 2021 and in accordance with the *Interpretation Act 1987*, the provisions of S*EPP* (Coastal Management) 2018 transferred to and the provisions of S*EPP* (State Significant Precincts) 2005 transferred to *SEPP (Precincts—Regional) 2021.*

### 2.2.2 State Environmental Planning Policy (Resilience and Hazards) 2021

Clause 2.3 of this SEPP states that it applies to land within the coastal zone. Clause 2.4 defines the coastal zone as including the coastal environment area as identified on the Coastal Environment Area Map. The southwest corner of the site is included within the Coastal Environment Area Map (Figure 2-1), which subjects it to the provisions of this SEPP. However, only clauses of *SEPP (Resilience and Hazards) 2021* equivalent to clauses 10, 11 and 19 in *SEPP (Coastal Management) 2018* prevail over *TISEPP 2021*.

Clause 10 of *SEPP (Coastal Management) 2018* related to wetlands and littoral rainforest areas and since the site is not mapped as either under *SEPP (Resilience and Hazards) 2021,* this clause does not apply.

Similarly, Clause 11 applied to land in proximity to coastal wetlands and littoral rainforests. These areas are now included on the Coastal Vulnerability Area Map in *SEPP (Resilience and Hazards) 2021* and therefore it does not apply.

Finally, clause 19 applied to coastal protection works and these are not relevant to this project.

It is therefore concluded that nothing in *SEPP (Resilience and Hazards) 2021* prevents the library from being demolished without consent.


*Figure 2-1 Coastal Environment Area Map*

### 2.2.3 State Environmental Planning Policy (Precincts—Regional) 2021

*SEPP (State Significant Precincts) 2005* was consolidated into *SEPP (Precincts—Regional) 2021* and the latter specifically covers Gosford City Centre in Chapter 5. Clause 5.17 states

The demolition of a building or work may be carried out only with development consent.

However, importantly, while *SEPP (Precincts—Regional) 2021* takes this provision directly from *SEPP (Gosford City Centre) 2018,* when the latter SEPP was consolidated into the former, *SEPP (Gosford City Centre) 2018* is not referenced as a prevailing SEPP in *TISEPP* and therefore this provision does not apply to the development.

Nevertheless, it is worth considering the aims for Gosford City Centre as set out in Chapter 5 of *SEPP (Precincts—Regional) 2021.* They are as follows:

(a) to promote the economic and social revitalisation of Gosford City Centre,

(b) to strengthen the regional position of Gosford City Centre as a multi-functional and innovative centre for commerce, education, health care, culture and the arts, while creating a highly liveable urban space with design excellence in all elements of its built and natural environments,

(c) to protect and enhance the vitality, identity and diversity of Gosford City Centre,

(d) to promote employment, residential, recreational and tourism opportunities in Gosford City Centre,

(e) to encourage responsible management, development and conservation of natural and man-made resources and to ensure that Gosford City Centre achieves sustainable social, economic and environmental outcomes,

(f) to protect and enhance the environmentally sensitive areas and natural and cultural heritage of Gosford City Centre for the benefit of present and future generations,

(g) to help create a mixed use place, with activity during the day and throughout the evening, so that Gosford City Centre is safe, attractive and efficient for, and inclusive of, its local population and visitors alike,

(h) to preserve and enhance solar access to key public open spaces,

(i) to provide direct, convenient and safe pedestrian links between Gosford City Centre and the Gosford waterfront,

(j) to ensure that development exhibits design excellence to deliver the highest standard of architectural and urban design in Gosford City Centre.

The demolition of the library building is not inconsistent with those aims.

## 2.3 Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. The WM Act defines principles of water management, sets out water licensing laws and environmental water provisions.

Section 91 (2) states that: ***waterfront land*** *means—…where the prescribed distance is 40 metres or (if the regulations prescribe a lesser distance, either generally or in relation to a particular location or class of locations) that lesser distance.*

This project is being carried out further than 40 metres so is exempt from requiring a Controlled Activity Approval in accordance with the WM Act. An artificial water feature is located at Kibble Park but has been decommissioned and is dry, a future waterway is not proposed.

As detailed in Section 5.1.6, groundwater is not anticipated to be encountered during the project therefore additional licensing from Water NSW will not be required.

## 2.4 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) includes the Biodiversity Offsets Scheme (BOS) that governs how biodiversity offsets will be used to ensure they offset the loss due to development and deliver conservation outcomes. The Act and Regulations also govern the Biodiversity Assessment Method (BAM) as a scientific method that assesses biodiversity losses from impacts at development sites and gains from conserving land at stewardship sites.

Authorities such as Council seeking to undertake an activity under Part 5 of the EP&A Act can voluntarily opt-in to the BOS and BAM scheme, or alternatively can elect to undertake an Assessment of Significance and proceed with a Part 5 approval. It will be required to:

- take serious and irreversible impacts into consideration; and
- determine if there are any additional and appropriate measures that will minimise the impact if the activity is to be carried out or approved.
- The potential ecological impacts of the proposal are discussed in Section 5.3 of this REF. It is concluded that the proposal is not likely to have a significant impact on any threatened species, populations, or communities so the BOS nor BAM is required.

## 2.5 Fisheries Management Act 1994

The provisions of the *Fisheries Management Act 1994* relating to project development and approval processes operate similarly to the BC Act. The Act identifies threatened aquatic species, populations and ecological communities.

Significant impacts trigger the need for a species impact statement for Part 4 and Part 5 projects. The potential ecological impacts of the proposal are discussed in Section 5.3 of this REF report. It is concluded that the proposal is not likely to have a significant impact on any threatened aquatic species, populations or communities.

Key Fish Habitat was detected in nearby Brisbane Water yet this area is not deemed to be impacted by the demolition of the library building.

## 2.6 Heritage Act 1977

The *Heritage Act 1977* provides for the protection of non-Aboriginal heritage in NSW.

Items listed on the State Heritage Register, including archaeological heritage, require consent of the Heritage Council to undertake work or development which alters, moves, despoils or damages any part of the heritage item, place, precinct, land, its relics or any vegetation.

There are no known heritage items within the proposed site of works. It is concluded, at this stage, that the proposal is not likely to have a significant impact on any heritage features and so no Heritage Council consents will be required.

## 2.7 National Parks and Wildlife Act 1974

This Act provides for the protection of Aboriginal heritage. All Aboriginal objects are protected under Section 90 of the *National Parks and Wildlife Act 1974* (NPW Act).

Under Section 90, it is an offence to destroy, deface, damage or desecrate an Aboriginal object or Aboriginal place without the prior issue of an Aboriginal Heritage Impact Permit (AHIP) by Department of Climate Change, Energy, the Environment and Water. The amended Act requires that reasonable precautions and due diligence must be taken to avoid impacts on Aboriginal objects which includes:

- identifying whether there are, or likely to be any listed Aboriginal objects present in the area;
- determining whether the proposed activities are likely to harm Aboriginal objects (if present); and
- determining whether an Aboriginal Heritage Impact Permit (AHIP) is required.

If an AHIP is required, then consultation must be undertaken with Aboriginal stakeholder groups in accordance with the requirements in clause 80C of the NPW Regulation and the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales, Department of Environment, Climate Change and Water NSW, 2010.

The potential Aboriginal heritage impacts of the proposal will be part of a separate report. It is concluded, at this stage, that the proposal is not likely to have a significant impact on any heritage features. There are no known items of Aboriginal heritage significance and there are unlikely to be any so no approvals are likely to be required under this Act.

## 2.8 Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Commonwealth approval is required for certain actions. Actions which have or may have or are likely to have a significant impact on Matters of National Environmental Significance (MNES). MNES include nationally threatened species or endangered ecological communities. Under the EPBC Act an assessment of the impact of a proposal on a MNES must be undertaken to determine whether there is likely to be a significant impact. If the assessment concludes there is a significant impact, then it will become a controlled action under the EPBC Act and the proposal must be referred to the Commonwealth. Approval from the relevant Federal Minister is also required for any actions that may have a significant impact on matters of National Environmental Significance, except in circumstances which are set out in the EPBC Act.

Approval from the Commonwealth is in addition to any approvals under NSW legislation.

The potential ecological impacts of the proposal are discussed in Section 5.3 of this REF. It is concluded that the proposal is not likely to have a significant impact on any EPBC listed threatened species, populations or communities nor is it likely to impact on any matters of NES and so does not require referral to the Commonwealth under the EPBC Act.

## 2.9 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (PoEO Act) is the primary piece of legislation regulating pollution control and waste disposal in NSW and is administered by the Environment Protection Authority (EPA).

The proposed works will be carried out with appropriate mitigation measures in place so that air, water, and noise pollution will be minimal.

Scheduled activities, as defined in Schedule 1 of the Act, requires an Environment Protection License (EPL), for scheduled activities during development. The proposed works are not considered a scheduled activity so do not require an EPL.

# 3 PROJECT LOCATION

## 3.1 Location

The Gosford Library is located at 118 Donnison St Gosford NSW 2250 at Lot C/-/DP69497 (Figure 3-1). The subject site is 1,645m$^2$ and is within Kibble Park (Figure 3-2). This site is zoned as RE1 – Public recreation in *SEPP (Precincts—Regional) 2021.* As explained in Section 2.2, the demolition is exempt from the provisions of this SEPP.

The areas surrounding the project site consist of the following land uses and zonings:

- B3 – Commercial Core
- SP2 Road – Infrastructure
- B4 – Mixed Use

## 3.2 Land Ownership and Management

The Council is the land owner. Many properties near the library area are privately owned by company ownership and commercial businesses.


**Figure 3-1 Location of Study Site**


**Figure 3-2 Study Site**

# 4 DESCRIPTION OF THE PROPOSAL

## 4.1 Project Overview & Scope of Works

The demolition plan includes the removal of the library building, its stairs, ramps, and select trees, garden areas, and vegetation beds. A 1-1.5 metre buffer zone around the structure will be impacted. The council aims to conserve as much vegetation as possible, minimising disruption to the adjacent Kibble Park. Some exotic vegetation including trees, hedges and shrubs, will be cleared. Three large eucalyptus trees have been identified for preservation, and designated garden areas to be retained are illustrated in Figure 4-1, provided by Central Coast Council. These plans have been subject to minor modifications.

## 4.2 Library Demolition

The project involves the comprehensive demolition of the existing library structure, including the safe removal and disposal of all internal furnishings, timber elements, brickwork, and footings. All internal furnishings such as shelves, desks, chairs, and other fixtures will be carefully dismantled and disposed of in accordance with local waste management regulations, ensuring that any reusable materials are recycled or repurposed appropriately while non-recyclable items are disposed of safely.

The structural demolition of the library will involve the systematic deconstruction of timber and brick components, including footings using industry-standard techniques to minimise dust and debris, ensuring the safety of the demolition crew and surrounding areas. All timber and brick materials will be sorted and transported to designated recycling facilities where possible.

Any hazardous materials will be identified, handled, and disposed of by certified professionals to prevent environmental contamination. The demolition scope extends to include all external features such as surrounding vegetation and garden beds, with careful consideration given to the removal of these elements to minimise disruption to the local ecosystem and efforts made to preserve any vegetation that can be relocated or repurposed. Three eucalyptus trees on Donnison Street will be retained and where possible arrangements will be made to replant the rose bushes located at the back of the library adjacent to Kibble Park.

The entire demolition process will be conducted with a strong emphasis on safety, environmental protection, and compliance with local regulations, ensuring that all aspects of the library and its surrounding features are addressed, resulting in a clear and prepared site for future development.

## 4.3 Toilet Decommission

The sewage and water services to the toilet block will be decommissioned by Central Coast Council, after which the toilet block will be demolished and removed.

## 4.4 Electric Decommission

The main electrical exchange is in the basement of the library. This exchange will be safely decommissioned and removed by Central Coast Council. All electrical services to the library building will be disconnected, and the entire electrical infrastructure will be properly dismantled and disposed of in accordance with relevant regulations.


**Figure 4-1 Extent of work area, curtesy of Central Coast Council**

## 4.5 Construction Compound

The carpark, located east of the existing Gosford Library will be used as a construction compound. The compound will consist of site sheds, stockpiles, and general storage of materials (Figure 4-1).

Compounds/laydown areas are required and they should comply with the below requirements:

- Where possible, not be located within Tree Protection Zones (TPZs), for trees being retained
- Must be located in an area that has already been disturbed and does not require the clearing of native vegetation or other mature trees
- Not block or redirect surface water flows where flooding/drainage may become an issue
- Where possible, must maximise its distance from sensitive receivers to reduce the risk of community impacts, particularly noise
- Must have adequate space for worker carparks including entry/exit from the compound
- Must be approved by the Central Coast Council

## 4.6 Traffic and Parking

A Road Occupancy Licence will be obtained from the Transport NSW. Parking for workers will be located in the car park adjacent to the library building. A Traffic Management Plan (TMP) will be issued by Central Coast Council.

## 4.7 Demolition Equipment

Likely demolition equipment which will be used throughout the project includes:

- Excavators
- Skid steers
- Trucks
- Light vehicles
- Hand tools
- Power tools
- Line marking equipment
- Concrete trucks
- Concrete pumps
- Jackhammers
- Cranes

## 4.8 Utilities

Assessment for utilities within the project site using a ‘before you dig’ search would be carried out prior to the commencement of works to determine the location and nature of any utilities within the project site. Detailed design will take into consideration the location of any existing services, and any requirements from the utility/service provider.

## 4.9 Stockpile Sites

The adjacent carpark will be used as a site compound area. The car park will be utilised for stockpiling materials i.e. spoil, imported fill etc. Stockpile locations may be utilised within the project site in accordance with the below requirements:

- Must have appropriate erosion and sediment controls installed in accordance with the guidelines in "Managing Urban Stormwater: Soils and construction" commonly known as the Blue Book
- Must be located in a flat area and not in the vicinity of waterbodies or drainage channels
- Must be appropriately stabilised to minimise dust generation
- Where possible, must not be located within Tree Protection Zones (TPZs), for trees being retained
- Must be included in the erosion and sediment control plan
- Must be approved by Central Coast Council

## 4.10 Workforce and Working Hours

The work would be undertaken by private contractors on behalf of the Central Coast Council. Permitted work hours during demolition will be:

- Monday to Friday: 6:00 am to 6:00 pm
- Saturday: 7:00 am to 3:00 pm
- Sunday and Public Holidays: No work

## 4.11 Project Duration

The proposal would be undertaken over 14 weeks and is expected to commence June 2025.

# 5 EXISTING ENVIRONMENT, POTENTIAL IMPACTS

## 5.1 Landscape features

### 5.1.1 Topography and Geology

The project site is predominantly flat, with a slight elevation increase from north to south. Only the south-eastern corner exhibits a noticeable grade change, rising gently towards Donnison Street. The overall site elevation is 7 metres above Australian Height Datum (AHD). This uniform topography characterises most of the area, with the subtle slope being the main variation in the terrain.

### 5.1.2 Soil Landscapes

Published geological maps indicated variable geology at the site. The 1:100,000 Gosford – Lake Macquarie geological map showed the site was underlain by rocks from the Terrigal Formation of the Gosford Subgroup, comprising interbedded laminate, shale, sandstone, and minor red claystone.

The 1:100,000 Central Coast Area Coastal Quaternary Geology map, however, suggested the northern half of the site was underlain by Quaternary valley fill, consisting of silt, clay, fluvial sand, and gravel. The 1:100,000 Gosford – Lake Macquarie Soil Landscape Series Sheet depicted the surface geology as developed disturbed terrain, with highly variable soils and/or fill. The original vegetation had been cleared and replaced with turf or grassland. The geotechnical report (RCA Australia, 2021) indicated that no rock outcrops or exposures were observed near the boreholes during the field investigation.

### 5.1.3 Acid Sulphate Soils (ASS)

Acid sulphate soils (ASS) and potential ASS are naturally occurring soils containing iron sulphides. On exposure to air, iron sulphides oxidise and create sulfuric acid. This increase in acidity can result in the naturalised of aluminium, iron, and manganese from the soils.

The Gosford ASS Risk Map classified the site as Class 5, indicating no known occurrence of ASS. Class 5 areas are typically not expected to contain ASS, though they are located adjacent to other classes of land where ASS may be present. However, due to the proximity of disturbed terrain to the west, it was noted that the actual presence of ASS could only be determined through specific soil investigation. The proposed works are already in disturbed terrain so excavation is unlikely to disturb ASS (Figure 5-1).

### 5.1.4 Salinity

Salinity has the potential to damage foundations of infrastructure, make soils unsuitable for re-use as fill, and may affect landscaping. Saline soil and water has the potential to damage concrete and metal structures, including bridge piers and foundations.

A review of the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) e-Spade mapping tool showed that there were no records of salinity at the Gosford Library site. However, there were sample points indicating salinity at Brisbane Waters and no salinity at West Gosford. Given that the Gosford Library was located between these two sample points, it was assumed that the potential for salinity at Gosford Library was low.

### 5.1.5 Surface Water

Surface water passes through the storm water pits, located at the north side of Gosford library in Kibble Park. Stormwater pipes from Gosford's road gutters and inlets are present in Donnison Street, Henry Parry Drive, Mortimer Lane and the surrounding streets. The stormwater drains into Brisbane Water.


**Figure 5-1 Acid Sulphate Soils Map**

### 5.1.6 Groundwater

The geotechnical report (RCA Australia, 2021) indicated that groundwater was encountered at 1.6-4.9m depth during borehole investigations. At the time of the geotechnical fieldwork groundwater was encountered in all boreholes. Groundwater is not expected to be encountered during this demolition project.

### 5.1.7 Flooding

The Gosford CBD Local Overland Flow Flood Study (Cardno, 2013) indicated that the Gosford CBD catchment experiences provisional high hazard flood conditions in several areas, with Kibble Park playing a significant role in the local flood dynamics.

The proposed works may reduce flooding through the proposed removal of hard stand and introduction of vegetation and permeable surfaces.

### 5.1.8 Demolition Impacts

Demolition would temporarily expose the natural ground surface and sub-surface through the removal of vegetation, excavations, removal of hardstand surfaces etc. Excavation and ground disturbance activities would expose and disturb soils which, if not managed adequately, could result in:

- Exposure of the natural ground surface and subsurface increasing the risk of soil to water runoff and erosion
- Generation of sediment laden water entering the local drainage line can result in potential adverse impacts to aquatic fauna
- Water runoff from the project site containing other pollutants may include asbestos, concrete particles/slurry, hydrocarbons and other contaminants
- Dust generation resulting in air quality impacts
- Mud tracking onto public roads causing community complaints and sediment laden water runoff into the stormwater system

This demolition phase of the project has the potential to have detrimental impacts on soil, however provided controls are in place and well managed. Any impacts are anticipated to be insignificant.

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disturbed during demolition will be adequately stabilised by using mitigation measures outlined in Table 5-1. Drainage infrastructure will be designed and installed to manage any surface water flows

### 5.1.9 Operational Impacts

Low impacts are expected as a result of the demolition, it is anticipated that the demolition will reduce hardstand areas and improve permeability and reduce water drainage.

### 5.1.10 Mitigation Measures

Measures that will be implemented to address potential contamination, soils, and water impacts are listed in Table 5-1.

*Table 5-1 Mitigation measures for soil and water (SW)*

| Ref | Mitigation Measure | Timing |
|---|---|---|
| SW1 | A Construction Soil and Water Management Plan (SWMP) will be prepared and implemented during demolition. The plan will detail processes, responsibilities and measures to manage potential soil and water quality impacts during demolition, including potential impacts associated with the presence of stockpile management, erosion and sediment controls, water discharge requirements, monitoring requirements and any other relevant areas. The SWMP will need to be prepared by the contractor (once appointed) and submitted to the Central Coast Council for written approval prior to construction.<br>The SWMP will be prepared in accordance with relevant guidelines and standards, including Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) Volume 2B Waste landfills (DECC, 2008a) and Volume 2D (DECC, 2008b) (the Blue Book). | Pre-demolition |
| SW2 | An Erosion and Sedimentation Control Plan (ESCP) will be developed and maintained for the site in accordance with Managing Urban Stormwater, Soils and Construction Guidelines (Landcom, 2004). The plan would include site access controls preventing tracking of sediment from site, limiting the removal of groundcover and ensuring that the excavation works do not block natural drains or create undrained areas. | Pre-demolition / demolition |
| SW3 | Measures for erosion and sediment control are to be installed prior to commencement of demolition activities. They are to be regularly monitored throughout demolition to ensure effectiveness, particularly following significant rainfall, and remain in place until the site is stabilised post- demolition. | Pre-demolition / demolition /Post - demolition |
| SW4 | Any offsite water discharges from the project (either by sediment basin or other) will be managed to ensure compliance with Section 120 of the *Protection of the Environment Operations Act 1997* (POEO Act). Discharge processes should be detailed in the SWMP. | Demolition |
| SW5 | Any cleared areas are to be revegetated/stabilised as soon as possible to prevent erosion of soil surfaces. Vegetation is to be maintained until it is established. | Demolition /Post - demolition |
| SW6 | All chemicals must be stored in appropriately bunded and secure areas in accordance with relevant Australian Standards and Environmental Protection Authority (EPA) guidelines. These areas should not be located within, or directly adjacent to, drainage channels or pits. | Demolition |
| SW7 | Any designated refuelling areas are to be appropriately contained to prevent any soil contamination from spills. | Demolition |
| SW8 | Spill kits are to be present throughout the site in relevant areas. | Demolition |

| Ref | Mitigation Measure | Timing |
|---|---|---|
| SW9 | Spill response procedures should be developed to ensure any spills are appropriately managed to minimise the risk of impact on the environment. | Demolition |

## 5.2 Hazardous Material

Hazardous materials must be managed in accordance with applicable NSW legislation, Australian standards, codes of practices, and guidelines. A site-specific Hazardous Material Removal Control Plan (HMCRP) should be developed to manage potential risks associated with hazardous material removal and ensure compliance with relevant regulations.

Before beginning demolition, all hazardous materials must be removed under controlled conditions as per the HMCRP. After removal, a Competent Person or Licensed Asbestos Assessor should conduct clearance inspections. Inaccessible or unsafe areas that might contain hazardous materials should be presumed to contain them. These areas should be assessed for hazardous materials once safe access is achieved.

An Unexpected Finds Protocol should be established and implemented during controlled demolition works to minimise risks associated with unexpected finds. This protocol includes steps such as stopping work immediately, restricting access and establishing an exclusion zone, installing warning signage, and contacting a competent person to provide further advice.

### 5.2.1 Asbestos

Asbestos was present in the Gosford Library and a hazardous materials survey was conducted (Assessment Corp, 2024) (7Appendix A). Asbestos was found in the building in the following sections:

- Internal, ground level, storage room, white vinyl floor tile
- Internal, ground level, staff office area, concealed cream vinyl floor tile
- Internal, first floor, reading room, concealed vinyl floor tile
- Internal, first level, IT / server room, concealed vinyl floor tile
- External, metal window frames, grey putty

The Hazardous Materials Survey Report (Assessment Corp, 2024) outlined procedures for managing asbestos-containing materials (ACM) during demolition and renovation projects. It specified that licensed contractors must remove ACM prior to demolition under controlled conditions, adhering to NSW Work Health and Safety regulations and SafeWork NSW codes. Airborne asbestos fibre monitoring by qualified assessors is required to ensure safety standards are met, with results not exceeding the SafeWork Australia exposure standard.

Post-removal, clearance inspections by assessors are necessary before issuing asbestos clearance certificates. For buildings where ACM remains, an Asbestos Management Plan (AMP) is mandatory under NSW WHS regulations, emphasising proper management to mitigate health risks.

### 5.2.2 Lead Paint

This survey found no occurrences of lead-containing paint, although minimal amounts of lead paint (<0.1%) were detected, which is not considered hazardous. However, when a building sample tests positive for lead paint, all underlying paint should be considered lead-containing. A project cannot be classified as lead-free unless all samples are proven to be lead-free. Additional lead sampling may be needed for inaccessible areas or before disturbing unsampled paint during future demolition.

Unexpected finds of lead paint are possible, so following the mitigation measures and recommendations by Assessment Corp, 2024 in 7Appendix A is paramount. If lead paint is unexpectedly encountered, removal

should comply with the NSW Work Health and Safety Act 2011, NSW Work Health and Safety Regulation 2017, and the relevant Australian Standards.

Air monitoring for lead may be necessary during removal, ensuring levels do not exceed SafeWork Australia's 0.05 mg/m³ exposure standard over an 8-hour time weighted average. After removal, a Competent Person should perform a visual clearance inspection and decide if further clearance testing is needed.

### 5.2.3 Operational Impacts

Operation of the proposal will generate waste. Any waste generated during maintenance would be classified in accordance with the NSW Waste Classification Guidelines (EPA 2014) and disposed of at an appropriately licensed waste disposal or recycling facility.

### 5.2.4 Mitigation Measures

Measures that will be implemented to address potential contamination and soils impacts are listed in *Table 5-2*.

*Table 5-2 Mitigation measures for contamination (C)*

| Ref | Mitigation Measure | Timing |
|---|---|---|
| C1 | All works must be conducted following guidance and protocols outlined within the recommendations undertaken by Assessment Corp, 2024 in Appendix A. If unexpected finds are discovered a Competent Person should be engaged to ensure the hazard has been removed. | Demolition |
| C2 | Should any unexpected contamination be discovered, all works should be ceased and notify the Central Coast Council representative and any other relevant regulatory bodies immediately. | Demolition |
| C3 | Any spills, leaks or other contamination events are to be managed in accordance with spill management procedures to minimise and contain any further contamination. | Demolition |
| C4 | Ongoing management measures will be implemented for any areas where contamination remains following demolition and has the potential to cause an ongoing risk to maintenance works, the community and/or the receiving environment. These management measures will be documented in an Operational Environmental Management Plan or other appropriate mechanism. | Operation |
| C5 | Asbestos post-removal, clearance inspections by assessors are necessary before issuing asbestos clearance certificates. | Post Demolition |

## 5.3 Biodiversity

### 5.3.1 Desktop search

Prior to undertaking the ecological field survey, desktop searches were conducted to provide a context of the surrounding environment.

#### 5.3.1.1 Vegetation communities

A review of the vegetation mapping databases using the NSW Government The Central Resource for Sharing and Enabling Environmental Data in NSW (SEED) portal was undertaken to identify Plant Community Types (PCTs) present within the area. As indicated in Figure 5-2, no PCT's were mapped as being present within the project site. The closest mapped PCTs are PCT 3436 and PCT 3230 which are east of the site and are unlikely to be impacted by the proposed works in any way.


**Figure 5-2 Plant Community Type (PCT) Map**

The proposed work has no native vegetation clearing associated with it, three mature eucalypts at the corner of Donnison Street and Mortimer Lane will be retained. The majority of the building works will minimise negative impact on biodiversity values in the area. Therefore, no offsetting is required. No impacts on threatened native flora and fauna species or threatened ecological communities species are anticipated

#### 5.3.1.2 Threatened Species

A desktop search of threatened species was undertaken done with the DCCEEW BioNet Atlas for an area which included the study site and a 10 km radius around the site. A search was also undertaken using the Protected Matters Search tool (Appendix B) within a 1 km radius of the site. The results of the Protected Matters Search included 5 threatened ecological communities, 85 listed threatened species and 47 listed migratory species.

A Likelihood of Occurrence assessment has been completed and is included in Appendix C. The DCCEEW BioNet Atlas search returned 2,277 records of 80 species. Most commonly occurring in the area were the Spreading Guinea Flower (*Hibbertia procumbens)* 449 sightings, *Darwinia glaucophylla* 223 sightings, and Grey Headed Flying Fox (*Pteropus poliocephalus*) 218 sightings.

Due to sparse vegetation on the site primarily comprising exotic trees and shrubs, the probability of encountering species like the Grey Headed Flying Fox has a medium likelihood. The threatened flora species of Spreading Guinea Flower, and *Darwinia glaucophylla* has a low likelihood as the library building is surrounded by exotic garden beds, exotic plants, and has been cleared in the past.

While other threatened species have previously been identified nearby, these are considered unlikely to occur within the immediate project site due to the absence of any suitable habitat, shown in Figure 5-3. Based on the available information, it can be stated that no further action is required regarding threatened species as no native trees are being removed nor the artificial waterway disturbed.

### 5.3.2 Site Visit

#### 5.3.2.1 Flora

Three native flora species were observed during a site visit on 4 June 2024. The native flora were three mature Eucalyptus trees and will be retained during the demolition.

The native flora species are listed in Table 5-3.

*Table 5-3 Native flora species list of the subject site*

| Common Name | Scientific Name |
|---|---|
| **NATIVE SPECIES** | |
| Spotted Gum | *Corymbia maculata* |
| River Red Gum | *Eucalyptus camaldulensis* |

#### 5.3.2.2 Fauna

The fauna survey involved both searching for threatened species and assessing the value of the site as habitat for fauna. Searches for species present included visual survey, searches for proxy evidence of fauna activity such as tree scratches and scats, and searches for bird nests and tree hollows. No remote survey techniques such as camera trapping were conducted.

Hollows were found in the River Red Gum (Figure 5-4). So it is expected that birds, mammals and reptiles may use this tree for nesting and shelter. No operational impacts to fauna are anticipated as a result of the proposal. All hollows should be checked for fauna before the demolition proceeds.

No native fauna, including any threatened species, were identified during the site inspection. The terrestrial flora and fauna survey was limited to less than one hour. The field survey was restricted to the area of impact of the proposed works

As there were no threatened species found, a Test of Significance was not required. As many faunal species likely to occur within the project area are cryptic and/or nocturnal, they are unlikely to be detected even during seasonal surveys. The fauna assessment is, accordingly, largely an assessment of the potential of the project site as habitat for various fauna species. Therefore, it is important to adopt the precautionary principle such that it is assumed that threatened species may be at the site if suitable habitat exists.

### 5.3.3 Demolition Impacts

The following is a summary of the direct and indirect impacts to the biodiversity potentially persisting onsite.

The three mature eucalypts, River Red Gum (two trees) and Spotted Gum (one tree), at the library entrance on Donnison Street will be retained (Figure 5-4). Some exotic vegetation will be removed during the demolition and some will be retained (Figure 4-1). The roses located at the rear of the Gosford Library will be attempted to be made available for relocation and replanting.

The Formosan ash is an exotic tree in the northwest corner of the site will be removed. No hollows and nests were found in this tree (Figure 5-4). However, the ash tree may be used as habitat for fauna so the tree should be inspected for faunal habitat before it is extracted. The vegetation marked for removal should be inspected before removal to ensure no fauna will be harmed.

As the site is predominantly hard stand the proposed works should not result in any further vegetation removal or damage.

It is important to note that activities are scheduled to take place within the Tree Protection Zone (TPZ). The Eucalyptus trees should be protected to avoid them being damaged. As the demolition takes place in an area of the TPZ precautions should be taken (Figure 5-4) 7Appendix E).

It is recommended that the Central Coast Council's Arborist is to attend to the pruning and the removal of any trees. Also, if roots greater than 50mm are encountered or if any trees are to be removed or significantly pruned an arborist will monitor and evaluate the remaining trees. An arborist will be engaged prior to demolition to provide a Tree Protection Plan.

### 5.3.4 Operational Impacts

Hollows were found in the River Red Gum. So it is expected that birds, mammals and reptiles may use this tree for nesting and shelter. However, this tree will be retained. No operational impacts to fauna are anticipated as a result of the proposal.

Prior to the commencement of the demolition all trees and vegetation should be inspected for hollows and nests. If fauna is discovered inhabiting in hollows or nests an ecologist may be required to remove and relocate any fauna if the tree or vegetation is to be removed.


**Figure 5-3 Threatened Species Map**

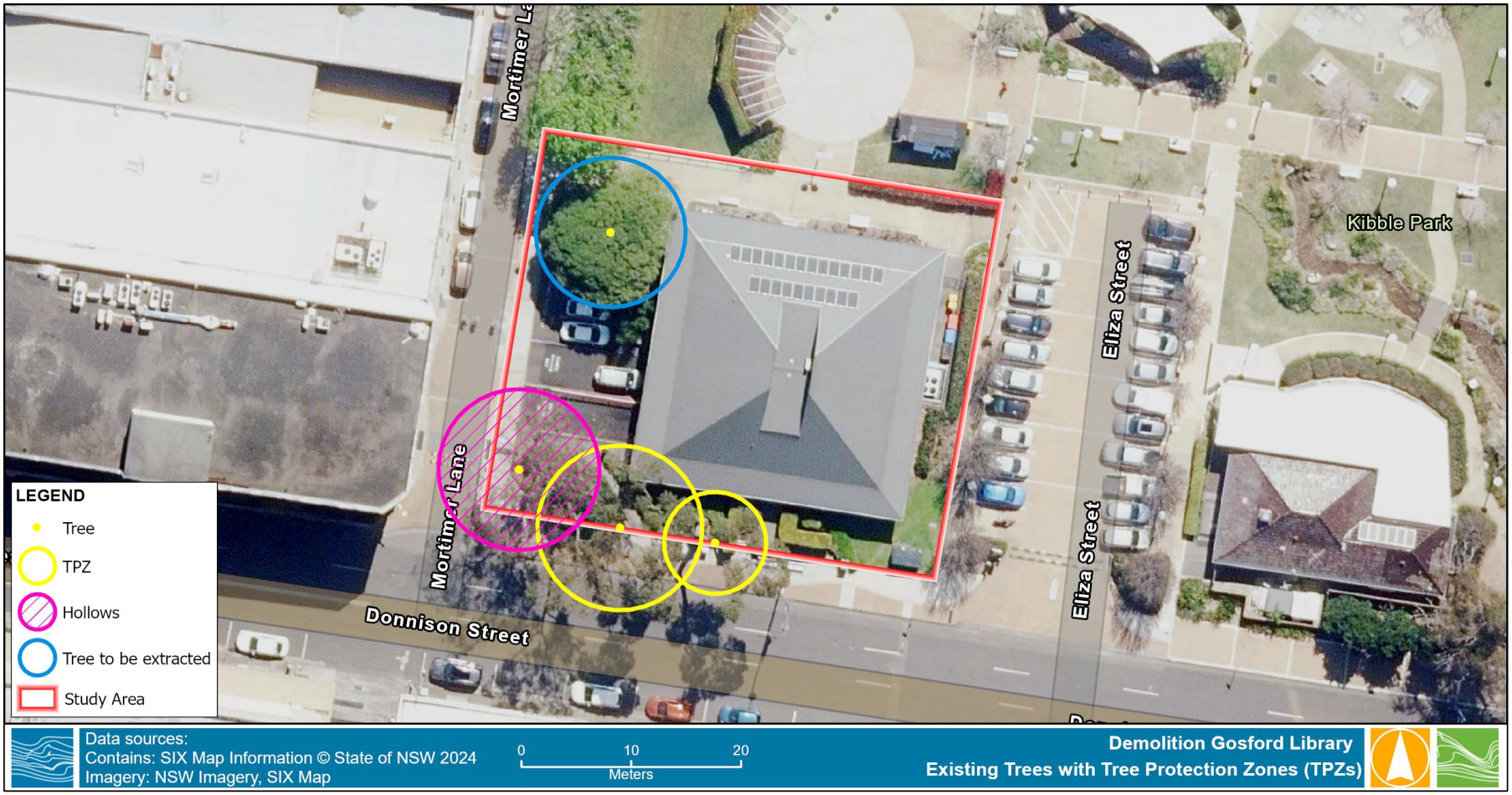


**Figure 5-4 TPZ and Hollows Map**

### 5.3.5 Mitigation Measures

Measures that will be implemented to address potential demotion impacts are listed in Table 5-4

*Table 5-4 Mitigation measures for demolition impacts (DI)*

| Ref | Mitigation Measure | Timing |
|---|---|---|
| DI1 | Tree Protection Zones (TPZs) will be maintained around vegetation to be retained. TPZs will be maintained in accordance with Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970). No activities are to take place within the Structural Root Zones (SRZs) of mature trees. No works, stockpiling of materials, excavation, parking or any other potentially harmful activities will be undertaken within TPZs unless a Level 5 Arborist has provided confirmation that the works will not impact the tree 7Appendix E). | Pre-Demotion/ Demotion |
| DI2 | The exotic tree, in the northwest corner, and other vegetation marked for removal should be inspected by an ecologist before removal to ensure no fauna will be harmed. | Pre-Demotion |
| DI3 | Prior to vegetation clearing, trees to be retained should be clearly demarcated. Trees should be fenced off and protected if necessary. | Pre- Demotion / Demotion |
| DI4 | Inspect all trees for hollows and nests. If fauna is discovered an ecologist may be required to remove and relocate any fauna if the tree or vegetation is to be removed. | Pre- Demotion |
| DI5 | Induction of all contractors and staff outlining the ecological sensitivity of the site, no-go areas, the need to minimise ecological impact, and all other required mitigation measures is to be undertaken. | All stages |
| DI6 | Basic hygiene protocols would be implemented for demolition personnel and machinery on site to reduce the potential for invasion by plant pathogens including *Phytopthora cinnamomi*, the fungus myrtle rust *Uredo rangelli* and amphibian chytrid fungus. | Demotion |

## 5.4 Air Quality

### 5.4.1 Existing Environment

Ambient air quality throughout the Central Coast is influenced by several factors, including topography, prevailing meteorological conditions, such as wind and temperature, which vary seasonally, and local and regional air pollution sources, such as motor vehicles, industrial facilities, and bushfires. Consequently, regional air quality can be highly variable and impacted by events occurring a significant distance away. Local emission sources, the existing air quality environment, and sensitive receivers. Sensitive receivers are community members impacted by pollution.

A search of the National Pollutant Inventory (NPI), and a desktop review, identified that there are a few industrial facilities approximately 4 kms southeast and 3 kms west of the project site that report air emissions. Based upon current site knowledge, no other air monitoring is considered necessary during remediation works on the site.

### 5.4.2 Impacts

During demolition, potential air quality impacts would be primarily associated with asbestos exposure. As asbestos was found at the site a site specific Remediation Action Plan should be written regarding asbestos mitigation.

The generation of dust and emissions from the operation of on-site machinery, excavation works, materials handling and material storage/stockpiling. Impacts associated with these works include:

- Asbestos exposure from excavation and disposal works
- Asbestos exposure from demolition
- Vegetation development and management
- Dust generation and deposition on nearby properties causing community complaints/damage
- Dust generation resulting in an overall reduction in air quality
- Exhaust gases from vehicles, machinery, plant and equipment used to complete the works causing impact to workers and/or nearby sensitive receivers

### 5.4.3 Operational Impacts

Aside from potential asbestos exposure the project is not expected to result in additional emissions or other negative air quality impacts during the operational phase of the project. As the area is highly built up additional emissions from construction machinery is unlikely to have a high impact.

### 5.4.4 Mitigation Measures

Measures that will be implemented to address potential air quality impacts are listed in Table 5-5.

*Table 5-5 Mitigation measures for air quality (AQ)*

| Ref | Mitigation Measure | Timing |
|---|---|---|
| AQ1 | Dust suppression of asbestos:<br>• Regular dampening of areas using heavy machinery where excavations, spreading/compactions is taking place<br>• Vehicle operations within asbestos containing material areas should be minimised. Vehicle routes should be covered with impermeable material<br>• Protecting stockpiled material with tarps, consolidation, erection of wind breaks and if these measures cannot be reached, then wetting down of the material<br>• Ceasing work in heavy wind events<br>• Loading of materials into trucks as close to stockpile or in-situ location as possible<br>• Trucks should have their loads covered when not being loaded, including movement on the site | Demolition |

| Ref | Mitigation Measure | Timing |
|---|---|---|
| AQ2 | Manage exposed surfaces which have the potential to generate dust. Examples which may be used include:<br>• Covering with geofabric<br>• Stabilising with mulch<br>• Applying a cover crop<br>• Use of water carts for dust suppression<br>• Application of polymer | Demolition |
| AQ3 | During earthworks, visual inspections for dust in windy or dry periods would be undertaken. Dust generating activities should be avoided or minimised, or methodologies reviewed during these periods. Appropriate water suppression measures would be used on exposed surfaces and equipment that may be generating dust. | Demolition |
| AQ4 | Dust suppression techniques such as ventilation during cutting, grinding, or sawing activities would be used where required. | Demolition |
| AQ5 | Water assisted dust sweepers to be used on the access and local roads to remove any material tracked out by the trucks. | Demolition |
| AQ6 | Ensure all dust generating loads are covered except for when loading and unloading. | Demolition |
| AQ7 | Demolition plant and equipment to be well maintained to ensure no exhaust particulates are visible for more than 10 continuous seconds. | Demolition |
| AQ8 | Vehicles will not be left idling when not in use. | Demolition |
| AQ9 | Odour or air pollutant emission complaints will be dealt with promptly and the source will be appropriately managed. | Demolition |

## 5.5 Noise and Vibration

### 5.5.1 Existing Receivers

The local community is exposed to noise and vibration pollution through multiple pathways. Addressing these exposures from the demolition project, as well as implementing effective mitigation and regulatory strategies, will protect the community. The project site, located in Kibble Park, may affect receivers on Donnison Street, Mortimer Lane, and the greater Gosford area. These include:

- Commercial – There are approximately 14 commercial receivers located along Donnison Street and Mortimer Lane which are closest to the project site. These are largely local businesses including shops, cafes, restaurants, beauty salons, and banks. The Imperial Centre Gosford Shopping Mall is located on William Street north of the study site, adjacent to Kibble Park.
- Residential – The closest residential buildings are approximately 200 metres to the north of the study site.
- Religious Institution**:** The Gosford Uniting Church is located opposite Gosford Library on Donnison Street.

### 5.5.2 Demolition Impacts

The proposed works will result in elevated noise and vibration levels particularly during the civil works phase of the project. As the work will be undertaken during daylight hours there will be no evening or night work and hence no disruption to local residences at this time. The demolition of the library building is likely to be the noisiest activity as it will require the breaking of bricks and concrete.

Plant and equipment which will generate noise and vibration throughout daylight hours of the project may include excavators, rollers, skid steers, trucks, light vehicles, hand tools, power tools, concrete trucks etc.

Demolition will take approximately 14 weeks. Most of the impacts listed would be only for the duration of demolition and the site would be returned to the previously existing environment. Temporary impacts to the community would be managed through consultation as provided in the safeguards below.

### 5.5.3 Operational Impacts

The project is not expected to result in additional noise and vibration impacts during the operational phase of the project.

### 5.5.4 Mitigation Measures

Measures that will be implemented to address potential noise and vibration management are listed Table 5-6

Table 5-6 Mitigation measures for noise and vibration management (NV)

| Ref | Mitigation Measure | Timing |
|---|---|---|
| NV1 | The project's Construction Management Plan (CEMP) will include detailed processes, responsibilities, and measures to manage noise and vibration and minimise the potential for impacts during demolition, consistent with the management approach and mitigation measures in the *EPA Interim Noise Construction Guidelines (ICNG)*. | Pre-demolition |
| NV2 | Work will be undertaken during standard working hours between 6:00 am and 6:00 pm, Monday to Friday inclusive, and between 7:00 am and 3:00 pm on Saturdays. No work is to be carried out on Sundays and public holidays unless further approvals from the Central Coast Council are obtained. | Demolition |
| NV3 | All machinery and plant to be fitted with residential class mufflers to keep noise levels to a minimum. | Demolition |
| NV4 | Vehicles will not be left idling when not in use. | Demolition |
| NV5 | A general notification will be provided to the wider community with adequate notice prior to commencement of works. A complaints register will be established to record noise complaints from local residents, and local residents will be informed of the process for registering a complaint. | Demolition |
| NV6 | Specific notification (door knock, phone calls etc.) will be made to residents located in proximity to the project site on Donnison Street and Mortimer Lane. This consultation should seek to identify any sensitive days and/or times, and schedule works outside those days and/or times where feasible and reasonable. | Demolition |
| NV7 | Where it is necessary to use concrete breaking equipment this should not be undertaken continuously for more than 3hrs hours with no less than a 1hr respite period between and not before 8am or after 5pm. | Demolition |
| NV8 | If vibration intensive plant and equipment are working in close proximity (within minimum working distances) to other structures, additional vibration assessments may be required. | Demolition |

## 5.6 Aboriginal and Non-Aboriginal Heritage

### 5.6.1 Existing Environment and Impacts

An Aboriginal Heritage Information Management System (AHIMS) search was conducted but no aboriginal sites of places were found in at or near the study site (7Appendix D). There are no known items of Aboriginal heritage significance and there unlikely to be any.

Two Heritage sites were found near the study site, including a Shopfront and the William Street Well both were listed under the State Environmental Planning Policy (Gosford City Centre) 2018 (Figure 5-5). The demolition of the Gosford Library will not impact these heritage items as they are located at a considerable distance.

No State Significant heritage items were found at or near the site.

### 5.6.2 Mitigation Measures

Measures that will be implemented to address potential heritage impacts are listed in Table 5-7.

*Table 5-7 Mitigation measures for heritage items (H)*

| Ref | Mitigation Measure | Timing |
|---|---|---|
| H1 | If, during the works, any unexpected archaeological deposits are uncovered, all work in the vicinity of that deposit must cease immediately and advice be sought from a suitably qualified archaeologist. | Demolition |
| H2 | Stop work if human remains are found and contact NSW Police. | Demolition |
| H3 | In accordance with Section 146 of the NSW Heritage Act 1977, the accidental discovery of relics must be reported immediately to the Heritage Council and Demolition work must cease until the Heritage Council has provided clearance to recommence. | Demolition |


**Figure 5-5 Heritage Map**

## 5.7 Waste & Resource Management

### 5.7.1 Demolition Impacts

#### 5.7.1.1 Energy and fuel use

Demolition of the project would require the use of energy and fuels to power equipment and transport vehicles. Fuels would include non-renewable sources such as petroleum, diesel, natural gas and liquefied natural gas.

#### 5.7.1.2 Water

Water would be required during demolition for dust suppression, compaction, stabilisation, and washing of plant and equipment.

#### 5.7.1.3 Waste

The project may generate various types of waste, some of which would be reused or recycled, while others would require disposal. Demolition waste associated with the project would be managed in accordance with *the Waste Avoidance and Resource Recovery Act 2001*. Typical waste generated during demolition would include:

- excess spoil from excavations works
- demolition waste, including packaging, concrete, bricks, bitumen, asphalt, steel, timber
- general litter from site personnel such as food scraps, plastic and glass containers and packages
- liquid waste such as oils and chemicals from equipment maintenance

The project would require a wide range of material waste. Where possible materials will be recycled. All technical and computer terminals will be reused in the new library. A target of 70% of the laminated timber beams will be retained. Where possible, concrete will be recycled.

Furnishings, carpet, building materials, and other waste will go to general waste.

The incorrect disposal of demolition wastes could potentially result in contamination of local soils and water resources. Prior to the disposal of any waste material, it would be classified in accordance with NSW Waste Classification Guidelines (EPA 2014) and taken to an appropriately licensed waste management facility.

As asbestos has been detected, a site specific Remediation Action Plan Further validation reporting and waste management and disposal will need to be considered. Excavated materials are to be classified under the NSW EPA Waste Classification guidelines and disposed of to a licensed waste management facility.

It is anticipated that demolition works would not require the use of, or result in the production of, any hazardous materials apart from standard machinery fuel and oil. Opportunities to reduce, recycle and reuse on this project would be sought with the contractor and documented in the Waste Management Plan or CEMP.

### 5.7.2 Operational Impacts

As there are rubbish bins available in Kibble Park and Donnison Street, rubbish dumping by the public is not expected to increase during the demolition.

### 5.7.3 Mitigation Measures

Measures that will be implemented to address potential waste impacts are listed in Table 5-8.

*Table 5-8 Mitigation measures for waste and resource management items (WR)*

| Ref | Mitigation Measure | Timing |
|---|---|---|
| WR1 | Demolition waste would be managed through the waste hierarchy established under the *Waste Avoidance and Recovery Act 2001*, which is as follows:<br>Avoidance of waste – minimise the amount of waste generated during demolition by avoiding unnecessary resource consumption<br>Resource recovery – Reuse, reprocess, and recycle waste products generated during demolition to minimise the amount of waste requiring disposal<br>Disposal – Where resources cannot be recovered, dispose of them appropriately to minimise the potential adverse environmental impacts. | Demolition |
| WR2 | Where possible demolition waste would be diverted from landfill and recycled or reused within the project areas or with an appropriate recycling contractor. | Demolition |
| WR3 | Refuse receptacles must be used at the compound to enable the site to be kept tidy and for waste to be sorted and disposed of correctly. Waste bins must be used at the contractor's compound for office waste and general putrescible waste. Waste bins must also be provided within the demolition site but be located such that no water pollution can occur from litter. | Demolition |
| WR4 | The contractor will be required to dispose of any waste materials not able to be reused or recycled onsite to an approved waste disposal facility and in accordance with the relevant statutory provisions. | Demolition |
| WR5 | All waste, including soil, is to be classified in accordance with the *NSW EPA Waste Classification Guidelines* prior to removal offsite. | Demolition |
| WR6 | Waste to be disposed at suitably licensed waste facilities. All waste material taken offsite is to be tracked (through disposal dockets) to ensure it is disposed at the designated destination. | Demolition |
| WR7 | Any fill material brought on site for the works must be verified as virgin excavated natural material or excavated natural material before its use. No contaminated or potentially contaminated materials are to be used. | Demolition |
| WR8 | A Demolition Waste Management Plan (CWMP) is to be developed to detail how waste will be adequately managed throughout the project. The CWMP is to be approved by the Central Coast Council prior to demolition. The CWMP may be incorporated into the CEMP. | Pre-Demolition |
| WR9 | An operational litter management plan will need to be implemented. | Demolition |

## 5.8 Traffic and Parking

### 5.8.1 Demolition Impacts

The proposed demolition activities will lead to heightened traffic levels from construction vehicles, worker vehicles, and trucks transporting materials. This is anticipated to locally impact traffic during standard working hours throughout the estimated 14-week demolition period, as outlined in the contractor's schedule once appointed by the Central Coast Council.

The demolition workers will use the carpark, located next to the library at Donnison Street. The workforce will not have a significant impact on parking demand.

The subject site may generate some visitation by vehicle but most of the visitors to the site are expected to arrive on foot, to use Kibble Park or patronise the Shopping Mall. Most vehicles driving to the site are likely to stay only for a short period, as parking in the area is restricted to ¼ - 2 hours during the day.

### 5.8.2 Operational Impacts

The impact on traffic and parking is expected to be minimal. The Central Coast Council will issue a Traffic Management Plan (TMP).

### 5.8.3 Mitigation Measures

Measures that will be implemented to address potential traffic impacts are listed in Table 5-9.

*Table 5-9 Mitigation measures for traffic management (T)*

| Ref | Mitigation Measure | Timing |
|---|---|---|
| T1 | A Traffic Management Plan will be prepared with details of active and passive measures to control pedestrian and vehicle traffic and on and off street parking. | Demolition |
| T2 | Access to the track for maintenance and emergency vehicles and fire trucks is to be secured at all times. | Demolition, Operational |
| T3 | Where possible, current traffic movements and property access are to be maintained during the works. Any disturbance is to be minimised to prevent unnecessary traffic delays. | Demolition |
| T4 | Notify residents in advance of any access restrictions and driveway works. | Pre-Demolition |
| T5 | Signage will be used to advise pedestrians and motorists of the worksite. Appropriate measures would be implemented to direct people around and through the work site. | Pre-Demolition |
| T6 | Comply with Central Coast Council requirements regarding traffic control, access and road/ pedestrian access. | Demolition |
| T7 | Erect signs regarding proposed works, temporary road closures, diversions etc. | Demolition |
| T8 | All work vehicles and machinery when not in actual use for the proposed activity will be stored off road. | Demolition |
| T9 | Operators to drive to conditions. | Demolition |
| T10 | Traffic Management Plan (TMP) and/or Traffic Control Plan (TCP) prepared for the management of local traffic during the demolition. | Pre-Demolition |
| T11 | Appropriate numbers of off-site and onsite carparking will be available to minimise the amount of public carpark being used by demolition workers. | Demolition |
| T12 | Pedestrian and cyclist access and safety (including diversions) must be considered in the Traffic Management Plan. | Demolition |
| T13 | Security measures must be put in place to ensure the safety of the public during the course of demolition. | Demolition |

## 5.9 Public Amenity

### 5.9.1 Visual Impacts

Visual Impacts for the project have been considered and detailed below:

- Exclusion fencing during demolition area (the library)
- Removal of library building

- Removal of vegetation, including garden beds and exotic trees and hedges
- Pruning branches of existing trees
- Signage

Further details are provided in the design plans for the proposal. During demolition, some short-term visual impacts will be present for nearby sensitive receivers. The aesthetics of the site will be diminished during demolition, with excavation and stockpiled material visible, as well as demolition material and equipment. However, this visual impact, will only be temporary during demolition.

### 5.9.2 Access and Safety

While some of the areas will be closed to the public during demolition, there are still footpaths and other accessways in the vicinity which will require diversions or other active management during the demolition. Security measures will be put in place to ensure the safety of the public during the demolition period. Signage will be used on the fencing.

During operation, security (crime prevention) is considered to be low risk given the short pathway lengths and overall passive surveillance of public areas (pathways, grass areas, carparks etc). There will be no access to the site during demolition as the existing fence will prohibit access.

### 5.9.3 Lighting

During demolition, works are anticipated to be completed during daylight hours; therefore, additional lighting is not expected to be required.

### 5.9.4 Mitigation Measures

Measures that will be implemented to address potential public amenity impacts are listed in Table 5-10.

*Table 5-10 Mitigation measures for public amenity management items (PA)*

| Ref | Mitigation Measure | Timing |
|---|---|---|
| PA1 | Exclusion fencing must be used to ensure members of the public are kept out of the demolition area. Shade cloth or similar should be used on perimeter fencing to improve visual amenity. | Demolition |
| PA2 | Signage must be used on the fencing. | Demolition |
| PA3 | Operational lighting is to be installed in accordance with *AS4282:2019 – Control of the obtrusive effect of outdoor lighting*. This will minimise any light spill impacts to nearby sensitive receivers. | Operation |

## 5.10 Cumulative Impacts

The proposed works are not anticipated to have any significant cumulative impacts and is not considered to inhibit the ability of future generations to use or enjoy the site.

# 6 CONCLUSION

## 6.1 Summary of Findings

The Central Coast Council's proposal to decommission and demolish the Gosford Library at 118 Donnison Street is a strategic move aimed at revitalising the urban landscape of Gosford. This project is not only about removing an outdated structure but also about integrating the site into an expanded and enhanced Kibble Park. By doing so, the Council plans to create a more cohesive and vibrant public space that will better serve the community's needs.

Efforts to preserve significant vegetation and minimise environmental impact underscore the Central Coast Council's commitment to sustainable development. The retention of native trees and designated garden areas reflects a balanced approach to urban renewal, where ecological considerations are integral to the planning process.

An extensive Review of Environmental Factors (REF) has been conducted, confirming that the project complies with relevant environmental regulations and will not have significant adverse impacts. The REF has ensured that the Central Coast Council has examined and fully considered all matters that have the potential to affect or are likely to affect the existing environment as a result of the project. The REF has established that the proposal will have some environmental impacts, which can be satisfactorily ameliorated with mitigation measures.

Key findings of the REF include:

- The project is likely to cause minor negative impacts on the environment, and no established native trees will be removed.
- Mitigation measures will be implemented to minimise vegetation clearing and protect trees from direct or indirect damage.
- Hollows found in the River Red Gum should be inspected for fauna.
- The proposal is unlikely to have a significant impact on these species due to the absence of tree clearing, the proximity of roosting sites, and the availability of nearby foraging habitats.
- The threatened flora species Spreading Guinea Flower and *Darwinia glaucophylla* are unlikely to occur at the site.
- Earthworks required during the project may result in erosion and sediment impacts. To manage these risks, a Construction Environmental Management Plan (CEMP) and an Erosion and Sediment Control Plan will be developed and implemented.
- Asbestos is a concern at this site. All measures outlined in the NSW Waste Classification Guidelines (EPA 2014) will be adhered to, and a Remediation Action Plan for asbestos will be written.

In summary, the demolition of the Gosford Library and the subsequent integration of the site into Kibble Park represent a thoughtful and progressive step towards enhancing the urban environment, fostering community engagement, and promoting sustainable development in Gosford.

## 6.2 Concluding Statement

The REF has examined and considered the available information on matters likely to affect the environment by reason of the activity. It has established that the proposal described will have some environmental impacts, which could be ameliorated satisfactorily. With mitigation measures, it is not likely to significantly affect the environment of threatened species, populations, ecological communities or their habitats. The assessment shows that if we adopt the measures identified in this REF, the proposal would not have a significant environmental impact. Accordingly, we do not require an Environmental Impact Statement (EIS).

The REF has concluded that there will be no significant impacts on matters of national environmental significance. No referral to the Australian Minister for the Environment under the EPBC act is required.

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under the EP&A Act.

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# APPENDIX A
# HAZARDOUS MATERIALS SURVEY (2024)

ASSESSMENTCORP.

Assessment Corp Pty Ltd
11/51-53 Gavenlock Road
Tuggerah NSW 2259
info@assessmentcorp.com.au
0417372611
ABN: 68 633 660 652

# HAZARDOUS MATERIALS SURVEY

Reference: A-2161-01-HR

## Gosford Library
## 118 Donnison Street,
## Gosford NSW 2250

| Document Details: | |
|---|---|
| **Client:** | Mark Butterfield |
| **Client Contact:** | Central Coast Council |
| **Client Address:** | 2 Hely Street, Wyong NSW 2259 |
| **Report Name:** | Hazardous Materials Survey |
| **Report Reference:** | A-2161-01-HR |
| **Report Date:** | 27/02/2024 |

**Document Control:**

| Revision: | Revision Date | Prepared by: | Signature | Reviewed by: | Signature: |
|---|---|---|---|---|---|
| 0 | 27/02/2024 | Shaun Muir<br>Projects Manager / Leading Consultant |  | Josh Spalding<br>HSEQ Manager / Senior Consultant |  |



| Contact Information: | |
|---|---|
| **Address:** | Unit 11 / 51-53 Gavenlock Road, Tuggerah NSW 2259 |
| **Email:** | info@assessmentcorp.com.au |
| **Phone:** | 0428 732 964 |
| **Website:** | www.assessmentcorp.com.au |

Table of Contents

# 1. Statement of Limitations

Assessment Corp's proposed services to the client were subject to the terms and conditions listed on the Assessment Corp website, and the client accepted these terms upon signing the proposal or when the services were initiated. The services were conducted in accordance with industry standards and relevant government regulations. Assessment Corp assumes no liability for any losses, damages, costs, or expenses arising outside of the specific purpose of the services.

Assessment Corp has conducted an assessment of the nominated property discussed in this report and has prepared the report based on the findings of the assessment. The scope of works conducted and preparation of the report were carried out in response to specific instructions and requirements from the client, within the client's time and budget constraints and relied on provided data and information. The analysis, evaluations, conclusions and recommendations in this report are based on those instructions, requirements, data, and information provided and are subject to change if any inaccuracies or omissions are discovered.

The assessment was conducted in accordance with relevant government Regulations, Australian standards and Codes of Practices whilst considering the client's instructions and requirements. The findings of the assessment were based on the findings of the visual assessment conducted and site conditions at the time of the assessment. Within our knowledge, these findings and interpretations provide a reasonable assessment of the inspected site's current condition.

The report provided is for the exclusive use of the client for the specified project only and should not be used for other purposes or by unauthorised third parties. Assessment Corp is not responsible for any inaccuracies or errors in the information provided by third parties. The report should be read in full and should not be copied or altered without permission.

# 2. Acronyms:

The following table provides the definitions of the acronyms used throughout this report.

| Acronym: | Definition: |
|---|---|
| AC | Asbestos Cement |
| ACD | Asbestos-Containing Dust |
| ACM | Asbestos-Containing Material |
| AMP | Asbestos Management Plan |
| ARCP | Asbestos Removal Control Plan |
| EDB | Electrical Distribution Board |
| FC | Fibre Cement |
| LAA | Licensed Asbestos Assessor |
| LARC | Licensed Asbestos Removal Contractor |
| LCM | Lead-Containing Material |
| NATA | National Association of Testing Authorities |
| PCB | Polychlorinated Biphenyls |
| SMF | Synthetic Mineral Fibres |
| UFP | Unexpected Finds Protocol |

# 3. Introduction:

## 3.1 Background:

Assessment Corp Pty Ltd (A.C) was commissioned by Mark Butterfield (Central Coast Council), hereby referred to as 'the client', to conduct a hazardous materials survey of the nominated building Gosford Library building located at 118 Donnison Street, Gosford NSW 2250, hereby referred to as 'the site'.

This report presents the findings of the hazardous materials survey undertaken by Assessment Corp (A.C) Licensed Asbestos Assessor(s); Shaun Muir (LAA002025) on the 24th and 29th of January 2024. For the purpose of this report, hazardous materials include:

- Asbestos Containing Materials (ACM)
- Lead Containing Materials (LCP)
- Lead Containing Dust (LCD)
- Synthetic Mineral Fibres (SMF)
- Polychlorinated Biphenyls (PCBs)

## 3.2 Objective:

The objective of the hazardous materials survey was to identify, assess and document the presence of any potential hazardous building materials as far as reasonably practicable within the safely accessible areas of the nominated buildings under current assessment prior to scheduled demolition and redevelopment works.

The survey undertaken is intended to meet the obligations and requirements of the following applicable Standards, Regulations and Code of Practices:

- NSW Work Health and Safety Act 2011
- NSW Work Health and Safety Regulation 2017
- Australian Standard AS2601-2001 – The Demolition of Structures
- SafeWork NSW Code of Practice – Demolition Work (August 2019)

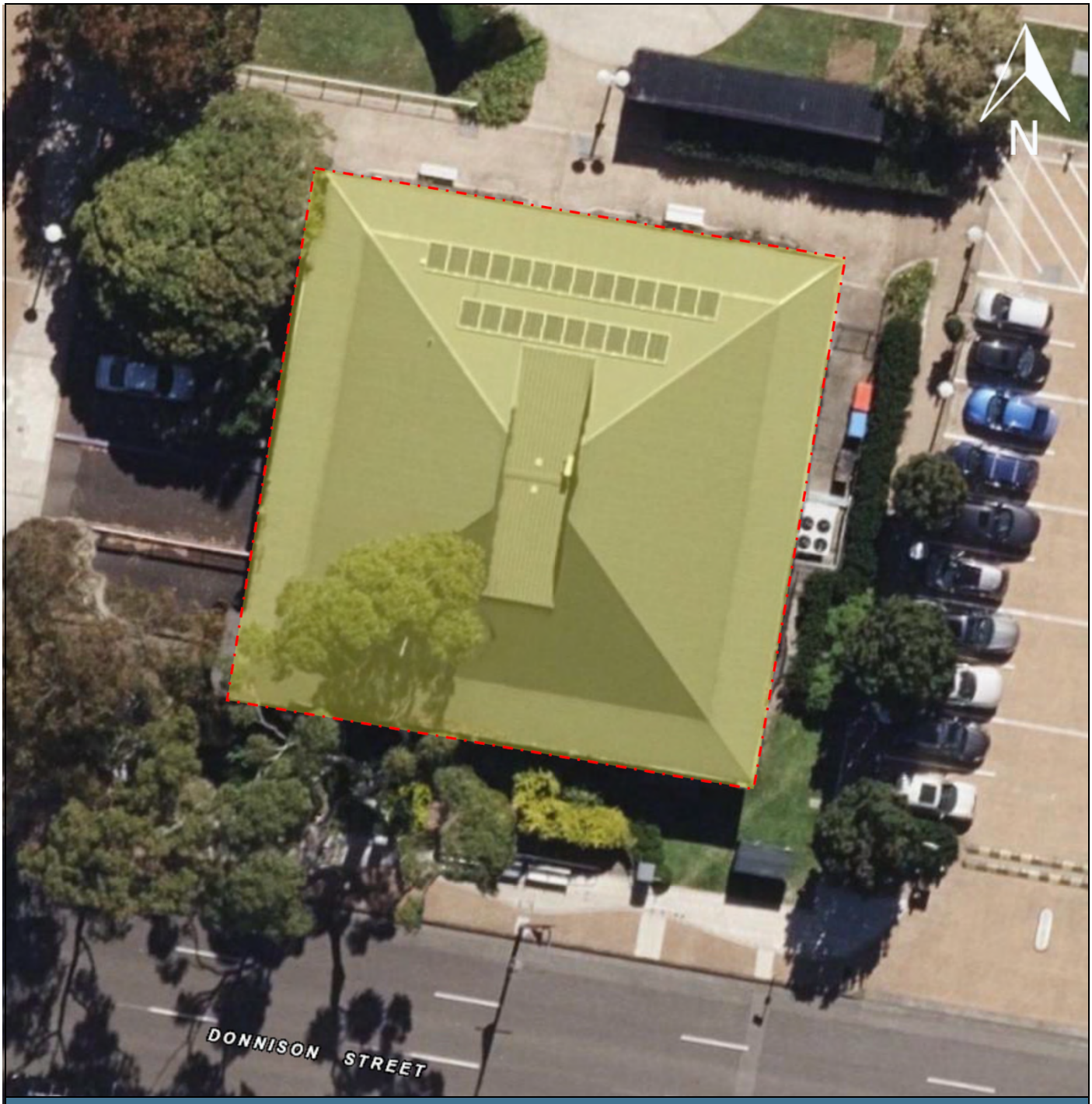
## 3.3 Scope of Works:

The scope of works for the survey conducted was as follows:

- Visually inspect safely accessible areas of the site / buildings under current assessment to identify hazardous building materials.
- Identify the potential of hazardous materials within inaccessible areas.
- Collect representative photographs of identified hazardous building materials.
- Collect representative samples of suspected hazardous building materials.
- Assess the risks posed by the identified hazardous building materials.
- Provide recommended control measures / corrective management actions in order to mitigate and manage the risks posed by the identified hazardous building materials.
- Compile a detailed hazardous materials register and provide a copy of the report in electronic (PDF) format to the client.

## 4. Site Details:

The site is located at 118 Donnison Street, Gosford NSW 2250. The hazardous materials survey conducted was limited to the visually and safely accessible internal and external areas of the nominated Gosford Library building that is scheduled to be demolished.




| Key: | |
|---|---|
| | Approximate location of the building under current assessment |

# 5. Survey Methodology

The survey conducted was undertaken in accordance with the applicable NSW Legislation, Codes of Practices, Australian Standards and Guidelines including but not limited to:

- NSW Work Health and Safety Act 2011
- NSW Work Health and Safety Regulation 2017
- SafeWork NSW Code of Practice: How to Manage and Control Asbestos in the Workplace (December 2022)
- Australian Standard (AS 4361.2:2017) Guide to hazardous paint management – Part 2: Lead paint in residential, public and commercial buildings.
- Australian Standard (AS 4361.2:1998) Guide to lead paint management – Part 2: Residential and commercial buildings.
- Code of Practice for the Safe Use of Synthetic Mineral Fibres [NOHSC:2006 (1990)]
- Australian and New Zealand Environment and Conservation Council (ANZECC): Identification of PCB-Containing Capacitors (1997)

Assessment Corp conducted the survey by visual inspection of visible and safely accessible areas of the nominated buildings using limited destructive techniques supplemented by limited sampling, field testing and NATA accredited analysis.

In line with industry standard, a representative sample strategy is implemented. The representative sample strategy includes the collection of representative samples of suspected hazardous materials and presuming the same for materials that are considered physically identical following visual assessment.

## 5.1 Asbestos Containing Materials (ACM):

Representative samples of suspected ACM were collected and sent for analysis by a NATA accredited laboratory.

## 5.2 Synthetic Mineral Fibres (SMF):

SMF was identified primarily through visual inspection or as a result of asbestos NATA accredited laboratory analysis.

## 5.3 Lead Containing Paint (LCP):

Samples of suspected lead paint were collected and sent for analysis at a NATA accredited laboratory. Paint samples contained layers of paint from the location sampled, therefore results typically reflect the lead content of the paint system from the location sampled.

## 5.4 Lead Containing Dust (LCD):

Lead dust samples were collected from settled dust within accessible ceiling cavity spaces. The samples were collected from a known surface area of 100cm$^2$ (0.01m$^2$) and sent for analysis by a NATA accredited laboratory. The sample surface area and laboratory analysis result (ug/filter) are then used to calculate surface dust lead loadings in milligrams of lead per square meter (mg/m$^2$).

## 5.5 Polychlorinated Biphenyls (PCBs):

Visual inspections of each major type of fluorescent light fittings were conducted. Light fittings are not generally dismantled to confirm capacitor type due to risk factors such as electrical hazards, height and causing damage to the light fitting. Where information was accessible, the make, model, and capacity of each capacitor are recorded and compared against ANZECC register of known PCB and PCB-free capacitors.

# 6. Survey Limitations

When conducting a limited destructive hazardous materials survey, Assessment Corp (A.C) performs all work in a thorough and professional manner. A limited destructive survey means inspection of 'normally' inaccessible / visually obscured areas using minor dismantling or demolition techniques were considered safe to do so.

At the time of the survey, the building was occupied and electricity to the buildings was not isolated. Therefore, the following could be conducted; lifting of floor coverings was conducted where considered necessary, no inspection into subfloors was conducted as the subfloor spaces locked, penetrations into wall voids was not conducted due to electrical hazards and inspection of ceiling cavity spaces was conducted through existing openings.

Based on the observations made at the time of the inspection, certain areas were restricted due physical inaccessibility or unsafe access based on various factors such as structural integrity, excessive heights, and electrical hazards. These areas include but are not limited to:

- Inaccessible voids such as wall voids, flat roof and skillion roof voids.
- Beneath hardstands such as concrete slabs, underground and inground services, including pits and pipes.
- Inset pipe-works in brick or concrete walls.
- All live electrical and mechanical equipment.
- Electrical boards and circuit breakers.
- Areas outside the scope of the survey.

Inaccessible areas or areas deemed not safely accessible that are likely to contain hazardous building materials have been presumed as containing hazardous building materials and should be treated as unless confirmed otherwise by inspection and/or NATA-accredited analysis.

Dusts within ceiling cavities, wall voids, subfloor spaces and ducting have the potential to contain asbestos and lead. The hazardous materials survey conducted does not generally include the reporting on the presence of asbestos or lead within dust unless specifically requested by the client or considered necessary by the assessor.

Hazardous building materials may be present beneath the ground surface or beneath hardstands such as concrete slabs. The hazardous materials survey conducted does not generally include the reporting on the presence of hazardous building materials within subsurface soils unless specifically requested by the client or considered necessary by the assessor.

No assessment can be considered definitive without invasive procedures that cause extensive damage to the structure or building. These procedures may potentially destabilise the structure / building or render it unusable for its current occupation. Future refurbishment and demolition works may reveal hazardous building materials that were inaccessible or visually obscured during the assessment.

Therefore, inaccessible and visually obscured areas including areas that require significant dismantling or demolition in order to gain access may contain hazardous building materials. During refurbishment / demolition works detailed care should be exercised and any unexpected finds of suspected hazardous building materials should be managed in accordance with an unexpected finds protocol.

Assessment Corp (A.C) will not be liable in the event that this report fails to identify the presence of any hazardous building materials within the nominated areas of the building(s) under current assessment. This includes any materials that were considered inaccessible at the time of the inspection or unable to be identified within the constraints and limitations as stated above.

# 7. Asbestos Risk Assessment:

A risk assessment is the overall process of risk identification, risk analysis and risk evaluation. Assessment Corp's semi-quantitative risk assessment is based on Australian and New Zealand Standard | AS/NZS ISO 31000:2009 Risk

Management | Principles and guidelines and our risk assessment algorithm is based on UK Health and Safety Executive | HG 264 Asbestos: The Survey Guide (Second Edition, 2012).

The presence of asbestos-containing materials (ACM) with a building or workplace does not always pose an exposure risk to occupants / employees. ACM that are in good condition, adequately sealed, have low accessibility and are labelled pose a negligible risk. However, an exposure risk may be posed if these materials are significantly disturbed or damaged. The assessment of asbestos exposure risk is based on the following risk factors:

| **Friability:** | | |
|---|---|---|
| The friability of a material is defined by how easily the material can be crumbled or reduced to a powder. When determining the friability of identified ACM, the following definitions apply: | | |
| **Variable:** | **Definition:** | **Risk Score:** |
| Non-Friable | Consists of ACM contained by a bonded matrix (when dry, cannot be crushed or reduced to a powder by hand pressure) | 1 |
| Friable | Consists of ACM not contained by a bonded matrix (when dry, is or may be crushed or reduced to a powder by hand pressure) | 5 |

| **Condition:** | | |
|---|---|---|
| When determining the condition / deterioration of identified ACM, the following definitions apply: | | |
| **Variable:** | **Definition:** | **Risk Score:** |
| Good | ACM which is undamaged, showing no signs of deterioration and is adequately managed e.g. adequately sealed with paint. | 1 |
| Fair | ACM which shows evidence of minor damaged i.e. minor cracking, showing minimal signs of deterioration and minimal management action. | 3 |
| Poor | ACM which is clearly damaged or deteriorated and not adequately managed. | 5 |

| **Accessibility / Disturbance Potential:** | | |
|---|---|---|
| When determining the accessibility / disturbance potential of identified ACM, the following definitions are applied based of the physical location of the material: | | |
| **Variable:** | **Definition:** | **Risk Score:** |
| Low | ACM which is unlikely to cause exposure / disturbance during routine activities | 1 |
| Moderate | ACM which may result in exposure / disturbance during routine activities | 3 |
| High | ACM which is likely to result in exposure / disturbance during routine activities | 5 |
| **Labelling:** | | |
| When determining the labelling status of identified ACM, the following definitions are applied: | | |

| Variable: | Definition: | Risk Score: |
|---|---|---|
| Low | ACM which is labelled correctly | 1 |
| Moderate | ACM which inadequately or unclearly labelled | 3 |
| High | ACM which is not labelled | 5 |

| Risk Status Table | |
|---|---|
| The following table provides an asbestos exposure risk ranking system which uses the total risk scores of the risk factors as described above in order to determine the asbestos exposure risk status of each asbestos occurrence. | |
| **Risk Status** | **Description:** |
| **Negligible Risk**<br>**Risk Score (1 - 4)** | ACM that poses a negligible asbestos exposure risk to occupants, employees and/or the general public.<br>E.g. Non-friable ACM that are in good condition / show no evidence of deterioration, adequately sealed (will not release asbestos fibres on contact), have low accessibility / disturbance potential and are labelled as asbestos-containing.<br>This category of ACM does not present an asbestos exposure risk unless disturbed by intrusive maintenance works such as sanding, cutting or drilling etc. |
| **Low Risk**<br>**Risk Score (5 - 10)** | ACM that poses minimal exposure risk to occupants, employees and/or the general public.<br>E.g. Non-friable ACM that are in good to fair condition / show no evidence of significant deterioration, adequately sealed (will not release asbestos fibres on contact), have low accessibility / disturbance potential but are not labelled as asbestos-containing.<br>This category of ACM does not present an asbestos exposure risk unless disturbed by intrusive maintenance works such as sanding, cutting or drilling etc. |
| **Moderate Risk**<br>**Risk Score (11-15)** | ACM that pose a moderate asbestos exposure risk to occupants, employees and/or the general public.<br>E.g. Non-friable ACM that are in fair to poor condition / show evidence of minor damage / deterioration, inadequately sealed (may release asbestos fibres on contact), have moderate accessibility / disturbance potential and are not labelled as asbestos-containing.<br>This category may also consist of friable ACM that is adequately managed. |
| **High Risk**<br>**Risk Score (>15)** | ACM that poses a high exposure risk to occupants, employees and/or the general public.<br>E.g. Friable or Non-friable ACM that are damaged or deteriorated, inadequately sealed (may release asbestos fibres on contact), have high accessibility / disturbance potential and are not labelled as asbestos-containing. |
| **Corrective Management Actions Table:** | |

The following table provides a corrective management action priority ranking system that is based primarily on the risk status of each asbestos occurrence. The table should be used as a guide by persons with management or control of the workplace when prioritising, budgeting, and scheduling the corrective management actions in order to control the asbestos exposure risk identified for each asbestos occurrence.

| Action Priority: | Corrective Management Action (CMA): |
|---|---|
| **Priority 4 (P4)** | **No short-term CMA required**<br>**Review periodically and manage in accordance with AMP** |
| | • Maintain clear labelling as “asbestos-containing” so they are not disturbed during any intrusive maintenance works such as sanding, cutting, or drilling etc.<br>• If damaged or disturbed management actions such as painting, enclosing, or removing is recommended.<br>• Removal of these ACM by a licensed asbestos removal contractor (LARC) recommended when practicable / financially viable.<br>• If planned maintenance, refurbishment, or demolition works will disturb these ACM, immediate removal by a licensed asbestos removal contractor (LARC) is required. |
| **Priority 3 (P3)** | **Short-term CMA required**<br>**Review periodically and manage in accordance with AMP** |
| | • These ACM should be clearly labelled as “asbestos-containing”, so they are not disturbed during any intrusive maintenance works such as sanding, cutting, or drilling etc.<br>• If damaged or disturbed, management actions such as painting, enclosing, or removing is recommended.<br>• Removal of these ACM by a licensed contractor is recommended when practicable / financially viable.<br>• If planned maintenance, refurbishment, or demolition works will disturb these ACM, immediate removal by a licensed asbestos removal contractor (LARC) is required. |
| **Priority 2 (P2)** | **CMA required as soon as practicable**<br>**Review periodically and manage in accordance with AMP** |
| | • Removal / management of these ACM by a licensed asbestos removal contractor (LARC) is recommended as soon as practicable.<br>• These ACM should be clearly labelled as “asbestos-containing”, so they are not disturbed during any intrusive maintenance works such as sanding, cutting or drilling etc.<br>• Management actions such as painting, enclosing and periodic asbestos airborne fibre monitoring is recommended (unless adequately managed) until such time that the ACM is removed.<br>• If planned maintenance, refurbishment, or demolition works will disturb these ACM, immediate removal by a licensed asbestos removal contractor is required. |
| **Priority 1 (P1)** | **Immediate CMA required**<br>**Manage any remaining materials in accordance with AMP** |
| | • Immediate removal / management by a licensed contractor licensed asbestos removal contractor (LARC) is required.<br>• As an interim measure restrict access to the area. An exclusion zone of 10m is recommended (where considered practicable) achieved by barricading the area with caution tape (or suitable alternative) and installing asbestos warning signs on all entry points to the exclusion zone.<br>• Encapsulation with a PVA emulsion or suitable sealant<br>• Regular asbestos airborne fibre monitoring should be conducted where recommended by a Licensed Asbestos Assessor (LAA) during normal operations / occupancy hours of the building / workplace until such time that the ACM is removed. |

# 8. Sampling Results:

## 8.1 Asbestos Containing Material (ACM):

The following table provides the results of the representative asbestos sampling regime conducted during the hazardous materials survey. Refer to Appendix A: Laboratory Reports for the NATA accredited laboratory analysis report.

| Sample Reference: | Location: | Result: |
|---|---|---|
| 2161-01-01 | Internal, ground level, ceiling, vermiculite | No Asbestos Detected |
| 2161-01-02 | Internal, ground level, storage room, white vinyl floor tile | **Asbestos Detected** |
| 2161-01-03 | Internal, ground level, storage room, bituminous glue beneath white vinyl floor tile | No Asbestos Detected |
| 2161-01-04 | Internal, ground level, staff office area, concealed cream vinyl floor tile | **Asbestos Detected** |
| 2161-01-05 | Internal, ground level, staff office area, brown glue beneath concealed cream vinyl floor tile | No Asbestos Detected |
| 2161-01-06 | Internal, ground level, plant room, bituminous gasket | No Asbestos Detected |
| 2161-01-07 | Internal, first floor, reading room, concealed vinyl floor tile | **Asbestos Detected** |
| 2161-01-08 | Internal, first floor, reading room, bituminous glue beneath concealed vinyl floor tile | No Asbestos Detected |
| 2161-01-09 | Internal, first level, IT / server room, concealed vinyl floor tile | **Asbestos Detected** |
| 2161-01-10 | Internal, first level, IT / server room, bituminous glue beneath concealed vinyl floor tile | No Asbestos Detected |
| 2161-01-11 | External, timber window frames, brown putty | No Asbestos Detected |
| 2161-01-12 | External, metal window frames, grey putty | **Asbestos Detected** |

**Note:** Asbestos detected results are list in bold.

## 8.2 Lead Containing Paint (LCP):

The following table provides the results of the representative lead containing paint sampling regime conducted during the hazardous materials survey. Refer to Appendix A: Laboratory Reports for the NATA accredited laboratory analysis report.

| Sample Reference: | Location: | Result: |
|---|---|---|
| 2161-01-LP01 | Internal, first level, grey / purple paint system, vertical concrete columns | 0.01% |
| 2161-01-LP02 | Internal, first level, concrete book shelve enclosure, white paint system | <0.01% |
| 2161-01-LP03 | Internal, first level, storeroom, brick walls, white paint system | <0.01% |
| 2161-01-LP04 | Internal, first level, IT / server room, concrete rendered walls, yellow paint system | <0.01% |
| 2161-01-LP05 | Internal, first level, reading room, brick walls, white / cream / aqua paint system | <0.01% |
| 2161-01-LP06 | Internal, ground level, stack room, brick walls, white paint system | <0.01% |
| 2161-01-LP07 | Internal, ground level electrical room, brick walls, white paint system | <0.01% |
| 2161-01-LP08 | Internal, ground level, substation, concrete ceiling, white paint | <0.01% |
| 2161-01-LP09 | Internal, ground level, substation, door frames, white paint system | <0.01% |
| 2161-01-LP10 | Internal, ground level, plant room, brick walls, white paint system | <0.01% |
| 2161-01-LP11 | Internal, ground level, men’s amenities, concrete ceiling, white pain system | <0.01% |
| 2161-01-LP12 | External, eave / roof timber framing, white / navy paint system | <0.01% |

**Note:** lead paint is defined as a paint film that contains greater than 0.1% lead by mass in the dry film. Results above the assessment criteria are listed in bold.

# 9. Recommendations:

The following recommendations have been determined based on the information provided by the client indicating that the nominated building(s) under current assessment are scheduled to be demolished.

## 9.1 General:

Hazardous materials should be managed in accordance with the requirements of applicable NSW Legislation, Australian Standards, Codes of Practices and Guidelines.

A site-specific Hazardous Material Removal Control Plan (HMCRP) should be developed to manage potential risks associated with hazardous material removal works and to ensure compliance with the requirements of applicable NSW Legislation, Australian Standards, Codes of Practices and Guidelines. If requested by the client, Assessment Corp (A.C) can provide this documentation.

Prior to commencing demolition works all hazardous materials should be removed under controlled conditions in accordance with the HMCRP. Subsequent to the completion of hazardous material removal works, clearance inspections should be conducted by a Competent Person and / or Licensed Asbestos Assessor.

Inaccessible areas or areas deemed unsafe to perform sampling (E.g. electrical hazards) that have the potential to contain hazardous materials should be presumed to contain hazardous materials. Prior to or during demolition works, adequate access should be achieved under controlled conditions and these areas should be assessed for the presence of hazardous materials.

Establish and implement an Unexpected Finds Protocol (UFP) during all future controlled demolition works to minimise the risks associated with unexpected finds events and to ensure that if unexpected hazardous materials are identified / uncovered they are managed correctly. This includes steps such as:

- Immediately stop work.
- Restrict access to the material and establish an exclusion zone by barricading the area.
- Install warning signage on all access points to the exclusion zone.
- Contact Assessment Corp (A.C) to inspect / sample the material and provide further advice.

## 9.2 Asbestos Containing Materials (ACM):

ACM and presumed ACM were identified during the hazardous materials survey. Refer to Appendix B: Hazardous Materials Register.

The identified ACM and presumed ACM occurrences are considered non-friable. Prior to the commencement of scheduled demolition work, ACM likely to be disturbed or affected by such processes are removed by a ‘Class A’ or ‘Class B’ Licensed Asbestos Removal Contractor (LARC) under controlled conditions.

All asbestos removal works are to be undertaken in accordance with the following:

- NSW Work Health and Safety Act 2011
- NSW Work Health and Safety Regulation 2017
- SafeWork NSW Code of Practice: How to Safely Remove Asbestos (December 2022)
- SafeWork NSW Code of Practice: How to Manage and Control Asbestos in the Workplace (December 2022)

Airborne asbestos fibre monitoring is the established method to determine if control measures during asbestos removal works are effective and it is recommended during all asbestos remediation works.

All airborne asbestos fibre monitoring is to be undertaken by an appropriately qualified Licensed Asbestos Assessor (LAA) or Competent Person in accordance with the Guidance Note on the Membrane Filter Method for Estimating

Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)] and all samples are to be analysed by a NATA accredited laboratory.

Airborne asbestos fibre monitoring results should not exceed the SafeWork Australia (SWA) exposure standard for asbestos which is 0.1 fibres/mL as an 8-hour Time Waited Average (TWA).

Following the completion of any asbestos removal works, request for the appointed Licensed Asbestos Assessor or Competent Person to conduct a visual clearance inspection of the asbestos removal area to ensure that the removal works have been completed to a satisfactory industry standard.

Prior to issuing of an asbestos clearance certificates the following requirements must be met:

- No further evidence of asbestos contamination is visually identified
- Any encapsulation work is found to be complete and adequate (if applicable)
- All airborne asbestos fibre monitoring results are satisfactory (if applicable)
- All sample analysis results are satisfactory (if applicable)

Once all requirements have been met, an asbestos clearance certificate will be issued.

In the case that the building is not demolished, or ACM / presumed ACM is to remain onsite, it is a requirement under the NSW WHS Regulation 2017 that an Asbestos Management Plan (AMP) is to be developed and implemented at the workplace.

Assessment Corp (A.C) always recommends the complete removal of all hazardous building materials occurrences throughout the building as best practice. We understand that complete removal is not always considered practicable or finically viable, therefore we recommend that identified hazardous building material occurrences that are to remain in-situ are managed correctly.

Our Corrective Management Action (CMA) table within Section 7 can be used as a general guide in order to control the exposure risk identified for each the hazardous building material occurrence.

## 9.3 Lead Containing Paint (LCP):

In accordance with Australian Standard (AS 4361.2:2017) Guide to hazardous paint management – Part 2: Lead paint in residential, public and commercial buildings, lead paint is defined as a paint film that contains greater than 0.1% lead by mass in the dry film. Lead paint is sometimes referred to as ‘lead-based paint’, ‘leaded paint’, ‘lead-containing paint’ and ‘paint containing lead’.

Generally, when one or more samples from a building or portion of a building returns a positive lead paint result, all underlying paint should be treated as lead containing paint. Furthermore, a project should not be classified as free of lead, unless all samples within the area are proven to be free of lead.

Additional targeted lead sampling may be required for inaccessible areas, if any unexpected finds are occurred or prior to significant disturbance of a paint system that was not sampled during future demolition works.

Within the scope and limitations of the survey conducted no lead containing paint occurrences were identified at the time of the survey. The following recommendations should only be considered as contingency plan if lead paint is unexpectedly encountered during the project.

All lead removal works are to be undertaken in accordance with the following:

- NSW Work Health and Safety Act 2011
- NSW Work Health and Safety Regulation 2017
- Australian Standard (AS 4361.2:1998) Guide to lead paint management – Part 2: Residential and commercial buildings (superseded)

- Australian Standard (AS 4361.2:2017) Guide to hazardous paint management – Part 2: Lead paint in residential, public and commercial buildings

Air monitoring for lead may be required during lead paint removal works based on a site-specific risk assessment taking into account the chosen paint removal method.

All lead air monitoring results should not exceed the SafeWork Australia (SWA) exposure standard for lead which is 0.05 mg/m$^3$ as an 8-hour Time Waited Average (TWA).

Following the completion of any lead paint removal works, request for the appointed Competent Person to conduct a visual clearance inspection of the lead removal area to ensure that the removal works have been completed to a satisfactory industry standard. The competent person will determine if clearance testing is required.

## 9.4 Lead Containing Dust (LCD):

Generally, lead dust samples are collected from settled dust within accessible ceiling cavity spaces. No accessible ceiling cavity spaces with settled dust were identified at the time of the survey. Additional targeted lead dust sampling may be required for inaccessible areas or if any unexpected finds are occurred during future demolition works.

Currently there is no recognised Australian standard or guidelines for the assessment of lead concentrations in ceiling cavity dust. The superseded Australian Standard AS 4361.2 – 1988 Guide to Lead Paint Management, Part 2: Residential and Commercial Buildings provided acceptable limits for surface dust lead loading following lead paint management activities. These limits were:

- Interior floors: 1mg/m$^2$ (as lead)
- Interior windowsills: 5mg/m$^2$ (as lead)
- Exterior surfaces: 8mg/m$^2$ (as lead)

The current Australian Standard: AS 4361.2:2017 Guide to Hazardous Paint Management, Part 2 Lead Paint in Residential, Public and Commercial Buildings does not provide acceptable limits for surface dust lead loading but states “the acceptance limits for surface dust lead loadings should be published by the relevant regulatory authority in the jurisdiction within which the work was carried out, or as required by the project specification”.

The US EPA provides the following surface dust lead loadings following lead abatement works:

- Floors – 10 ug/ft$^2$ (≈0.1mg/m$^2$) lead,
- Windowsills – 100 ug/ft$^2$ (≈1.1mg/m$^2$) lead,
- Window troughs – 400 ug/ft$^2$ (≈4.3mg/m$^2$) lead

The above acceptance limits may be used as a guide to assess lead concentrations in settled dust.

In the absence of Australian standard or guidelines, Assessment Corp has adopted the surface limits for dust loadings published by the US EPA with consideration to the superseded Australian Standard AS 4361.2. Taking into account site considerations, a surface dust lead loading of 4.3mg/m$^2$ has been used it best matches a risk assessment for settled dust with ceiling cavities.

Within the scope and limitations of the survey conducted no elevated lead concentrations above the adopted assessment criteria (>4.3mg/m$^2$) were identified at the time of the survey. The following recommendations should only be considered as contingency plan if lead containing dust is unexpectedly encountered during the project.

All lead removal works are to be undertaken in accordance with the following:

- NSW Work Health and Safety Act 2011
- NSW Work Health and Safety Regulation 2017
- Australian Standard (AS 4361.2:1998) Guide to lead paint management – Part 2: Residential and commercial buildings (superseded)

- Australian Standard (AS 4361.2:2017) Guide to hazardous paint management – Part 2: Lead paint in residential, public and commercial buildings

Air monitoring is required during lead dust removal works based on a site-specific risk assessment taking into account the chosen removal method.

All lead air monitoring results should not exceed the SafeWork Australia (SWA) exposure standard for lead which is 0.05 mg/m$^3$ as an 8-hour Time Waited Average (TWA).

Following the completion of any lead dust removal works, request for the appointed Competent Person to conduct a visual clearance inspection of the lead removal area to ensure that the removal works have been completed to a satisfactory industry standard. Clearance testing is required.

## 9.5 Synthetic Mineral Fibres (SMF):

Within the scope and limitation of the survey conducted, no SMF materials were identified at the time of the survey.

Prior to the commencement of scheduled demolition work, if SMF is identified that is likely to be disturbed or affected by such processes, they are to be removed under controlled conditions. All SMF removal works are to be undertaken in accordance with the following:

- NSW Work Health and Safety Act 2011
- NSW Work Health and Safety Regulation 2017
- National Standard for Synthetic Mineral Fibres [NOHSC:1004(1990)]
- National Code of Practice for the Safe Use of Synthetic Mineral Fibres [NOHSC:2006 (1990)]
- SafeWork NSW: Safe Management of Synthetic Mineral Fibres (SMF) – Glasswool and Rockwool (May 2015)
- Guidance Note on the Membrane Filter Method for the Estimation of Airborne Synthetic Mineral Fibres [NOHSC:3006(1989)].

## 9.6 Polychlorinated Biphenyls (PCBs):

Within the scope and limitation of the survey conducted, no PCB capacitators were identified at the time of the survey.

However, light fittings are not generally dismantled to confirm capacitor type due to risk factors such as electrical hazards, height and causing damage to the light fitting.

Therefore, prior to the commencement of scheduled demolition work, older type fluorescent flight fittings should be electrically isolated and inspected in detail to for capacitators that may contain PCBs. If PCB containing capacitators are found, they should be removed / disposed of in accordance with the following:

- NSW Work Health and Safety Act 2011
- NSW Work Health and Safety Regulation 2017
- ANZECC Polychlorinated Biphenyls Management Plan (Revised edition April 2003)
- EPA Polychlorinated Biphenyl (PCB) Chemical Control Order 1997

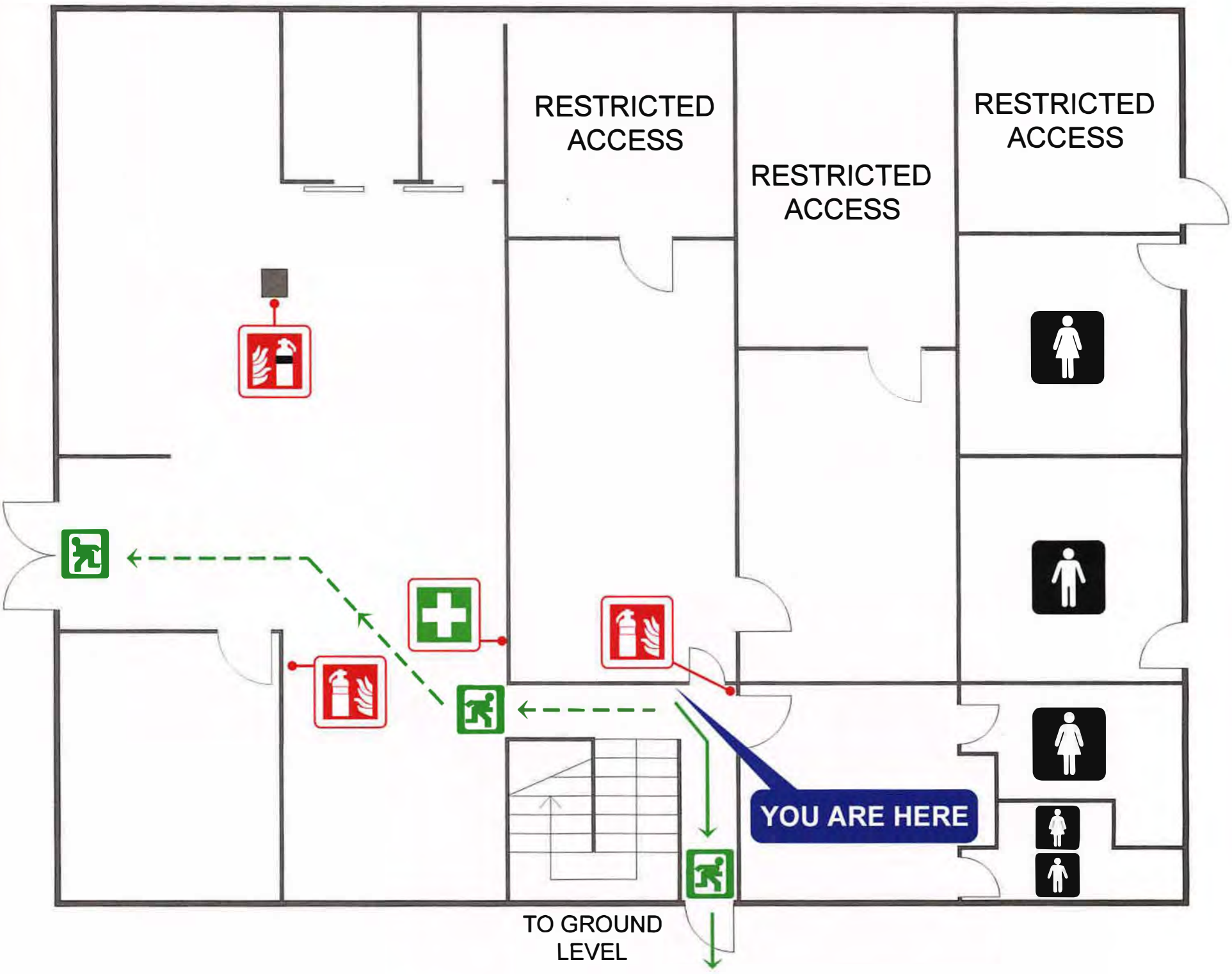
# APPENDIX A:
# SITE SCHEMATICS

EliteFire TRAINING

# EVACUATION SIGN

118 Donnison St
Gosford NSW

## Gosford Library - Lower Ground



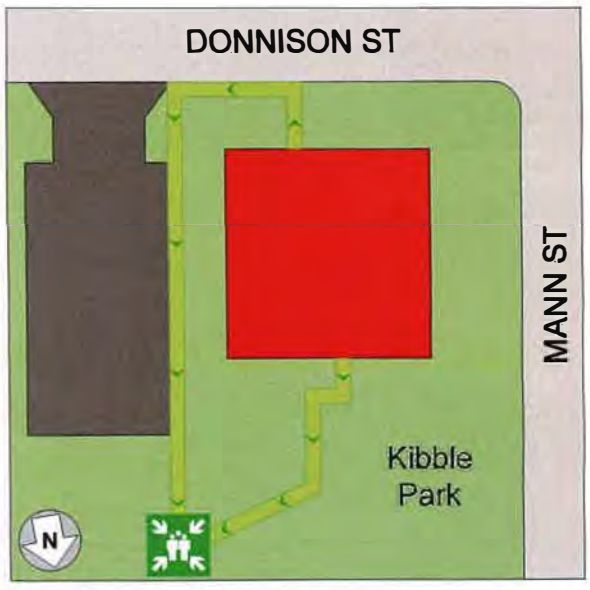

Kibble Park

## EVACUATION DIAGRAM

| FIRE EMERGENCY | |
|---|---|
| R | **REMOVE PEOPLE FROM DANGER**<br>Move to a safe place and keep all exit paths clear |
| A | **ALERT OCCUPANTS + RAISE AN ALARM**<br>**DIAL 000** – ask for the Fire Brigade |
| C | **CONFINE THE SMOKE and FIRE**<br>Restrict the spread of fire by closing doors. Attempt to extinguish the fire, if safe and if trained to do so |
| E | **EVACUATE BUILDING TO A SAFE AREA**<br>Via the nearest safe exit route. Wait for assistance from the emergency services. Report any missing persons |
| | **ASSIST MOBILITY IMPAIRED PERSONS**<br>To a safe area IMMEDIATELY |

**LEGEND**

- Dry Chemical Powder Extinguisher
- $CO_2$ Extinguisher
- First Aid Kit
- Main Path of Travel
- Alternative Path of Travel
- Assembly Area
- Emergency Exit

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NOT TO SCALE

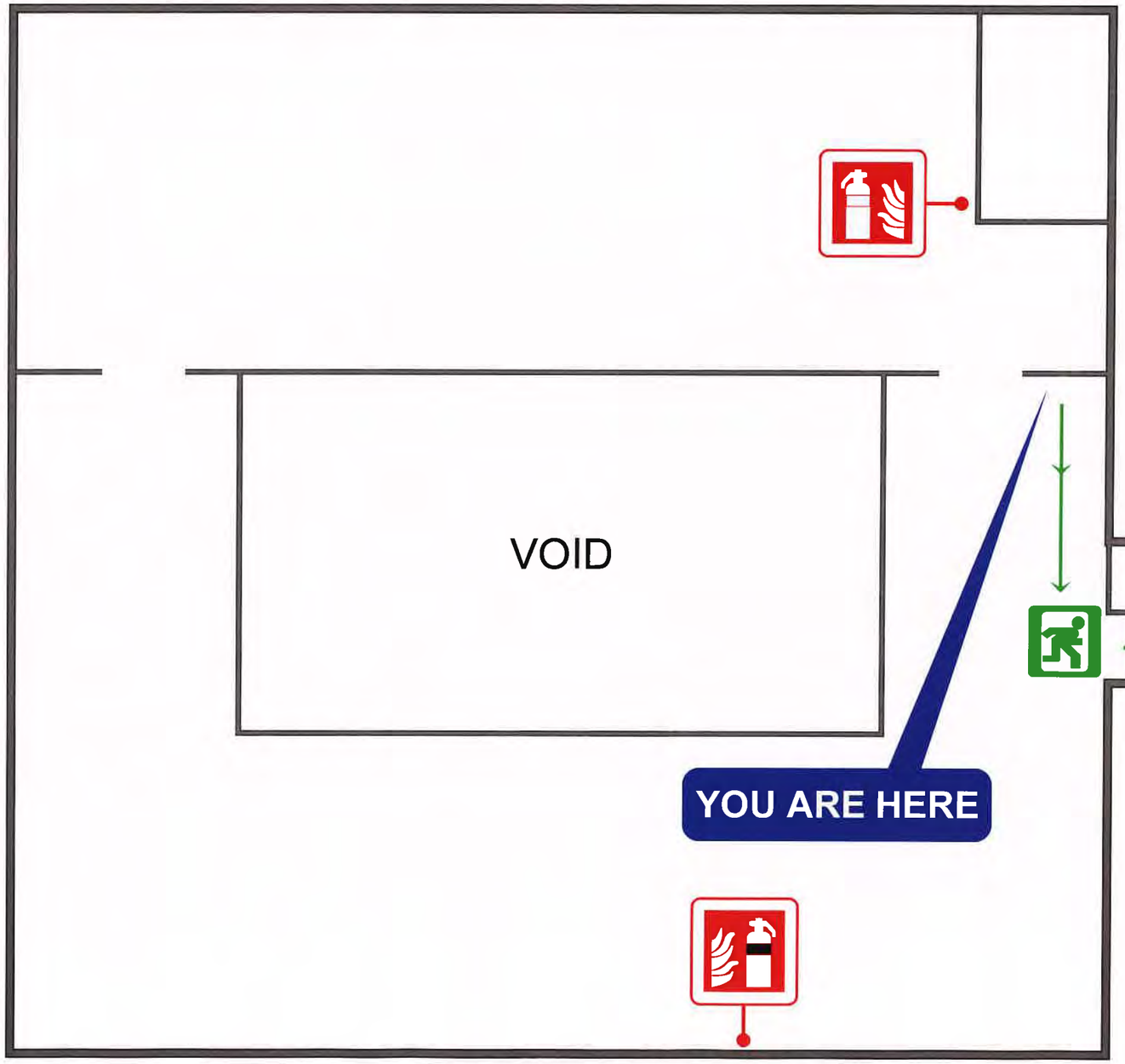
ED0004

EliteFire TRAINING

# EVACUATION SIGN

118 Donnison St
Gosford NSW

## Gosford Library - Mezzanine

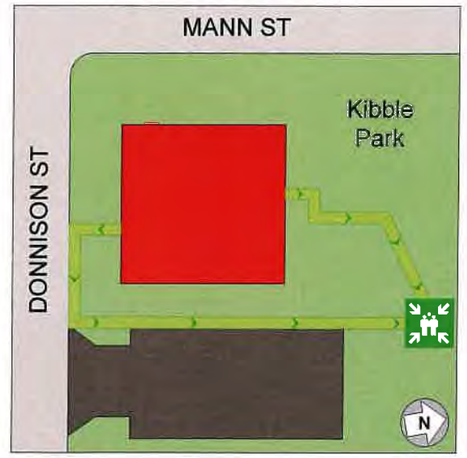



EVACUATION DIAGRAM

| FIRE EMERGENCY | |
|---|---|
| R | **REMOVE PEOPLE FROM DANGER**<br>Move to a safe place and keep all exit paths clear |
| A | **ALERT OCCUPANTS + RAISE AN ALARM**<br>DIAL 000 – ask for the Fire Brigade |
| C | **CONFINE THE SMOKE and FIRE**<br>Restrict the spread of fire by closing doors. Attempt to extinguish the fire, if safe and if trained to do so |
| E | **EVACUATE BUILDING TO A SAFE AREA**<br>Via the nearest safe exit route. Wait for assistance from the emergency services. Report any missing persons |
| | **ASSIST MOBILITY IMPAIRED PERSONS**<br>To a safe area IMMEDIATELY |

**LEGEND**

- Dry Chemical Powder Extinguisher
- $CO_2$ Extinguisher
- Path of Travel
- Assembly Area
- Emergency Exit

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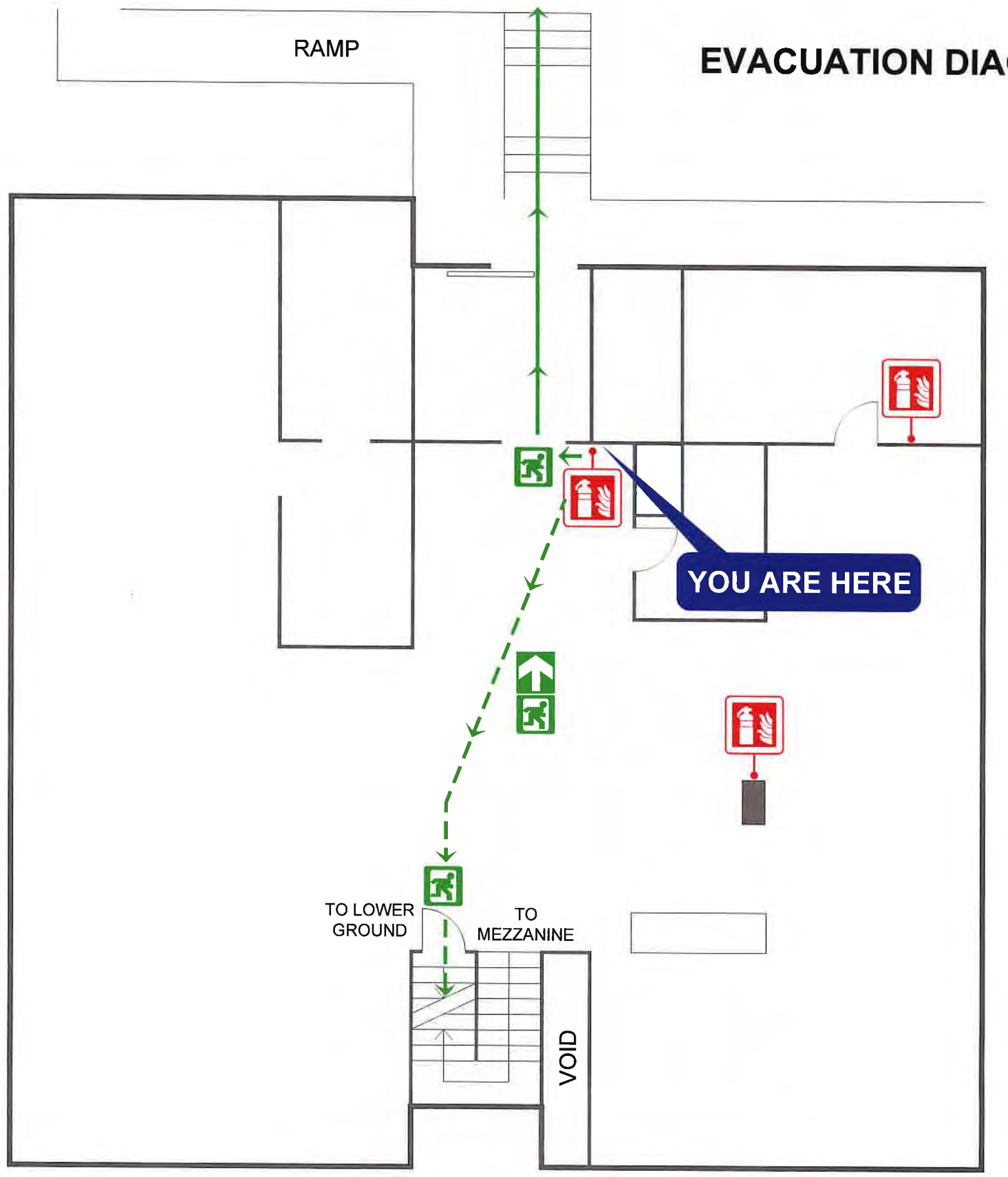
EliteFire TRAINING

# EVACUATION SIGN

118 Donnison St
Gosford NSW

## Gosford Library - Ground Level

Donnison Street

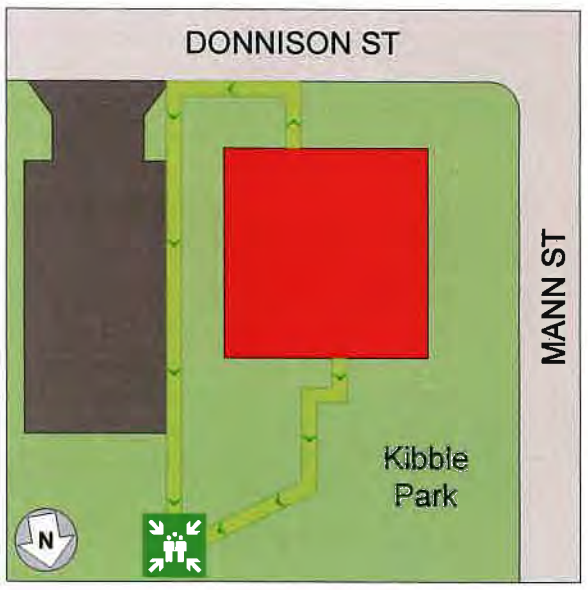



Kibble Park

| FIRE EMERGENCY | |
|---|---|
| R | **REMOVE PEOPLE FROM DANGER**<br>Move to a safe place and keep all exit paths clear |
| A | **ALERT OCCUPANTS + RAISE AN ALARM**<br>**DIAL 000** – ask for the Fire Brigade |
| C | **CONFINE THE SMOKE and FIRE**<br>Restrict the spread of fire by closing doors. Attempt to extinguish the fire, if safe and if trained to do so |
| E | **EVACUATE BUILDING TO A SAFE AREA**<br>Via the nearest safe exit route. Wait for assistance from the emergency services. Report any missing persons |
| | **ASSIST MOBILITY IMPAIRED PERSONS**<br>To a safe area IMMEDIATELY |

**LEGEND**

- Dry Chemical Powder Extinguisher
- Main Path of Travel
- Alternative Path of Travel
- Assembly Area
- Emergency Exit

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NOT TO SCALE

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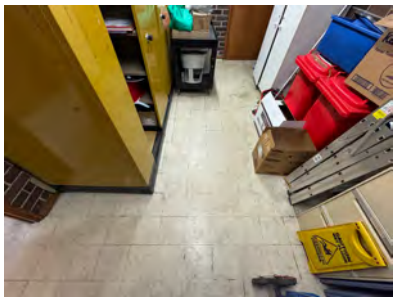
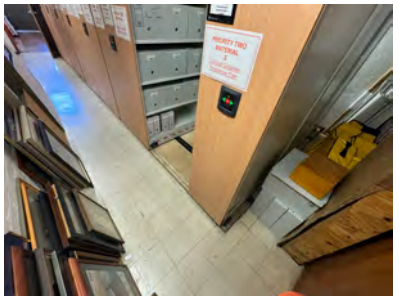
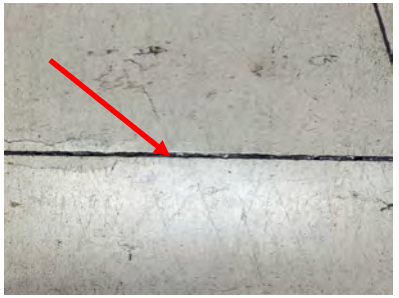
# APPENDIX B:
# HAZARDOUS MATERIALS REGISTER

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| **EXTERNAL – ALL LEVELS** | | | | | | | | | | | | |
| External, metal window frames, grey putty<br><br>(all metal window grey putty throughout presumed the same) | Asbestos | 2161-01-12 | **Asbestos Detected** | N/A | 1 | 3 | 1 | 5 | **L** | **P3** | Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details |  |
| External, timber window frames, brown putty<br><br>(all timber window brown putty throughout presumed the same) | Asbestos | 2161-01-11 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |
| External, timber roof framing, navy / white paint system | Lead | 2616-01-LP12 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| External areas throughout | Lead | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no lead dust occurrences were identified to the external areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |
| External areas throughout | SMF | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no SMF materials were identified to the external areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |
| External areas throughout | PCB | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no PCB containing capacitors were identified to the external areas of the building at the time of the inspection.<br><br>Refer to Section 9 for more details. | - |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| External, subfloor space | - | N/A<br><br>Inaccessible | - | - | - | - | - | - | - | - | The subfloor space should be assessed for the presence of hazardous materials by a Competent Person such as an Assessment Corp LAA, during demolition / refurbishment works when adequate access is available.<br><br>Refer to Section 9 for more details. |  |
| **INTERNAL AREAS – GROUND LEVEL** | | | | | | | | | | | | |
| Internal, ground level, vermiculite ceiling throughout | Asbestos | 2161-01-01 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |
| Internal, ground level, staff office area, cream vinyl floor tile concealed by carpet | Asbestos | 2161-01-04 | **Asbestos Detected** | N/A | 1 | 3 | 1 | 5 | **L** | **P3** | Full extent yet to be determined.<br><br>Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, staff office area, brown glue beneath cream vinyl floor tile concealed by carpet | Asbestos | 2161-01-05 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |
| Internal, ground level, storage room, white vinyl floor tiles | Asbestos | 2161-01-02 | **Asbestos Detected** | 15 | 1 | 3 | 1 | 5 | **L** | **P3** | Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details |  |
| Internal, ground level, storage room, bituminous glue beneath vinyl floor tiles | Asbestos | 2161-01-03 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, ground level, stack room, white vinyl floor tiles | Asbestos | Presumed same as 2161-01-02 | **Asbestos Detected** | 32 | 1 | 3 | 1 | 5 | **L** | **P3** | Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details. |  |
| Internal, ground level, stack room, bituminous glue beneath vinyl floor tiles | Asbestos | Presumed same as 2161-01-03 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |
| Internal, ground level, kitchen, white vinyl floor tiles | Asbestos | Presumed same as 2161-01-02 | **Asbestos Detected** | 16 | 1 | 3 | 1 | 5 | **L** | **P3** | Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details. |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, ground level, kitchen, bituminous glue beneath vinyl floor tiles | Asbestos | Presumed same as 2161-01-03 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |
| Internal, ground level, electrical room, square backing board | Asbestos | N/A<br>Electrical Hazard | **Presumed Asbestos-Containing** | 1 | 1 | 3 | 1 | 5 | **L** | **P3** | Confirm material status by sampling and NATA accredited analysis following electrical isolation.<br><br>Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details. |  |
| Internal, ground level, electrical room, rectangle backing boards (x2) | Asbestos | N/A<br>Electrical Hazard | **Presumed Asbestos-Containing** | 1 | 1 | 3 | 1 | 5 | **L** | **P3** | Confirm material status by sampling and NATA accredited analysis following electrical isolation.<br><br>Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details. |  |

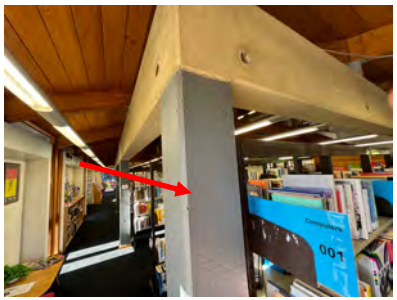
| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, ground level, plant room, bituminous gasket | Asbestos | 2161-01-06 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |
| Internal, ground level, hoist motor room | Asbestos | N/A<br><br>Electrical Hazard | **Presumed Asbestos-Containing** | - | - | - | - | - | - | - | Following electrical isolation, the components of the hoist motor should be assessed for the presence of asbestos by a Competent Person such as an Assessment Corp LAA, prior to demolition / refurbishment works.<br><br>Refer to Section 9 for more details. |  |
| Internal, ground level, stack room, brick walls, white paint system | Lead | 2616-01-LP06 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, ground level, electrical room, brick walls, white paint system | Lead | 2616-01-LP07 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |
| Internal, ground level, substation room, concrete ceiling, white paint system | Lead | 2616-01-LP08 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |
| Internal, ground level, substation room, door frames, white paint system | Lead | 2616-01-LP09 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, plant room, brick walls, white paint system | Lead | 2616-01-LP10 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |
| Internal, men's bathroom, concrete ceiling, white paint system | Lead | 2616-01-LP11 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |
| Internal, ground level areas throughout | Lead | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no lead dust occurrences were identified to the internal ground level areas of the building at the time of the inspection.<br><br>Refer to Section 9 for more details. | - |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, ground level areas throughout | SMF | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no SMF material occurrences were identified to the internal ground level areas of the building at the time of the inspection.<br><br>Refer to Section 9 for more details. | - |
| Internal, ground level areas throughout | PCB | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no PCB containing capacitor occurrences were identified to the internal ground level areas of the building at the time of the inspection.<br><br>Refer to Section 9 for more details. | - |
| **INTERNAL AREAS – FIRST LEVEL** | | | | | | | | | | | | |
| Internal, first level, vermiculite ceiling throughout | Asbestos | Presumed same as 2161-01-01 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, first level, IT / server room, white vinyl floor tiles concealed by carpet | Asbestos | 2161-01-09 | **Asbestos Detected** | 1 | 1 | 3 | 1 | 5 | **L** | **P3** | Full extent yet to be determined.<br><br>Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details. |  |
| Internal, first level, IT / server room, bituminous glue beneath white vinyl floor tiles concealed by carpet | Asbestos | 2161-01-10 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |
| Internal, first level, reading room, white vinyl floor tiles concealed by carpet | Asbestos | 2161-01-07 | **Asbestos Detected** | 1 | 1 | 3 | 1 | 5 | **L** | **P3** | Full extent yet to be determined.<br><br>Manage in accordance with Corrective Management Action (CMA) table.<br><br>Removal by LARC prior to refurbishment / demolition works.<br><br>Refer to Section 9 for more details. |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, first level, reading room, bituminous glue beneath white vinyl floor tiles concealed by carpet | Asbestos | 2161-01-08 | No Asbestos Detected | - | - | - | - | - | - | - | - |  |
| Internal, first level, vertical concrete columns, grey / purple paint system | Lead | 2616-01-LP01 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |
| Internal, first level, book shelve enclosures, white paint system | Lead | 2616-01-LP02 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, first level, storage cupboard, brick walls, white / cream paint system | Lead | 2616-01-LP03 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |
| Internal, first level, IT / server room, concrete rendered walls, yellow paint system | Lead | 2616-01-LP04 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |
| Internal, first level, reading room, brick walls, white / cream / aqua paint system | Lead | 2616-01-LP05 | Non-lead paint (<0.1%) | - | - | - | - | - | - | - | - |  |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal first level areas throughout | Lead | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no lead dust occurrences were identified to the internal first level areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |
| Internal first level areas throughout | SMF | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no SMF occurrences were identified to the internal first level areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |
| Internal first level areas throughout | PCB | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no PCB containing capacitor occurrences were identified to the internal first level areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, first level, AC void space | - | N/A<br><br>Inaccessible | - | - | - | - | - | - | - | - | The first level AC void space should be assessed for the presence of hazardous materials by a Competent Person such as an Assessment Corp LAA, during demolition / refurbishment works when adequate access is available.<br><br>Refer to Section 9 for more details. |  |
| **INTERNAL SURFACES – SECOND LEVEL** | | | | | | | | | | | | |
| Internal, second level areas throughout | Asbestos | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no asbestos occurrences were identified throughout the internal second level areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |
| Internal, second level areas throughout | Lead | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no lead paint occurrences were identified throughout the internal second level areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, second level areas throughout | Lead | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no lead dust occurrences were identified throughout the internal second level areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |
| Internal, second level areas throughout | SMF | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no SMF occurrences were identified throughout the internal second level areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |
| Internal second level areas throughout | PCB | - | - | - | - | - | - | - | - | - | Within the scope and limitations of the survey no PCB containing capacitor occurrences were identified throughout the internal second level areas of the building at the time of the survey.<br><br>Refer to Section 9 for more details. | - |

| Location / Material Description | Hazard Type | Sample Ref. | Material Status | Est. Extent ($m^2$) | Risk Assessment | | | | Risk Status | Action Priority | Recommendations | Photograph |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Friability | Condition | Accessibility | Labelling | | | | |
| Internal, second level, concealed room | - | N/A<br><br>Inaccessible | - | - | - | - | - | - | - | - | The second level concealed room should be assessed for the presence of hazardous materials by a Competent Person such as an Assessment Corp LAA, during demolition / refurbishment works when adequate access is available.<br><br>Refer to Section 9 for more details. |  |

# APPENDIX C:
# LABORATORY REPORTS

# AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112


Our ref : ASET115616 / 118796 / 1 – 12
Your ref : 2161-01-ID
**NATA Accreditation No: 14484**

**Accredited for compliance with ISO/IEC 17025 - Testing.**

16 February 2024

Assessment Corp
11/51-53 Gavenlock Road
Tuggerah NSW 2259

**Attn: Mr Shaun Muir**

Dear Shaun

**Asbestos Identification**
This report presents the results of twelve samples, forwarded by Assessment Corp on 15 February 2024, for analysis for asbestos.

**1.Introduction:** Twelve samples forwarded were examined and analysed for the presence of asbestos on 15 February 2024.

**2. Methods:** The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Australian Standard AS 4964 - 2004 and Safer Environment Method 1 as the supplementary work instruction) (Qualitative Analysis only).**

**3. Results :**

**Sample No. 1. ASET115616 / 118796 / 1. 2161-01-01-Ground level, vermiculite.**
Approx dimensions 2.7 cm x 2.0 cm x 0.3 cm
The sample consisted of fragments and powder of soft plaster material and vermiculite like material.
**No asbestos detected.**

**Sample No. 2. ASET115616 / 118796 / 2. 2161-01-02-Ground level, storage room, VFT.**
Approx dimensions 13.0 cm x 5.0 cm x 0.3 cm
The sample consisted of a fragment of a vinyl floor tile* having bituminous mastic like material as an adhesive layer.
**Chrysotile* asbestos detected.**

**Sample No. 3. ASET115616 / 118796 / 3. 2161-01-03-Ground level, storage room, VFT glue.**
Approx dimensions 2.2 cm x 1.8 cm x 0.3 cm
The sample consisted of a fragment of a bituminous material containing organic fibres.
**No asbestos detected.**

**Sample No. 4. ASET115616 / 118796 / 4. 2161-01-04-Ground level, staff area, VFT.**
Approx dimensions 8.0 cm x 8.0 cm x 0.3 cm
The sample consisted of a fragment of a vinyl floor tile* having mastic like material as an adhesive layer on one side.
**Chrysotile* asbestos detected.**

**Sample No. 5. ASET115616 / 118796 / 5. 2161-01-05-Ground level, staff area, VFT glue.**
Approx dimensions 0.5 cm x 0.4 cm x 0.2 cm
The sample consisted of a fragment of soft mastic like material.
**No asbestos detected.**

**Sample No. 6. ASET115616 / 118796 / 6. 2161-01-06-Ground level, plant room, gasket.**
Approx dimensions 3.5 cm x 1.0 cm x 0.3 cm
The sample consisted of a fragment of soft mastic like material and soft fibrous material containing organic fibres.
**No asbestos detected.**

**Sample No. 7. ASET115616 / 118796 / 7. 2161-01-07-First level, reading room, VFT.**
Approx dimensions 10.2 cm x 7.4 cm x 0.3 cm
The sample consisted of a fragment of a vinyl floor tile* having bitumen material as an adhesive layer on one side.
**Chrysotile* asbestos detected.**

**Sample No. 8. ASET115616 / 118796 / 8. 2161-01-08-First level, reading room, VFT glue.**
Approx dimensions 2.0 cm x 2.0 cm x 0.2 cm
The sample consisted of a fragment of a bituminous material containing organic fibres.
**No asbestos detected.**

**Sample No. 9. ASET115616 / 118796 / 9. 2161-01-09-First level, IT/server room, VFT.**
Approx dimensions 10.0 cm x 8.5 cm x 0.3 cm
The sample consisted of a fragment of a vinyl floor tile* having bitumen material as an adhesive layer on one side.
**Chrysotile* asbestos detected.**

**Sample No. 10. ASET115616 / 118796 / 10. 2161-01-10-First level, IT/serve room, VFT glue.**
Approx dimensions 1.5 cm x 1.0 cm x 0.2 cm
The sample consisted of a fragment of a bituminous material containing organic fibres.
**No asbestos detected.**

**Sample No. 11. ASET115616 / 118796 / 11. 2161-01-11-Brown window putty.**
Approx dimensions 2.5 cm x 0.4 cm x 0.3 cm
The sample consisted of a fragment of soft mastic like material.
**No asbestos detected.**

**Sample No. 12. ASET115616 / 118796 / 12. 2161-01-12-Grey window putty.**
Approx dimensions 1.5 cm x 1.0 cm x 0.2 cm
The sample consisted of a fragment of soft mastic like material.
**Chrysotile asbestos detected.**

Reported by,

**Mahen De Silva. BSc, MSc, Grad Dip (Occ Hyg)**
**Occupational Hygienist / Approved Identifier.** **Accredited for compliance with ISO/IEC 17025 - Testing.**
**Approved Signatory**

*The results contained in this report relate only to the sample/s submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted sample/s is/are representative. Results indicating "No asbestos detected" indicates a reporting limit specified in AS4964-2004 which is 0.1g/ Kg (0.01%). Any amounts detected at assumed lower level than that would be reported, however those assumed lower levels may be treated as "No asbestos detected" as specified and recommended by A4964-2004. Trace / respirable level asbestos will be reported only when detected.*

*** denotes asbestos detected in ACM in bonded form.**

# APPENDIX B
# PROTECTED MATTERS SEARCH

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 28-Jun-2024

# Summary

## Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance (Ramsar | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 5 |
| Listed Threatened Species: | 85 |
| Listed Migratory Species: | 47 |

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

| | |
|---|---|
| Commonwealth Lands: | 2 |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 54 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |
| Habitat Critical to the Survival of Marine Turtles: | None |

## Extra Information

This part of the report provides information that may also be relevant to the area you have

| | |
|---|---|
| State and Territory Reserves: | None |
| Regional Forest Agreements: | 1 |
| Nationally Important Wetlands: | 1 |
| EPBC Act Referrals: | 1 |
| Key Ecological Features (Marine): | None |
| Biologically Important Areas: | 1 |
| Bioregional Assessments: | 1 |
| Geological and Bioregional Assessments: | None |

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

| Community Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community | Endangered | Community likely to occur within area | In feature area |
| Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland | Endangered | Community may occur within area | In feature area |
| Coastal Upland Swamps in the Sydney Basin Bioregion | Endangered | Community likely to occur within area | In feature area |
| Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion | Endangered | Community likely to occur within area | In buffer area only |
| River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria | Critically Endangered | Community likely to occur within area | In feature area |

### Listed Threatened Species [ Resource Information ]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| BIRD | | | |
| Anthochaera phrygia | | | |
| Regent Honeyeater [82338] | Critically Endangered | Species or species habitat known to occur within area | In feature area |
| Ardenna grisea | | | |
| Sooty Shearwater [82651] | Vulnerable | Species or species habitat likely to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Botaurus poiciloptilus<br>Australasian Bittern [1001] | Endangered | Species or species habitat known to occur within area | In feature area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Calidris canutus<br>Red Knot, Knot [855] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area | In feature area |
| Callocephalon fimbriatum<br>Gang-gang Cockatoo [768] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Calyptorhynchus lathami lathami<br>South-eastern Glossy Black-Cockatoo [67036] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Climacteris picumnus victoriae<br>Brown Treecreeper (south-eastern) [67062] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Diomedea antipodensis<br>Antipodean Albatross [64458] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Diomedea antipodensis gibsoni<br>Gibson's Albatross [82270] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Diomedea exulans<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Diomedea sanfordi<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Erythrotriorchis radiatus<br>Red Goshawk [942] | Endangered | Species or species habitat may occur within area | In feature area |
| Falco hypoleucos<br>Grey Falcon [929] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Grantiella picta<br>Painted Honeyeater [470] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Lathamus discolor<br>Swift Parrot [744] | Critically Endangered | Species or species habitat likely to occur within area | In feature area |
| Limosa lapponica baueri<br>Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380] | Endangered | Species or species habitat known to occur within area | In feature area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Melanodryas cucullata cucullata<br>South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093] | Endangered | Species or species habitat may occur within area | In feature area |
| Neophema chrysostoma<br>Blue-winged Parrot [726] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area | In feature area |
| Pachyptila turtur subantarctica<br>Fairy Prion (southern) [64445] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Pycnoptilus floccosus<br>Pilotbird [525] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Stagonopleura guttata<br>Diamond Firetail [59398] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Sternula nereis nereis<br>Australian Fairy Tern [82950] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Thalassarche bulleri<br>Buller's Albatross, Pacific Albatross [64460] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Thalassarche bulleri platei<br>Northern Buller's Albatross, Pacific Albatross [82273] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Thalassarche eremita | | | |
| Chatham Albatross [64457] | Endangered | Foraging, feeding or related behaviour may occur within area | In buffer area only |
| Thalassarche impavida | | | |
| Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Thalassarche melanophris | | | |
| Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In feature area |
| Thalassarche salvini | | | |
| Salvin's Albatross [64463] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Thalassarche steadi | | | |
| White-capped Albatross [64462] | Vulnerable | Foraging, feeding or related behaviour known to occur within area | In buffer area only |
| Tringa nebularia | | | |
| Common Greenshank, Greenshank [832] | Endangered | Species or species habitat likely to occur within area | In feature area |
| FISH | | | |
| Epinephelus daemelii | | | |
| Black Rockcod, Black Cod, Saddled Rockcod [68449] | Vulnerable | Species or species habitat likely to occur within area | In buffer area only |
| Macquaria australasica | | | |
| Macquarie Perch [66632] | Endangered | Species or species habitat may occur within area | In feature area |
| Prototroctes maraena | | | |
| Australian Grayling [26179] | Vulnerable | Species or species habitat may occur within area | In feature area |
| FROG | | | |
| Heleioporus australiacus | | | |
| Giant Burrowing Frog [1973] | Vulnerable | Species or species habitat likely to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Litoria aurea | | | |
| Green and Golden Bell Frog [1870] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Mixophyes balbus | | | |
| Stuttering Frog, Southern Barred Frog (in Victoria) [1942] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Mixophyes iteratus | | | |
| Giant Barred Frog, Southern Barred Frog [1944] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| MAMMAL | | | |
| Chalinolobus dwyeri | | | |
| Large-eared Pied Bat, Large Pied Bat [183] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Dasyurus maculatus maculatus (SE mainland population) | | | |
| Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184] | Endangered | Species or species habitat known to occur within area | In feature area |
| Notamacropus parma | | | |
| Parma Wallaby [89289] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Petauroides volans | | | |
| Greater Glider (southern and central) [254] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Petaurus australis australis | | | |
| Yellow-bellied Glider (south-eastern) [87600] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Petrogale penicillata | | | |
| Brush-tailed Rock-wallaby [225] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) | | | |
| Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Endangered | Species or species habitat known to occur within area | In feature area |
| Potorous tridactylus tridactylus | | | |
| Long-nosed Potoroo (northern) [66645] | Vulnerable | Species or species habitat likely to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| [Pseudomys novaehollandiae](#)<br>New Holland Mouse, Pookila [96] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Pteropus poliocephalus](#)<br>Grey-headed Flying-fox [186] | Vulnerable | Foraging, feeding or related behaviour known to occur within area | In feature area |
| PLANT | | | |
| [Acacia bynoeana](#)<br>Bynoe's Wattle, Tiny Wattle [8575] | Vulnerable | Species or species habitat may occur within area | In feature area |
| [Acacia pubescens](#)<br>Downy Wattle, Hairy Stemmed Wattle [18800] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| [Asterolasia elegans](#)<br>[56780] | Endangered | Species or species habitat may occur within area | In buffer area only |
| [Baloskion longipes](#)<br>Dense Cord-rush [68511] | Vulnerable | Species or species habitat may occur within area | In feature area |
| [Caladenia tessellata](#)<br>Thick-lipped Spider-orchid, Daddy Long-legs [2119] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Cryptostylis hunteriana](#)<br>Leafless Tongue-orchid [19533] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Eucalyptus camfieldii](#)<br>Camfield's Stringybark [15460] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Genoplesium baueri](#)<br>Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528] | Endangered | Species or species habitat likely to occur within area | In feature area |
| [Melaleuca biconvexa](#)<br>Biconvex Paperbark [5583] | Vulnerable | Species or species habitat known to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Melaleuca deanei<br>Deane's Melaleuca [5818] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Micromyrtus blakelyi<br>[6870] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Persicaria elatior<br>Knotweed, Tall Knotweed [5831] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Prostanthera askania<br>Tranquillity Mintbush, Tranquility Mintbush [64958] | Endangered | Species or species habitat may occur within area | In feature area |
| Prostanthera junonis<br>Somersby Mintbush [64960] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Rhizanthella slateri<br>Eastern Underground Orchid [11768] | Endangered | Species or species habitat may occur within area | In feature area |
| Rhodamnia rubescens<br>Scrub Turpentine, Brown Malletwood [15763] | Critically Endangered | Species or species habitat known to occur within area | In feature area |
| Rhodomyrtus psidioides<br>Native Guava [19162] | Critically Endangered | Species or species habitat likely to occur within area | In feature area |
| Rutidosis heterogama<br>Heath Wrinklewort [13132] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Syzygium paniculatum<br>Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Thesium australe<br>Austral Toadflax, Toadflax [15202] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| REPTILE | | | |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat known to occur within area | In buffer area only |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area | In buffer area only |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| Hoplocephalus bungaroides<br>Broad-headed Snake [1182] | Endangered | Species or species habitat may occur within area | In feature area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| SHARK | | | |
| Sphyrna lewini<br>Scalloped Hammerhead [85267] | Conservation Dependent | Species or species habitat likely to occur within area | In buffer area only |

| Listed Migratory Species | | [ Resource Information ] |
|---|---|---|
| Scientific Name | Threatened Category | Presence Text | Buffer Status |
| Migratory Marine Birds | | | |
| Anous stolidus<br>Common Noddy [825] | | Species or species habitat may occur within area | In buffer area only |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area | In feature area |
| Ardenna grisea<br>Sooty Shearwater [82651] | Vulnerable | Species or species habitat likely to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat known to occur within area | In buffer area only |
| Diomedea antipodensis<br>Antipodean Albatross [64458] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Diomedea exulans<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Diomedea sanfordi<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Fregata ariel<br>Lesser Frigatebird, Least Frigatebird [1012] | | Species or species habitat likely to occur within area | In buffer area only |
| Fregata minor<br>Great Frigatebird, Greater Frigatebird [1013] | | Species or species habitat may occur within area | In buffer area only |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Phaethon lepturus<br>White-tailed Tropicbird [1014] | | Species or species habitat may occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Thalassarche bulleri | | | |
| Buller's Albatross, Pacific Albatross [64460] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Thalassarche cauta | | | |
| Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Thalassarche eremita | | | |
| Chatham Albatross [64457] | Endangered | Foraging, feeding or related behaviour may occur within area | In buffer area only |
| Thalassarche impavida | | | |
| Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Thalassarche melanophris | | | |
| Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In feature area |
| Thalassarche salvini | | | |
| Salvin's Albatross [64463] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Thalassarche steadi | | | |
| White-capped Albatross [64462] | Vulnerable | Foraging, feeding or related behaviour known to occur within area | In buffer area only |
| Migratory Marine Species | | | |
| Caretta caretta | | | |
| Loggerhead Turtle [1763] | Endangered | Species or species habitat known to occur within area | In buffer area only |
| Chelonia mydas | | | |
| Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| Dermochelys coriacea | | | |
| Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| [Dugong dugon](#)<br>Dugong [28] | | Species or species habitat may occur within area | In buffer area only |
| [Eretmochelys imbricata](#)<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| [Lamna nasus](#)<br>Porbeagle, Mackerel Shark [83288] | | Species or species habitat likely to occur within area | In buffer area only |
| [Mobula alfredi as Manta alfredi](#)<br>Reef Manta Ray, Coastal Manta Ray [90033] | | Species or species habitat may occur within area | In buffer area only |
| [Mobula birostris as Manta birostris](#)<br>Giant Manta Ray [90034] | | Species or species habitat may occur within area | In buffer area only |
| [Natator depressus](#)<br>Flatback Turtle [59257] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| **Migratory Terrestrial Species** | | | |
| [Cuculus optatus](#)<br>Oriental Cuckoo, Horsfield's Cuckoo [86651] | | Species or species habitat known to occur within area | In feature area |
| [Hirundapus caudacutus](#)<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| [Monarcha melanopsis](#)<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area | In feature area |
| [Motacilla flava](#)<br>Yellow Wagtail [644] | | Species or species habitat likely to occur within area | In feature area |
| [Myiagra cyanoleuca](#)<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| [Rhipidura rufifrons](#)<br>Rufous Fantail [592] | | Species or species habitat known to occur within area | In feature area |
| [Symposiachrus trivirgatus as Monarcha trivirgatus](#)<br>Spectacled Monarch [83946] | | Species or species habitat may occur within area | In feature area |
| **Migratory Wetlands Species** | | | |
| [Actitis hypoleucos](#)<br>Common Sandpiper [59309] | | Species or species habitat may occur within area | In feature area |
| [Calidris acuminata](#)<br>Sharp-tailed Sandpiper [874] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| [Calidris canutus](#)<br>Red Knot, Knot [855] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| [Calidris ferruginea](#)<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area | In feature area |
| [Calidris melanotos](#)<br>Pectoral Sandpiper [858] | | Species or species habitat known to occur within area | In feature area |
| [Charadrius leschenaultii](#)<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Gallinago hardwickii](#)<br>Latham's Snipe, Japanese Snipe [863] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Limosa lapponica](#)<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area | In feature area |
| [Numenius madagascariensis](#)<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Pandion haliaetus | | | |
| Osprey [952] | | Species or species habitat known to occur within area | In feature area |
| Tringa nebularia | | | |
| Common Greenshank, Greenshank [832] | Endangered | Species or species habitat likely to occur within area | In feature area |

## Other Matters Protected by the EPBC Act

### Commonwealth Lands [ Resource Information ]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

| Commonwealth Land Name | State | Buffer Status |
|---|---|---|
| Communications, Information Technology and the Arts - Australian Postal Corporation | | |
| Commonwealth Land - Australian Postal Commission [11776] | NSW | In feature area |
| Defence | | |
| Defence - TS HAWKESBURY [10054] | NSW | In buffer area only |

### Listed Marine Species [ Resource Information ]

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Bird | | | |
| Actitis hypoleucos | | | |
| Common Sandpiper [59309] | | Species or species habitat may occur within area | In feature area |
| Anous stolidus | | | |
| Common Noddy [825] | | Species or species habitat may occur within area | In buffer area only |
| Apus pacificus | | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area overfly marine area | In feature area |
| Ardenna grisea as Puffinus griseus | | | |
| Sooty Shearwater [82651] | Vulnerable | Species or species habitat likely to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Bubulcus ibis as Ardea ibis<br>Cattle Egret [66521] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Calidris canutus<br>Red Knot, Knot [855] | Vulnerable | Species or species habitat known to occur within area overfly marine area | In feature area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area overfly marine area | In feature area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat known to occur within area | In buffer area only |
| Charadrius leschenaultii<br>Greater Sand Plover, Large Sand Plover [877] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Diomedea antipodensis<br>Antipodean Albatross [64458] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Diomedea antipodensis gibsoni as Diomedea gibsoni<br>Gibson's Albatross [82270] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Diomedea epomophora<br>Southern Royal Albatross [89221] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| [Diomedea exulans](#)<br>Wandering Albatross [89223] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| [Diomedea sanfordi](#)<br>Northern Royal Albatross [64456] | Endangered | Species or species habitat may occur within area | In buffer area only |
| [Fregata ariel](#)<br>Lesser Frigatebird, Least Frigatebird [1012] | | Species or species habitat likely to occur within area | In buffer area only |
| [Fregata minor](#)<br>Great Frigatebird, Greater Frigatebird [1013] | | Species or species habitat may occur within area | In buffer area only |
| [Gallinago hardwickii](#)<br>Latham's Snipe, Japanese Snipe [863] | Vulnerable | Species or species habitat likely to occur within area overfly marine area | In feature area |
| [Haliaeetus leucogaster](#)<br>White-bellied Sea-Eagle [943] | | Species or species habitat known to occur within area | In feature area |
| [Hirundapus caudacutus](#)<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area overfly marine area | In feature area |
| [Lathamus discolor](#)<br>Swift Parrot [744] | Critically Endangered | Species or species habitat likely to occur within area overfly marine area | In feature area |
| [Limosa lapponica](#)<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area | In feature area |
| [Macronectes giganteus](#)<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Macronectes halli<br>Northern Giant Petrel [1061] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Monarcha melanopsis<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat likely to occur within area overfly marine area | In feature area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| Neophema chrysostoma<br>Blue-winged Parrot [726] | Vulnerable | Species or species habitat may occur within area overfly marine area | In feature area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area | In feature area |
| Pachyptila turtur<br>Fairy Prion [1066] | | Species or species habitat known to occur within area | In feature area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat known to occur within area | In feature area |
| Phaethon lepturus<br>White-tailed Tropicbird [1014] | | Species or species habitat may occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Pterodroma cervicalis<br>White-necked Petrel [59642] | | Species or species habitat may occur within area | In feature area |
| Rhipidura rufifrons<br>Rufous Fantail [592] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| Rostratula australis as Rostratula benghalensis (sensu lato)<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area overfly marine area | In feature area |
| Sterna striata<br>White-fronted Tern [799] | | Migration route may occur within area | In feature area |
| Symposiachrus trivirgatus as Monarcha trivirgatus<br>Spectacled Monarch [83946] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Thalassarche bulleri<br>Buller's Albatross, Pacific Albatross [64460] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Thalassarche bulleri platei as Thalassarche sp. nov.<br>Northern Buller's Albatross, Pacific Albatross [82273] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Thalassarche cauta<br>Shy Albatross [89224] | Endangered | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| Thalassarche eremita<br>Chatham Albatross [64457] | Endangered | Foraging, feeding or related behaviour may occur within area | In buffer area only |
| Thalassarche impavida<br>Campbell Albatross, Campbell Black-browed Albatross [64459] | Vulnerable | Species or species habitat may occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| [Thalassarche melanophris](#)<br>Black-browed Albatross [66472] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In feature area |
| [Thalassarche salvini](#)<br>Salvin's Albatross [64463] | Vulnerable | Foraging, feeding or related behaviour likely to occur within area | In buffer area only |
| [Thalassarche steadi](#)<br>White-capped Albatross [64462] | Vulnerable | Foraging, feeding or related behaviour known to occur within area | In buffer area only |
| [Tringa nebularia](#)<br>Common Greenshank, Greenshank [832] | Endangered | Species or species habitat likely to occur within area overfly marine area | In feature area |
| **Mammal** | | | |
| [Dugong dugon](#)<br>Dugong [28] | | Species or species habitat may occur within area | In buffer area only |
| **Reptile** | | | |
| [Caretta caretta](#)<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat known to occur within area | In buffer area only |
| [Chelonia mydas](#)<br>Green Turtle [1765] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| [Dermochelys coriacea](#)<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Species or species habitat known to occur within area | In buffer area only |
| [Eretmochelys imbricata](#)<br>Hawksbill Turtle [1766] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| [Natator depressus](#)<br>Flatback Turtle [59257] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |

## Extra Information

### Regional Forest Agreements [ Resource Information ]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

| RFA Name | State | Buffer Status |
|---|---|---|
| North East NSW RFA | New South Wales | In feature area |

### Nationally Important Wetlands [ Resource Information ]

| Wetland Name | State | Buffer Status |
|---|---|---|
| Brisbane Water Estuary | NSW | In buffer area only |

### EPBC Act Referrals [ Resource Information ]

| Title of referral | Reference | Referral Outcome | Assessment Status | Buffer Status |
|---|---|---|---|---|
| Not controlled action | | | | |
| Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia | 2015/7522 | Not Controlled Action | Completed | In feature area |

### Biologically Important Areas [ Resource Information ]

| Scientific Name | Behaviour | Presence | Buffer Status |
|---|---|---|---|
| Seabirds | | | |
| Ardenna tenuirostris | | | |
| Short-tailed Shearwater [82652] | Foraging | Likely to occur | In buffer area only |

### Bioregional Assessments [ Resource Information ]

| SubRegion | BioRegion | Website | Buffer Status |
|---|---|---|---|
| Hunter | Northern Sydney Basin | BA website | In feature area |

# Caveat

## 1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

## 2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

## 3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.



Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

# APPENDIX C
# LIKELIHOOD OF OCCURRENCE TABLE

| Likelihood Criteria | |
|---|---|
| **Recorded** | The species was observed in the study area during the current survey. |
| **High** | It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration. |
| **Moderate** | Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded. |
| **Low** | It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area, or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded. |
| **None** | Suitable habitat is absent from the study area. |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Amphibia | Hylidae | *Litoria aurea* | Green and Golden Bell Frog | E1,P | V | 2 | Inhabits marshes, dams and stream-sides, particularly those containing bullrushes or spikerushes. Optimum habitat includes water-bodies that are unshaded, free of predatory fish, have a grassy area nearby and diurnal sheltering sites. | Low |
| Amphibia | Hylidae | *Litoria brevipalmata* | Green-thighed Frog | V,P | | 1 | Found in rainforest, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000m. Breeds in semi-permanent and ephemeral wetlands. | Low |
| Amphibia | Limnodynastidae | *Heleioporus australiacus* | Giant Burrowing Frog | V,P | V | 51 | Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300m from breeding sites. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Amphibia | Myobatrachidae | *Pseudophryne australis* | Red-crowned Toadlet | V,P | | 127 | Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. | Low |
| Aves | Accipitridae | *Haliaeetus leucogaster* | White-bellied Sea-Eagle | V,P | | 12 | White-bellied Sea-Eagle. Forages over large areas of open water, including coastal seas, rivers, lakes and reservoirs. Breeds close to water in tall open forest or woodland. | Low |
| Aves | Accipitridae | *Hamirostra melanosternon* | Black-breasted Buzzard | V,P,3 | | 1 | Black-breasted Buzzard. Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparsely timbered woodlands. | Low |
| Aves | Accipitridae | *Hieraaetus morphnoides* | Little Eagle | V,P | | 1 | Little Eagle. Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. | Low |
| Aves | Accipitridae | *Lophoictinia isura* | Square-tailed Kite | V,P,3 | | 1 | Square-tailed Kite. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. | Low |
| Aves | Accipitridae | *Pandion cristatus* | Eastern Osprey | V,P,3 | | 19 | Eastern Osprey. Found in coastal areas, islands and estuaries. Nests in tall (usually dead or dead-topped) trees, man-made structures or on coastal cliffs. | Low |
| Aves | Anseranatidae | *Anseranas semipalmata* | Magpie Goose | V,P | | 1 | Magpie Goose. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. | Low |
| Aves | Apodidae | *Hirundapus caudacutus* | White-throated Needletail | V,P | V,C,J,K | 2 | Aerial species that occurs over most types of habitat. Roosts in tree hollows in tall forests. Breeds in northern Asia. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Aves | Ardeidae | *Ixobrychus flavicollis* | Black Bittern | V,P | | 5 | Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. | Low |
| Aves | Burhinidae | *Burhinus grallarius* | Bush Stone-curlew | E1,P | | 173 | Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Largely nocturnal, being especially active on moonlit nights. | Low |
| Aves | Cacatuidae | *Callocephalon fimbriatum* | Gang-gang Cockatoo | E1,P,3 | E | 4 | In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands. | Low |
| Aves | Cacatuidae | *Calyptorhynchus lathami lathami* | South-eastern Glossy Black-Cockatoo | V,P,2 | V | 55 | Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak and Forest Oak are important foods. | Low |
| Aves | Charadriidae | *Pluvialis squatarola* | Grey Plover | P | C,J,K | 2 | Occurs almost entirely in coastal areas, usually in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats. | Low |
| Aves | Climacteridae | *Climacteris picumnus victoriae* | Brown Treecreeper (eastern subspecies) | V,P | V | 1 | Found in eucalypt woodlands, mallee and drier open forest of eastern Australia. Prefers woodlands with an open understorey and plenty of fallen timber and debris. | Low |
| Aves | Haematopodidae | *Haematopus longirostris* | Pied Oystercatcher | E1,P | | 8 | Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide. | Low |
| Aves | Laridae | *Hydroprogne caspia* | Caspian Tern | P | J | 2 | Mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Aves | Laridae | *Sterna hirundo* | Common Tern | P | C,J,K | 3 | Mostly occurs in coastal areas, both on islands and on the mainland. Occasionally found inland. Forages in a wide range of marine and freshwater habitats. | Low |
| Aves | Laridae | *Thalasseus bergii* | Crested Tern | P | J | 1 | Inhabits coastal areas, including beaches, rocky shores, mudflats, estuaries, and lagoons. Often seen roosting on sandy shores or rocky islands. | Low |
| Aves | Meliphagidae | *Anthochaera phrygia* | Regent Honeyeater | E4A,P, 2 | CE | 4 | Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Nectar and insects from eucalypts are the primary food. | Low |
| Aves | Neosittidae | *Daphoenositta chrysoptera* | Varied Sittella | V,P | | 7 | Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. | Low |
| Aves | Petroicidae | *Petroica boodang* | Scarlet Robin | V,P | | 1 | Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. | Low |
| Aves | Pomatostomidae | *Pomatostomus temporalis temporalis* | Grey-crowned Babbler (eastern subspecies) | V,P | | 1 | Inhabits open forests and woodlands, favouring inland plains with an open shrub layer, little ground cover and plenty of fallen timber and leaf litter. | Low |
| Aves | Procellariidae | *Ardenna tenuirostris* | Short-tailed Shearwater | P | C,J,K | 4 | Marine species that breeds on islands. When not breeding, it's pelagic, occurring in subtropical and subantarctic waters of the Pacific Ocean. | Low |
| Aves | Psittacidae | *Glossopsitta pusilla* | Little Lorikeet | V,P | | 9 | Forages primarily in the canopy of open Eucalyptus forest and woodland, but also visits smaller trees and shrubs. Riparian habitats are particularly used. | Low |
| Aves | Psittacidae | *Lathamus discolor* | Swift Parrot | E1,P | CE | 8 | Breeds in Tasmania, migrates to mainland Australia in autumn. On mainland, occurs in areas where eucalypts are flowering profusely or where there are abundant lerp infestations. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Aves | Scolopacidae | *Numenius madagascariensis* | Eastern Curlew | P | CE,C,J,K | 4 | Primarily coastal distribution, found in estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats. | Low |
| Aves | Scolopacidae | *Numenius phaeopus* | Whimbrel | P | C,J,K | 1 | Often found on the intertidal mudflats of sheltered coasts. Also frequents harbours, lagoons, estuaries and river deltas, often with mangroves. | Low |
| Aves | Scolopacidae | *Tringa brevipes* | Grey-tailed Tattler | P | C,J,K | 1 | Inhabits sheltered coasts with reefs and rock platforms or with intertidal mudflats. Also found at intertidal rocky, coral or stony reefs, platforms and islets. | Low |
| Aves | Scolopacidae | *Tringa glareola* | Wood Sandpiper | P | C,J,K | 1 | Fresh and brackish wetlands, including temporary and permanent lakes, swamps and claypans. Prefers wetlands with mud flats and vegetated edges. | Low |
| Aves | Scolopacidae | *Tringa nebularia* | Common Greenshank | P | C,J,K | 1 | Found in a wide variety of inland wetlands and sheltered coastal habitats. Inland, it occurs in muddy margins of swamps, lakes, dams, rivers and streams. | Low |
| Aves | Strigidae | *Ninox connivens* | Barking Owl | V,P,3 | | 9 | Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend into closed forest and more open areas. | Low |
| Aves | Strigidae | *Ninox strenua* | Powerful Owl | V,P,3 | | 78 | Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tree hollows for nesting. | Low |
| Aves | Tytonidae | *Tyto novaehollandiae* | Masked Owl | V,P,3 | | 6 | Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Habitat must include a combination of old hollow eucalypts for nesting, dense understorey for roosting, and open areas for hunting. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Aves | Tytonidae | *Tyto tenebricosa* | Sooty Owl | V,P,3 | | 44 | Occurs in the moist eucalypt forests and rainforests, and the dense gullies and river valleys that support these vegetation types. Requires large hollows in old trees for nesting. | Low |
| Flora | Dilleniaceae | *Hibbertia procumbens* | Spreading Guinea Flower | E1 | | 449 | Grows in sandy or rocky heath and scrub, often near swamps. It occurs on the coast and adjacent ranges of eastern Australia. | Low |
| Flora | Dilleniaceae | *Hibbertia puberula* | | E1 | | 7 | Found in heathland, shrubland and dry sclerophyll forest on sandy soils. Often occurs in areas with laterite or sandstone geology. | Low |
| Flora | Elaeocarpaceae | *Tetratheca glandulosa* | | V | | 1 | Occurs in sandy or rocky heath, scrub and woodlands associated with sandstone, or sandy soils. | Low |
| Flora | Elaeocarpaceae | *Tetratheca juncea* | Black-eyed Susan | V | V | 1 | Found in a variety of forest and woodland habitats. Prefers well-drained sites with a moderate to high nutrient content. Often associated with ridges or slopes. | Low |
| Flora | Ericaceae | *Epacris purpurascens var. purpurascens* | | V | | 2 | Occurs in sclerophyll forest, scrubs and swamps. Found on sandstone and clay substrates, often in areas with high soil moisture. | Low |
| Flora | Fabaceae (Mimosoideae) | *Acacia pubescens* | Downy Wattle | V | V | 1 | Grows in open woodland and forest, in a variety of plant communities. Occurs on alluviums, shales and at the intergrade between shales and sandstones. | Low |
| Flora | Grammitidaceae | *Grammitis stenophylla* | Narrow-leaf Finger Fern | E1,3 | | 1 | Grows in moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest. | Low |
| Flora | Lamiaceae | *Prostanthera askania* | Tranquility Mintbush | E1 | E | 83 | Grows in sclerophyll forest and rainforest. Occurs on sandy soils overlying sandstone, in moist sclerophyll forest and warm temperate rainforest. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Flora | Lamiaceae | *Prostanthera junonis* | Somersby Mintbush | E1 | E | 125 | Found in low open woodland or open scrub. Restricted to a small area near Gosford on the NSW Central Coast. | Low |
| Flora | Lindsaeaceae | *Lindsaea fraseri* | Fraser's Screw Fern | E1,3 | | 1 | Grows in swamp forests or along streams in rainforest areas. | Low |
| Flora | Myrtaceae | *Callistemon linearifolius* | Netted Bottle Brush | V,3 | | 9 | Occurs in dry sclerophyll forest on the coast and adjacent ranges. | Low |
| Flora | Myrtaceae | *Darwinia glaucophylla* | | V | | 223 | Found in heathland and dry sclerophyll forest. Grows on sandstone ridges, often in rocky areas. | Low |
| Flora | Myrtaceae | *Eucalyptus camfieldii* | Camfield's Stringybark | V | V | 5 | Occurs in coastal heath on shallow sandy soils overlying Hawkesbury sandstone. | Low |
| Flora | Myrtaceae | *Eucalyptus glaucina* | Slaty Red Gum | V | V | 1 | Found in grassy woodland on deep, moderately fertile and well-watered soil. Occurs in coastal and sub-coastal areas. | Low |
| Flora | Myrtaceae | *Melaleuca biconvexa* | Biconvex Paperbark | V | V | 131 | Occurs in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. | Low |
| Flora | Myrtaceae | *Melaleuca deanei* | Deane's Paperbark | V | V | 2 | Grows in wet heath on sandstone and sandy soils in coastal districts, extending into nearby ranges. | Low |
| Flora | Myrtaceae | *Rhodamnia rubescens* | Scrub Turpentine | E4A | CE | 57 | Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest, usually on volcanic and sedimentary soils. | Low |
| Flora | Myrtaceae | *Rhodomyrtus psidioides* | Native Guava | E4A | CE | 3 | Occurs in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest, often near creeks and drainage lines. | Low |
| Flora | Myrtaceae | *Syzygium paniculatum* | Magenta Lilly Pilly | E1 | V | 19 | Found in subtropical and littoral rainforest on sandy soils or stabilized dunes near the sea. | Low |
| Flora | Orchidaceae | *Cryptostylis hunteriana* | Leafless Tongue Orchid | V,P,2 | V | 1 | Grows in swamp-heath and drier forest on sandy soils on the coast and nearby ranges. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Flora | Orchidaceae | *Dendrobium melaleucaphilum* | Spider orchid | E1,P,2 | | 1 | Grows on trees in coastal districts and nearby ranges, extending from rainforest into moist eucalypt forest. | Low |
| Flora | Restionaceae | *Baloskion longipes* | Dense Cord-rush | V | V | 1 | Found in swamps, sedgelands and wet heathlands in coastal areas. | Low |
| Mammalia | Burramyidae | *Cercartetus nanus* | Eastern Pygmy-possum | V,P | | 29 | Inhabits rainforest through to sclerophyll forest and tree heath. Optimal habitat appears to be a mixture of heath and woodland. | Low |
| Mammalia | Dasyuridae | *Dasyurus maculatus* | Spotted-tailed Quoll | V,P | E | 61 | Inhabits a range of forest types, including rainforest, open forest, woodland and coastal heath. Requires hollow-bearing trees, rocky outcrops or caves for den sites. | Low |
| Mammalia | Emballonuridae | *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | V,P | | 1 | Forages in most habitats across its range, with and without trees. Roosts in tree hollows, mammal burrows and various man-made structures. | Low |
| Mammalia | Miniopteridae | *Miniopterus australis* | Little Bent-winged Bat | V,P | | 48 | Coastal areas, moist eucalypt forests, rainforests, wet and dry sclerophyll forests, Melaleuca swamps, dense coastal forests and banksia scrub. Roosts in caves, tunnels, and sometimes tree hollows. | Low |
| Mammalia | Miniopteridae | *Miniopterus orianae oceanensis* | Large Bent-winged Bat | V,P | | 35 | Occurs in a wide range of habitats including rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland. Roosts in caves, old mines, and stormwater channels. | Low |
| Mammalia | Molossidae | *Micronomus norfolkensis* | Eastern Coastal Free-tailed Bat | V,P | | 14 | Occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in man-made structures. | Low |
| Mammalia | Muridae | *Pseudomys gracilicaudatus* | Eastern Chestnut Mouse | V,P | | 1 | Inhabits dense, wet heath and swamps, favouring areas with thick ground cover. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Mammalia | Petauridae | *Petaurus australis* | Yellow-bellied Glider | V,P | V | 11 | Found in a variety of forest types but prefers tall, mature eucalypt forest with high rainfall and rich soil. Requires abundant hollow-bearing trees and a mix of eucalypt species. | Low |
| Mammalia | Petauridae | *Petaurus norfolcensis* | Squirrel Glider | V,P | | 10 | Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. | Low |
| Mammalia | Phascolarctidae | *Phascolarctos cinereus* | Koala | E1,P | E | 11 | Inhabits eucalypt woodlands and forests. Feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but favours about 10 eucalypt species. | Low |
| Mammalia | Potoroidae | *Potorous tridactylus* | Long-nosed Potoroo | V,P | V | 4 | Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat. | Low |
| Mammalia | Pseudocheiridae | *Petauroides volans* | Southern Greater Glider | E1,P | E | 5 | Inhabits a variety of eucalypt forests, from low open forests on the coast to tall forests in the ranges and low woodland westwards. Requires abundant hollow-bearing trees. | Low |
| Mammalia | Pteropodidae | *Pteropus poliocephalus* | Grey-headed Flying-fox | V,P | V | 218 | Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. Forages on the nectar and pollen of native trees, especially Eucalyptus, Melaleuca and Banksia. | Medium |
| Mammalia | Vespertilionidae | *Chalinolobus dwyeri* | Large-eared Pied Bat | V,P | E | 1 | Roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin. Frequents low to mid-elevation dry open forest and woodland close to these features. | Low |
| Mammalia | Vespertilionidae | *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V,P | | 12 | Inhabits moist and dry eucalypt forest and occasionally rainforest. Prefers tall, wet forest in high rainfall areas. | Low |

| Class | Family | Scientific Name | Common Name | NSW status | Comm. status | Records | Description | Likelihood of Occurrence |
|---|---|---|---|---|---|---|---|---|
| Mammalia | Vespertilionidae | *Myotis macropus* | Southern Myotis | V,P | | 15 | Forages over streams and pools catching insects and small fish. Roosts in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage. | Low |
| Mammalia | Vespertilionidae | *Scoteanax rueppellii* | Greater Broad-nosed Bat | V,P | | 10 | Forages in moister gullies and wet sclerophyll forests as well as in lightly wooded areas and open spaces/ecotones. Roosts in tree hollows. | Low |
| Mammalia | Vespertilionidae | *Vespadelus troughtoni* | Eastern Cave Bat | V,P | | 6 | Roosts in caves, old mines, and tunnels. Forages in well-timbered valleys. | Low |
| Reptilia | Cheloniidae | *Caretta caretta* | Loggerhead Turtle | E1,P | E | 1 | Occurs in tropical and warm temperate waters off the Australian coast. Nests on sandy beaches. | Low |
| Reptilia | Cheloniidae | *Chelonia mydas* | Green Turtle | V,P | V | 7 | Found in tropical and subtropical waters. Forages in shallow benthic habitats such as coral and rocky reefs, seagrass beds, and algal mats. Nests on sandy beaches. | Low |
| Reptilia | Varanidae | *Varanus rosenbergi* | Rosenberg's Goanna | V,P | | 2 | Found in heath, open forest and woodland. Associated with termite mounds, which they use for nesting and shelter. | Low |

# APPENDIX D
# ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM (AHIMS)

# APPENDIX E
# AUSTRALIAN STANDARD PROTECTION OF TREES ON DEVELOPMENT SITES

AS 4970—2009
(Incorporating Amendment No. 1)

AS 4970—2009

Australian Standard®

# Protection of trees on development sites

This Australian Standard® was prepared by Committee EV-018 (formerly BD-068), Arboriculture. It was approved on behalf of the Council of Standards Australia on 31 July 2009.
This Standard was published on 26 August 2009.

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The following are represented on Committee EV-018 (formerly BD-068):

- Australian Council of National Trusts
- Australian Institute of Building Surveyors
- Australian Institute of Horticulture
- Australian Institute of Landscape Architects
- Australian Local Government Association
- Australian Pipeline Industry Association
- Australian Property Institute
- Energy Networks Association
- Institute of Australian Consulting Arboriculturists
- International Society of Arboriculture (Australia Chapter)
- Local Government Tree Resources Association
- National Arborists Association of Australia
- Nursery and Garden Industry Australia
- Parks and Leisure Australia
- TAFE NSW
- The University of Melbourne
- Water Services Association of Australia

Additional Interests:

- National Trusts of Australia NSW
- Wollongong City Council

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This Standard was issued in draft form for comment as DR AS 4970.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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AS 4970—2009
(Incorporating Amendment No. 1)

Australian Standard®

# Protection of trees on development sites

First published as AS 4970—2009.
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# PREFACE

This Standard was prepared by the Standards Australia Committee EV-018, Arboriculture.

*This Standard incorporates Amendment No. 1 (March 2010). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.*

This Standard provides guidance for arborists, architects, builders, engineers, land managers, landscape architects and contractors, planners, building surveyors, those concerned with the care and protection of trees, and all others interested in integration between trees and construction.

This document describes the best practices for the planning and protection of trees on development sites. The procedures described are based on plant biology and current best practices as covered in recently published literature.

The assistance obtained from the 1991 and 2005 editions of BS 5837, *Trees in relation to construction—Recommendation*, along with Matheny and Clark (1998)* and Mattheck and Breloer (1994)* is acknowledged.

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

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* See bibliography in Appendix E for details.

# CONTENTS

# FOREWORD

Landscape design is an important component of most development. Established trees of appropriate species and sound structure are beneficial components of the built environment and a potential asset to any development site. Trees may be retained because of their—

(a) aesthetic qualities;

(b) heritage values;

(c) ecosystem benefits, including—

  (i) stormwater management;

  (ii) shade and heat reduction qualities;

  (iii) wildlife habitat and biodiversity;

  (iv) carbon dioxide absorption;

  (v) particulate pollution capture;

  (vi) salt wind protection; and

(d) social and psychological values.

A living tree is a dynamic organism that needs specific environmental conditions to continue healthy, stable growth. It is rarely possible to repair stressed and injured trees, so substantial injury needs to be avoided during all stages of development and construction. For trees to be retained and their requirements met, procedures must be in place to protect trees at every stage of the development process. This should be taken into account at the earliest planning stage of any outdoor event or design of a development project where trees are involved.

Trees and their root systems may occupy a substantial part of any development site and because of their potential size, can have a major influence on planning the use of the site.

Existing trees of appropriate species and sound structure can significantly enhance new development by providing immediate benefits such as shade and stormwater reduction as well as complementing new development.

Most trees will take many years and possibly decades to establish but can be injured or killed in a very short time as their vulnerability is commonly not understood. This is especially so in relation to tree root systems which cannot usually be seen. Irreparable injury frequently occurs in the early stages of site occupation and remedial measures routinely fail.

Early identification and protection of important trees on development sites is essential from the outset and will minimize the problems of retaining inappropriate trees.

Successful long term retention of trees on development sites depends on an acceptance and acknowledgment of the constraints and benefits that existing trees generate. Protecting trees in accordance with this Standard may influence design and construction costs and this should be considered in project budgets and contracts. The gains and benefits of retaining trees will accrue if the measures detailed in this Standard are applied.

STANDARDS AUSTRALIA

# Australian Standard
# Protection of trees on development sites

## SECTION 1 SCOPE AND GENERAL

### 1.1 SCOPE

This Standard provides guidance on the principles for protecting trees on land subject to development. It follows, in sequence, the stages of development from planning to implementation.

This Standard aims to assist those concerned with trees in relation to development. Where development is to occur, the Standard provides guidance on how to decide which trees are appropriate for retention, and on the means of protecting those trees during construction work. It does not argue for or against development, or for the removal or retention of trees nor does it consider the monetary value of trees. The Standard does not apply to the establishment of new trees.

### 1.2 APPLICATION

This Standard gives guidance to horticulturists, arborists, architects, builders, engineers, land managers, landscape architects, contractors, planners, determining authorities, building surveyors, certifiers, those concerned with the care and protection of trees, and all others involved in the management of trees and development.

### 1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS
1319 Safety signs for the occupational environment

4373 Pruning of amenity trees

4454 Composts, soil conditioners and mulches

4687 Temporary fencing and hoardings

### 1.4 DEFINITIONS

For the purpose of this Standard, the following definitions apply:

#### 1.4.1 Determining authority

Those bodies responsible for issuing approvals.

#### 1.4.2 Development

Includes the following:

(a) The use of land (e.g. festival events, use of park areas and other events) that requires approval.

(b) The subdivision of land.

(c) The erection of a building.

(d) The carrying out of a work.

(e) The demolition of a building or works.

(f) Road works.

(g) The installation of utilities and services.

(h) Any other act, matter or thing as defined by the relevant legislation.

### 1.4.3 Diameter at breast height (DBH)

The nominal trunk diameter at 1.4 m above ground level determined from the circumference of the trunk divided by *pi* ($\pi$) (see Appendix A).

### 1.4.4 Project arborist

The person responsible for carrying out the tree assessment, report preparation, consultation with designers, specifying tree protection measures, monitoring and certification. The project arborist will be suitably experienced and competent in arboriculture, having acquired through training, qualification (minimum Australian Qualification Framework (AQF) Level 5, Diploma of Horticulture (Arboriculture)) and/or equivalent experience, the knowledge and skills enabling that person to perform the tasks required by this Standard.

### 1.4.5 Structural root zone (SRZ)

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.

### 1.4.6 Tree

Long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority).

### 1.4.7 Tree protection zone (TPZ)

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.

### 1.4.8 Vigour

Ability of a tree to sustain its life processes.

The term 'vigour' in this document is synonymous with commonly used terms such as 'health' and 'vitality'.

### 1.4.9 Work

Any physical activity in relation to land that is specified by the determining authority.

# SECTION 2 PLANNING AND THE TREE MANAGEMENT PROCESS

## 2.1 TREE MANAGEMENT PROCESS

The success of the tree management process will depend on the cooperation of all involved in the design and development team. In particular, it is essential for those involved in site works to appreciate the need for maintaining the area of protection around the trees.

An example of the tree management process in relation to the stages of a typical development is set out in Table 1.

NOTE: Appendix B outlines potential damage to trees on development sites.

## 2.2 DETERMINING AUTHORITIES

Legal controls and liabilities under common law should be considered at the earliest stages of potential site development.

NOTE: Trees may be subject to legislation. Where development is proposed, additional protection may be appropriate and may be enforced by a determining authority.

Determining authorities have an important role in encouraging and enforcing the development process. Table 1 indicates the common stages in the development process and typical considerations and actions applicable to trees.

When development has been approved, planning conditions may be imposed for the management of trees.

**TABLE 1**

**INDICATIVE STAGES IN DEVELOPMENT AND THE TREE MANAGEMENT PROCESS**

| Stage in development | Tree management process | |
|---|---|---|
| | Matters for consideration | Actions and certification |
| **Planning (Sections 2 and 3)** | | |
| Site acquisition | Legal constraints | |
| Detail surveys | Council plans and policies<br>Planning instruments and controls<br>Heritage<br>Threatened species | Existing trees accurately plotted on survey plan |
| Preliminary tree assessment | Hazard/risks<br>Tree retention value | Evaluate trees suitable for retention and mark on plan<br>Provide preliminary arboricultural report and indicative TPZs to guide development layout |
| Preliminary development design | Condition of trees<br>Proximity to buildings<br>Location of services<br>Roads<br>Level changes<br>Building operations space<br>Long-term management | Planning selection of trees for retention<br>Design review by proponent<br>Design modifications to minimize impact to trees |

(*continued*)

TABLE 1 (*continued*)

| Stage in development | Tree management process | |
|---|---|---|
| | **Matters for consideration** | **Actions and certification** |
| Development submission | Identify trees for retention through comprehensive arboricultural impact assessment of proposed construction.<br>Determine tree protection measures<br>Landscape design | Provide arboricultural impact assessment including tree protection plan (drawing) and specification |
| Development approval | Development controls<br>Conditions of consent | Review consent conditions relating to trees |
| **Pre-construction (Sections 4 and 5)** | | |
| Initial site preparation | State based OHS requirements for tree work | Compliance with conditions of consent |
| | Approved retention/removal | Tree removal/tree retention/transplanting |
| | Refer to AS 4373 for the requirements on the pruning of amenity trees | Tree pruning<br>Certification of tree removal and pruning |
| | Specifications for tree protection measures | Establish/delineate TPZ<br>Install protective measures |
| | | Certification of tree protection measures |
| **Construction (Sections 4 and 5)** | | |
| Site establishment | Temporary infrastructure<br>Demolition, bulk earthworks, hydrology | Locate temporary infrastructure to minimize impact on retained trees<br>Maintain protective measures<br>Certification of tree protection measures |
| Construction work | Liaison with site manager, compliance<br>Deviation from approved plan | Maintain or amend protective measures<br>Supervision and monitoring |
| Implement hard and soft landscape works | Installation of irrigation services<br>Control of compaction work<br>Installation of pavement and retaining walls | Remove selected protective measures as necessary<br>Remedial tree works<br>Supervision and monitoring |
| Practical completion | Tree vigour and structure | Remove all remaining tree protection measures<br>Certification of tree protection |
| **Post construction (Section 5)** | | |
| Defects liability/ maintenance period | Tree vigour and structure | Maintenance and monitoring<br>Final remedial tree works<br>Final certification of tree condition |

NOTES:

1 Owing to variations in planning legislation this table is a general indication of the process only.

2 Certification of tree protection and condition should be carried out by the project aborist.

## 2.3 PLANNING

### 2.3.1 Site survey

A detailed topographical survey should be made showing all existing site features.

NOTE: This should be made by a registered surveyor.

The survey plans should include—

(a) location of all individual trees or groups of trees and other vegetation;

(b) location of trees on land adjacent to the development site that may be impacted by the development;

(c) crown spread, measured and drawn to scale, defining the actual crown spread;

(d) other features, such as streams, creeks, watercourses, buildings and above and below ground services; and

(e) spot heights of ground level throughout the development site and specifically including level at the base of individual trees as a basis for evaluating changes in soil level around retained trees.

NOTES:

1 Before commencing this survey, advice should be sought from the project arborist to confirm relevant items for inclusion in the survey.

2 Other vegetation may need to be surveyed to meet specific provisions of the determining authority or legislation.

### 2.3.2 Preliminary tree assessment

The preliminary assessment of the trees should take place at the beginning of the project, once any site surveys have been completed. The purpose of this assessment is to provide quantitative and qualitative information on the trees. All trees included in the site survey should be numbered and assessed by the project arborist as the basis for deciding which trees are suitable for retention. For each tree consideration should be given to—

(a) correct botanical identification and common name;

(b) vigour;

(c) structure;

(d) dimensions, height, crown spread and DBH;

(e) age class;

(f) estimated life expectancy;

(g) heritage and/or cultural matters (refer Note 3);

(h) ecological and habitat matters (refer Note 3);

(i) the location relative to existing site features, e.g. its function as a screen or as a landmark feature;

(j) other matters relevant to the site, e.g. surface roots; and

(k) retention value.

NOTES:

1 These criteria should also be recorded for trees surveyed on adjacent properties.

2 Accuracy of the survey data to be verified by the arborist.

3 Input from other specialists may be required.

4 If trees require tagging use a temporary, non-injurious method.

5 A number of commonly used assessment methods are contained is documents listed in Appendix E.

### 2.3.3 Preliminary arboricultural report

Tree protection is most effective when considered at the earliest stage of development planning. The process will require reports at different stages. The most crucial reports are the Preliminary Arboricultural Report and the Arboricultural Impact Assessment.

The preliminary report is not intended to be the comprehensive tree protection report. This information is to be used by planners, architects and designers, in conjunction with any planning controls and other legislation, to develop the design layout in such a way that trees selected for retention are provided with enough space.

The report should list all the trees, providing all the details collected in the tree assessment (see Clause 2.3.2). Trees (or groups of trees) should be placed into categories based on their suitability for retention (for examples refer to documents listed in Appendix E).

Trees suitable for retention should be identified and marked on the detailed survey plan. This plan should also show the location of TPZs, trees to be transplanted and trees to be removed. TPZs are to be calculated as shown in Section 3.

### 2.3.4 Development design and review

The preliminary arboricultural report should guide the development layout. During the design and documentation stages, the project arborist should be involved in ongoing review of architectural, engineering (e.g. bulk earth works and construction drawings), services and landscape drawings. The purpose of this is to determine the potential impact on trees proposed to be retained.

Consideration should be given to tree sensitive measures such as pier and beam, suspended slabs, cantilevered building sections, screw piles and contiguous piling.

Service corridors should be established at the planning stage to avoid their redirection after works have commenced. It is essential that detailed plans show the routing of all services (above and below ground) in the proximity of trees.

Consideration should be given to activities required during the construction stage, such as over-excavation, scaffolding, temporary access roads, stockpiling materials, site sheds, temporary services and sediment control measures as well as the permanent elements of the development such as onsite water detention and storage.

### 2.3.5 Arboricultural impact assessment

The arboricultural impact assessment will be prepared once the final layout is complete. The report will identify trees to be removed, retained or transplanted. The report will identify possible impacts on trees to be retained. The report will explain design and construction methods proposed to minimize impacts on retained trees where there is encroachment into the calculated TPZ (refer to Clause 3.3.2). It will recommend measures necessary to protect the trees throughout all demolition and construction stages. Review of architectural, services and landscape plans should be included to provide an accurate impact assessment. If these plans are not available for review, it should be clearly stated in the report. Specification of tree protection measures will be included in construction documentation (refer to Section 4).

The report will include a tree protection plan (drawing) showing the TPZs for trees being retained taking into account the matters referred to in Section 3 and other protection measures. Groups of trees with overlapping TPZs may be included within a single protection area. A copy of this plan will form part of the development plans.

The tree protection plan should be included in subsequent construction documentation. The location of tree protection measures should also be shown on other documents such as demolition, bulk earth works, construction and landscape plans.

# SECTION 3 DETERMINING THE PROTECTION ZONES OF THE SELECTED TREES

## 3.1 TREE PROTECTION ZONE (TPZ)

The tree protection zone (TPZ) is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The TPZ incorporates the structural root zone (SRZ) (refer to Clause 3.3.5).

## 3.2 DETERMINING THE TPZ

The radius of the TPZ is calculated for each tree by multiplying its DBH × 12.

$$TPZ = DBH \times 12$$

where

DBH = trunk diameter measured at 1.4 m above ground

Radius is measured from the centre of the stem at ground level.

A TPZ should not be less than 2 m nor greater than 15 m (except where crown protection is required). Clause 3.3 covers variations to the TPZ.

The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 m outside the crown projection.

## 3.3 VARIATIONS TO THE TPZ

### 3.3.1 General

It may be possible to encroach into or make variations to the standard TPZ. Encroachment includes excavation, compacted fill and machine trenching.

### 3.3.2 Minor encroachment

If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ (see Clause 3.3.5), detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. Variations must be made by the project arborist considering relevant factors listed in Clause 3.3.4. The figures in Appendix D demonstrate some examples of possible encroachment into the TPZ up to 10% of the area.

### 3.3.3 Major encroachment

If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ (see Clause 3.3.5), the project arborist must demonstrate that the tree(s) would remain viable. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. This may require root investigation by non-destructive methods and consideration of relevant factors listed in Clause 3.3.4.

### 3.3.4 TPZ encroachment considerations

When determining the potential impacts of encroachment into the TPZ, the project arborist should consider the following:

(a) Location and distribution of the roots to be determined through non-destructive investigation methods (pneumatic, hydraulic, hand digging or ground penetrating radar). Photographs should be taken and a root zone map prepared.

NOTE: Regardless of the method, roots must not be cut, bruised or frayed during the process. It is imperative that exposed roots are kept moist and the excavation back filled as soon as possible.

(b) The potential loss of root mass resulting from the encroachment: number and size of roots.

(c) Tree species and tolerance to root disturbance.

(d) Age, vigour and size of the tree.

(e) Lean and stability of the tree.

NOTE: Roots on the tension side are likely to be most important for supporting the tree and are likely to extend for a greater distance.

(f) Soil characteristics and volume, topography and drainage.

(g) The presence of existing or past structures or obstacles affecting root growth.

(h) Design factors.

Tree sensitive construction measures such as pier and beam, suspended slabs, cantilevered building sections, screw piles and contiguous piling can minimize the impact of encroachment.

When siting a structure near to a tree, the future growth of the tree, both above and below ground should be taken into account. Precautions should be taken at the planning and design stage to minimize potential conflict between trees and new structures.

When the root zone is reactive clay, techniques such as localized pier and beam (bridged), screwpile footings or root and soil moisture control barriers may be appropriate to minimize effects on structures.

NOTE: Collaboration may be required between the project arborist and the geotechnical or structural engineer. Further information is provided in the documents listed in Appendix E.

### 3.3.5 Structural root zone (SRZ)

The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree.

The SRZ only needs to be calculated when major encroachment into a TPZ is proposed.

There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula or Figure 1. Root investigation may provide more information on the extent of these roots.

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64$$

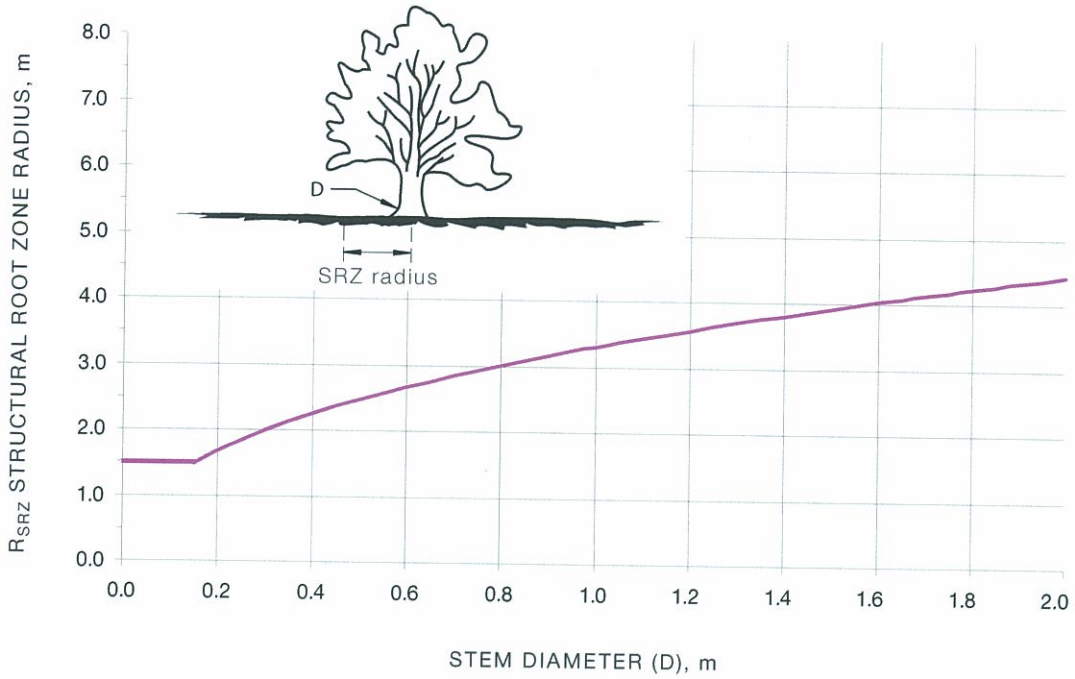
where

$D$ = trunk diameter, in m, measured above the root buttress

NOTE: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m (see Figure 1).

A1




The curve can be expressed by the following formula:
$R_{SRZ} = (D \times 50)^{0.42} \times 0.64$

NOTES:

1 $R_{SRZ}$ is the calculated structural root zone radius (SRZ radius).
2 D is the stem diameter measured immediately above root buttress.
3 The $R_{SRZ}$ for trees less than 0.15 m diameter is 1.5 m.
4 The $R_{SRZ}$ formula and graph do not apply to palms, other monocots, cycads and tree ferns.
5 This does not apply to trees with an asymmetrical root plate.

FIGURE 1 STRUCTURAL ROOT ZONE CALCULATION

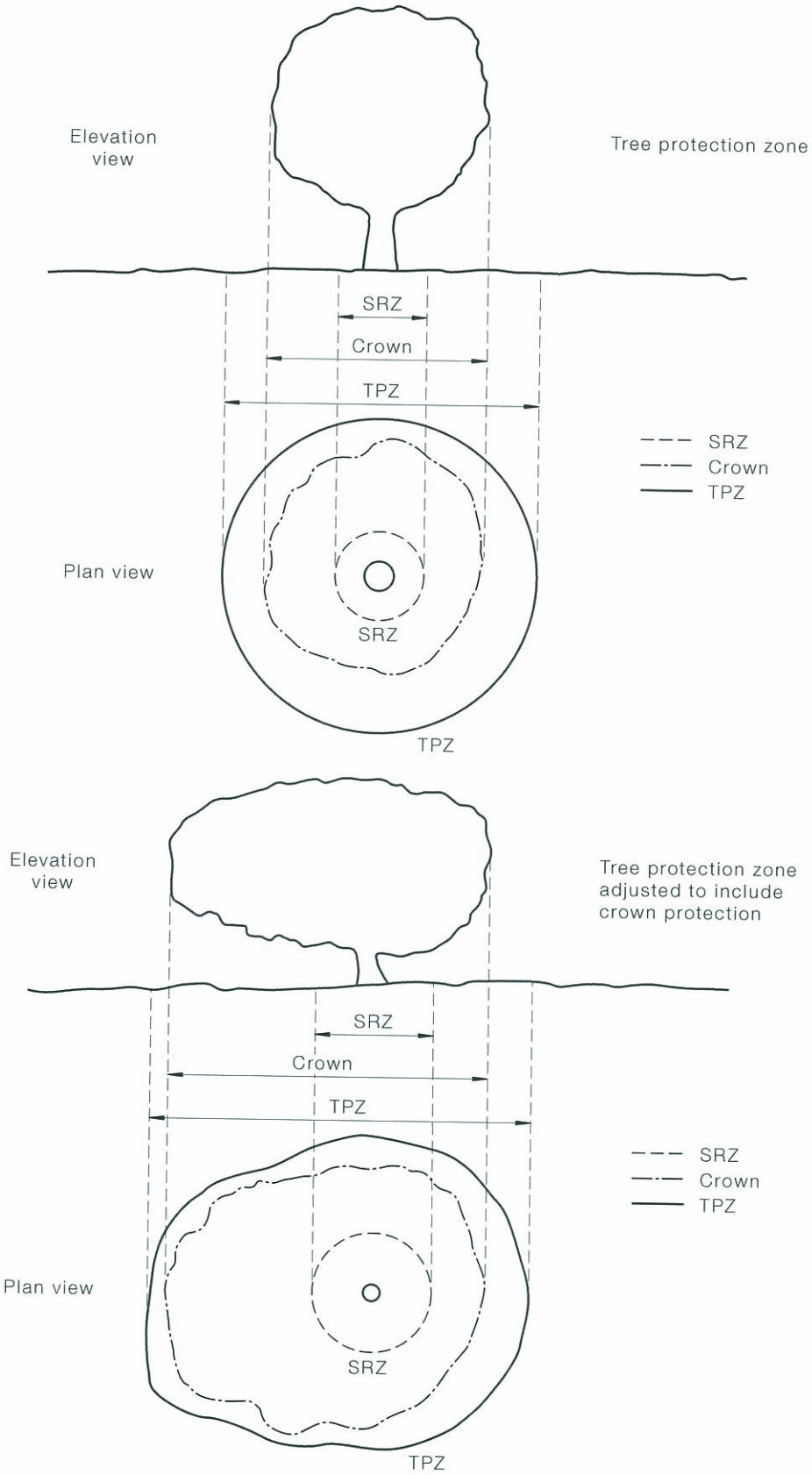
### 3.3.6 Crown protection

Tree crowns may be injured by machinery such as excavators, drilling rigs, cranes, trucks, hoarding installation and scaffolding. The TPZ may need to include additional protection of the above ground parts of the tree.

Where crown protection is required, it will usually be located at least one metre outside the perimeter of the crown (see Figure 2). The erection of scaffolding may require an additional setback from the edge of the crown.

Crown protection may include pruning, tying-back of branches or other measures. If pruning is required, requirements are specified in AS 4373 and should be undertaken before the establishment of the TPZ.

NOTE: Pruning may require approval from the determining authority.




NOTE: Refer to Clause 3.2 for calculation of TPZ.

FIGURE 2 INDICATIVE TREE PROTECTION ZONE

# SECTION 4 TREE PROTECTION MEASURES

## 4.1 GENERAL

Tree protection measures include a range of activities and structures. Structures are used to identify and isolate the TPZ (refer to Section 3). These measures are identified in the arboricultural impact assessment and tree protection plan.

The TPZ is a restricted area usually delineated by protective fencing (or use of an existing structure such as an existing fence or wall). It is installed prior to site establishment and retained intact until completion of the works.

Some works and activities within the TPZ may be authorized by the determining authority. These must be supervised by the project arborist. Any additional encroachment that becomes necessary as the site works progress must be reviewed by the project arborist and be acceptable to the determining authority before being carried out.

Approved tree removal and pruning should be carried out before the installation of tree protection measures.

## 4.2 ACTIVITIES RESTRICTED WITHIN THE TPZ

Activities generally excluded from the TPZ include but are not limited to—

(a) machine excavation including trenching;

(b) excavation for silt fencing;

(c) cultivation;

(d) storage;

(e) preparation of chemicals, including preparation of cement products;

(f) parking of vehicles and plant;

(g) refuelling;

(h) dumping of waste;

(i) wash down and cleaning of equipment;

(j) placement of fill;

(k) lighting of fires;

(l) soil level changes;

(m) temporary or permanent installation of utilities and signs, and

(n) physical damage to the tree.

## 4.3 PROTECTIVE FENCING

Fencing should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project arborist. The TPZ should be secured to restrict access.

AS 4687 specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area.

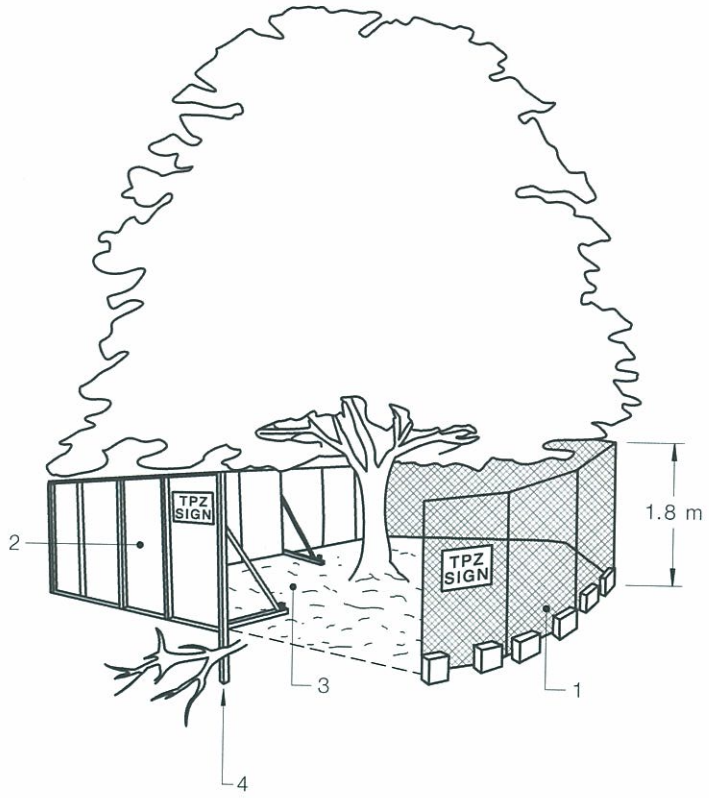
Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots.

Existing perimeter fencing and other structures may be suitable as part of the protective fencing.

Figure 3 indicates an example of protective fencing.

### 4.4 SIGNS

Signs identifying the TPZ should be placed around the edge of the TPZ and be visible from within the development site (refer Figure 3). The lettering on the sign should comply with AS 1319. Appendix C provides an example of a suitable TPZ sign.




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 PROTECTIVE FENCING

### 4.5 OTHER TREE PROTECTION MEASURES

#### 4.5.1 General

When tree protection fencing cannot be installed or requires temporary removal, other tree protection measures should be used, including those set out below.

### 4.5.2 Trunk and branch protection

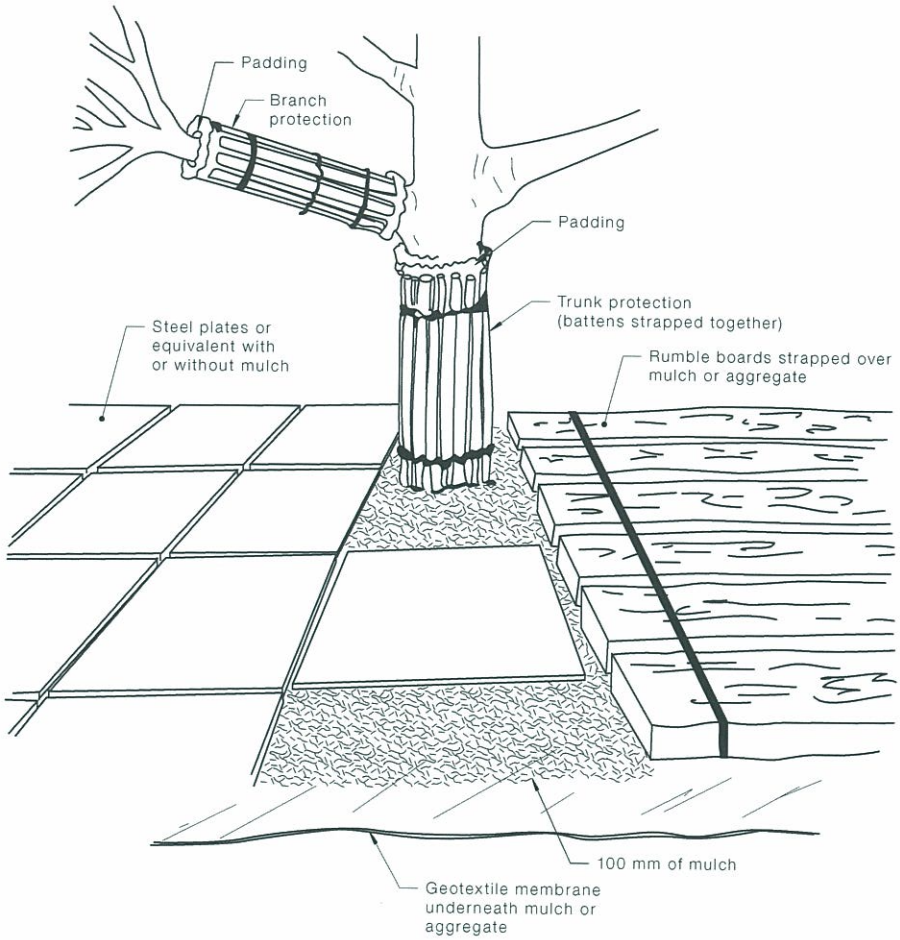
Where necessary, install protection to the trunk and branches of trees as shown in Figure 4. The materials and positioning of protection are to be specified by the project arborist. A minimum height of 2 m is recommended.

Do not attach temporary powerlines, stays, guys and the like to the tree. Do not drive nails into the trunks or branches.

### 4.5.3 Ground protection

If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards as per Figure 4.

These measures may be applied to root zones beyond the TPZ.




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 EXAMPLES OF TRUNK, BRANCH AND GROUND PROTECTION

### 4.5.4 Root protection during works within the TPZ

Some approved works within the TPZ, such as regrading, installation of piers or landscaping may have the potential to damage roots.

If the grade is to be raised the material should be coarser or more porous than the underlying material. Depth and compaction should be minimized.

Manual excavation should be carried out under the supervision of the project arborist to identify roots critical to tree stability. Relocation or redesign of works may be required.

Where the project arborist identifies roots to be pruned within or at the outer edge of the TPZ, they should be pruned with a final cut to undamaged wood. Pruning cuts should be made with sharp tools such as secateurs, pruners, handsaws or chainsaws. Pruning wounds should not be treated with dressings or paints. It is not acceptable for roots within the TPZ to be 'pruned' with machinery such as backhoes or excavators.

Where roots within the TPZ are exposed by excavation, temporary root protection should be installed to prevent them drying out. This may include jute mesh or hessian sheeting as multiple layers over exposed roots and excavated soil profile, extending to the full depth of the root zone. Root protection sheeting should be pegged in place and kept moist during the period that the root zone is exposed.

Other excavation works in proximity to trees, including landscape works such as paving, irrigation and planting can adversely affect root systems. Seek advice from the project arborist.

### 4.5.5 Installing underground services within TPZ

All services should be routed outside the TPZ. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches.

The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees.

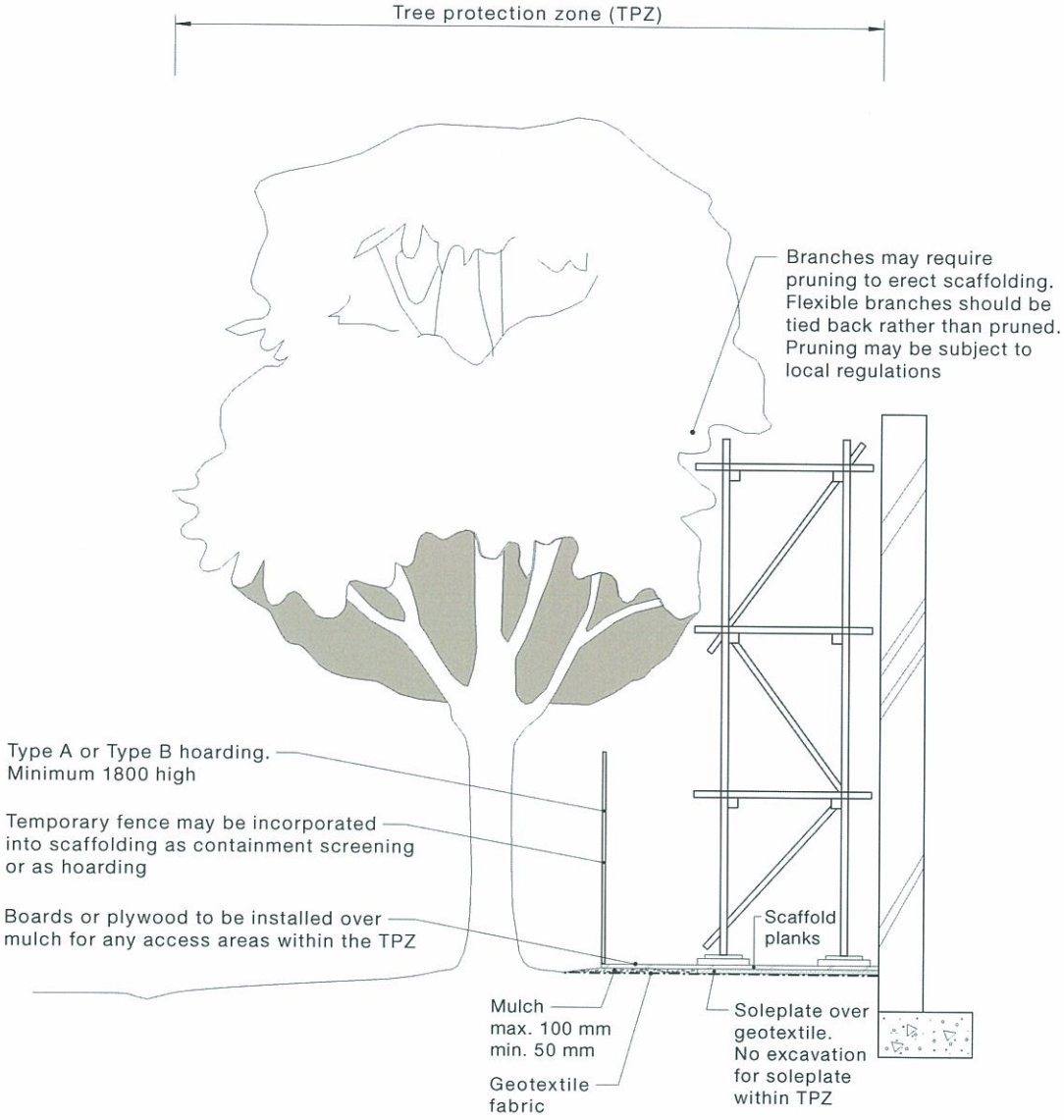
For manual excavation of trenches the project arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools. Refer Clause 4.5.3.

### 4.5.6 Scaffolding

Where scaffolding is required it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimized. This can be achieved by designing scaffolding to avoid branches or tying back branches. Where pruning is unavoidable it must be specified by the project arborist in accordance with AS 4373.

NOTE: Pruning works may require approval by determining authority.

Ground below the scaffolding should be protected by boarding (e.g. scaffold board or plywood sheeting) as shown in Figure 5. Where access is required, a board walk or other surface material should be installed to minimize soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed.




NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

FIGURE 5 INDICATIVE SCAFFOLDING WITHIN A TPZ

## 4.6 MAINTAINING THE TPZ

### 4.6.1 Mulching

The area within the TPZ should be mulched. The mulch must be maintained to a depth of 50–100 mm using material that complies with AS 4454. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required.

### 4.6.2 Watering

Soil moisture levels should be regularly monitored by the project arborist. Temporary irrigation or watering may be required within the TPZ. An above-ground irrigation system should be installed and maintained by a competent individual.

### 4.6.3 Weed removal

All weeds should be removed by hand without soil disturbance or should be controlled with appropriate use of herbicide.

# SECTION 5 MONITORING AND CERTIFICATION

## 5.1 GENERAL

There are many stages in the development process from site acquisition to completion where the project arborist is required to monitor or certify tree protection. Table 1 summarizes the process and indicates the stages that normally require certification (a written statement of compliance). This Section provides details of the monitoring and certification process.

## 5.2 TREE PROTECTION PLAN

The approved tree protection plan must be available onsite prior to the commencement of and during works. The tree protection plan will identify key stages where monitoring and certification will be required.

A pre-construction meeting should be attended by the site manager, the project arborist and contractors to introduce the tree protection plan and its requirements.

## 5.3 PRE-CONSTRUCTION

### 5.3.1 Tree removal and pruning

Trees for removal or transplanting should be marked onsite as per the approved tree protection plan. Before removal, the project arborist should confirm that all marked trees correspond with those shown on the schedule or plan. Other tree work may be specified in the tree protection plan.

Tree removal should be carried out prior to erection of protection fencing. Contractors should be instructed to avoid damage to trees within protection areas when removing or pruning trees. This may include restrictions of vehicle movements.

Any approved pruning required to allow for works should be done at this stage. AS 4373 specifies requirements for pruning.

Stumps to be removed from within a TPZ must be removed in a manner that avoids damaging or disturbing roots of trees to be retained.

The project arborist should supervise tree removal, transplanting and pruning and certify the works on completion.

### 5.3.2 Installing tree protection fencing and other protection measures

Fencing and other protection measures are to be installed in compliance with Section 4 and as detailed in the tree protection plan.

Protection measures are to be certified by the project arborist.

## 5.4 CONSTRUCTION STAGE

### 5.4.1 General

In order to ensure that protection measures are being adhered to during the pre-construction and construction stages, there should be a predetermined number of site inspections carried out by the project arborist. Matters to be monitored and reported should include tree condition, tree protection measures and impact of site works which may arise from changes to the approved plans.

If there is non-compliance with tree protection measures or if trees have been damaged, a timeframe for compliance and remedial works should be specified by the project arborist. The determining authority may need to be notified of non-compliance issues. Monitoring, reporting and certification should be carried out at the following critical stages of construction.

### 5.4.2 Site establishment

The project arborist will monitor the impacts of demolition, bulk earth works, installation of temporary infrastructure including bunding, sediment control works and drainage works.

The construction management plan (site establishment plan) should be checked for compliance with the tree protection plan. The construction management plan normally includes location of site sheds, stockpile areas, temporary access roads and sediment control devices.

At completion of site establishment, the project arborist should certify that tree protection measures comply with the tree protection plan.

### 5.4.3 Construction work

The project arborist will monitor the impacts of general construction works on retained trees. Monitoring should be done at regular intervals or in consultation with the site manager. Monitoring is to be recorded for inclusion in certification at practical completion.

Critical stages typically include installation of services, footings and slabs, scaffolding, works within the TPZ and at completion of building works.

### 5.4.4 Landscape works

The landscape plan should be checked for compliance with the tree protection plan. The project arborist may need to approve the staged removal of protection measures required to allow for landscape works. The project arborist should supervise any works within TPZs, including retaining walls, irrigation and lighting installation, topdressing, planting and paving. The project arborist should specify any remedial works above and below ground. Monitoring is to be recorded for inclusion in certification at practical completion.

### 5.4.5 Practical completion

Practical completion assumes that all construction and landscaping works are finished. At practical completion all remaining tree protection measures should be removed. The project arborist should assess tree condition and provide certification of tree protection.

## 5.5 POST-CONSTRUCTION

### 5.5.1 Defects liability period

Completion of outstanding building or landscaping works following the construction period must not injure trees.

### 5.5.2 Final certification

The project arborist should assess the condition of trees and their growing environment, and make recommendations for any necessary remedial actions.

Following the final inspection and the completion of any remedial works, the project arborist should certify (as appropriate) that the completed works have been carried out in compliance with the approved plans and specifications for tree protection. Certification should include a statement on the condition of the retained trees, details of any deviations from the approved tree protection measures and their impacts on trees. Copies of monitoring documentation may be required.

NOTES:

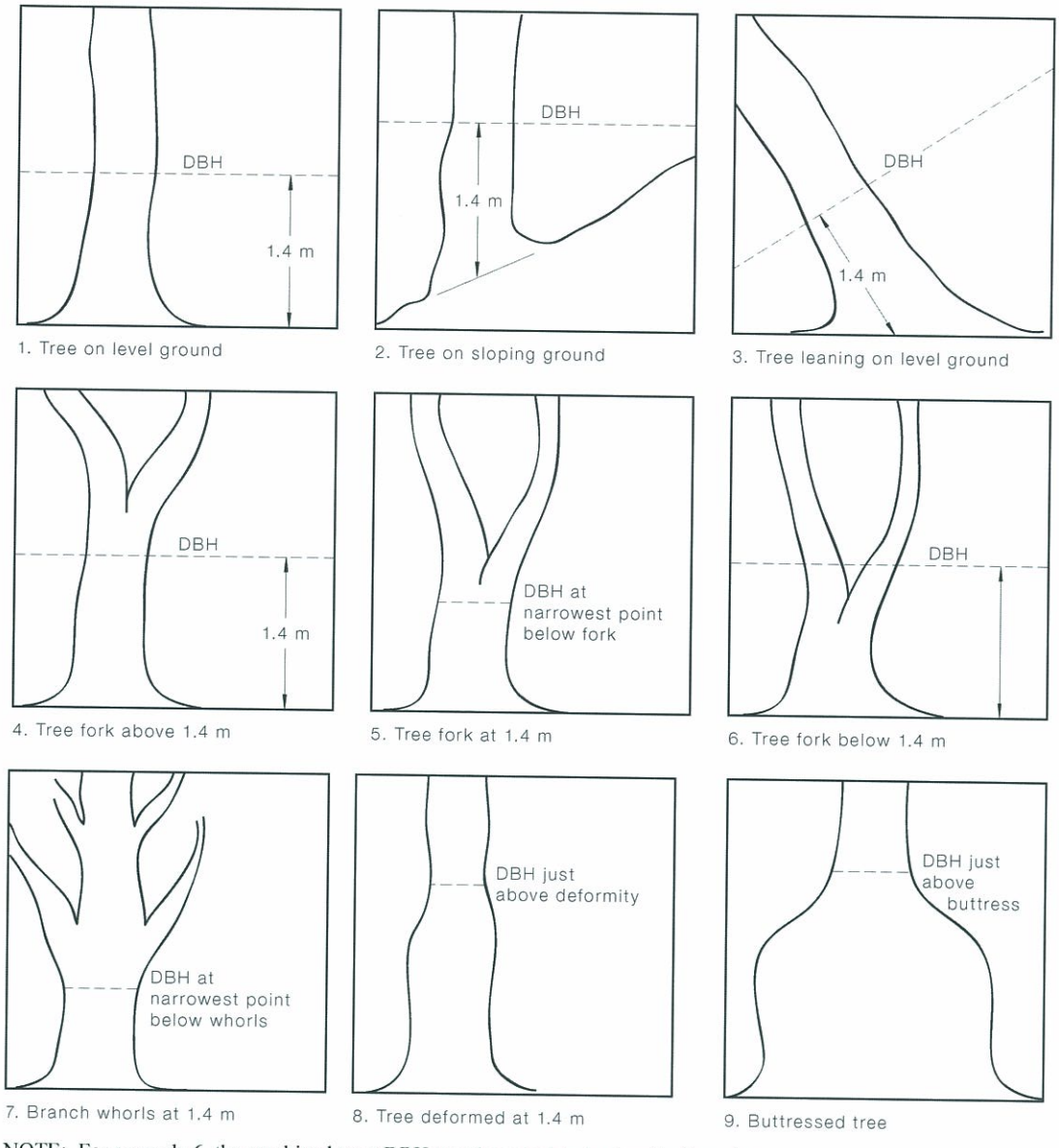
1 Remedial actions may include pruning in accordance with AS 4373 and/or soil remediation.

2 If the project arborist has not been involved throughout the project, they should have access to inspection reports by others and should review construction drawings to determine likely impacts on trees.

# APPENDIX A
# DIAMETER AT BREAST HEIGHT (DBH)

(Informative)

The diversity of trunk shapes, configurations and growing environments requires that DBH be measured using a range of methods to suit particular situations and Figure A1 provides examples.




NOTE: For example 6, the combined stem DBH may be calculated using the formula:

$$\text{Total DBH} = \sqrt{(\text{DBH}_1)^2 + (\text{DBH}_2)^2 + (\text{DBH}_3)^2}$$

FIGURE A1 MEASUREMENT OF DBH OF A TREE

# APPENDIX B

# POTENTIAL DAMAGE TO TREES ON DEVELOPMENT SITES

(Informative)

## B1 INTRODUCTION

Established trees of good vigour and structure represent an asset to any development site, particularly if landscaping is a significant component of the proposed development. Trees may be retained because of their aesthetic features, for shade, for the scale that they will give to new buildings or for their historical value.

Trees are living organisms that require certain environmental conditions in order to maintain their value as an asset. As remediation of badly stressed or damaged trees is rarely successful, damage must be avoided or minimized during development. Hence, if trees are to be retained and their requirements met, procedures which ensure the protection of trees must be in place at all stages of the development including the demolition stage.

## B2 BACKGROUND BIOLOGY

### B2.1 General

All plants consist of three main sections: a crown (leaves), a stem or trunk and a root system. Each one of these sections carries out specific functions necessary for the survival of the tree as all of the parts interact. A tree is in a state of physiological equilibrium between the above ground and below ground sections, so that if one of these sections is damaged, the entire tree will suffer and symptoms may appear in any part of the tree.

Thus any demolition and construction operations that occur around trees must be carried out in such a way as to minimize the impact on the health of the tree.

### B2.2 Leaves

The main function of leaves is photosynthesis, that is, the production of sugars. The sugars produced by the leaves (and any other green tissue) are the source of chemical energy for all living cells in the entire plant and as such are essential for the normal functioning and survival of the tree. Anything that directly or indirectly damages the leaves will interfere with photosynthesis.

### B2.3 Trunks and branches

Branches and trunks are composed of many tissues with specialized functions including the bark (protection), phloem (transport of sugars from the leaves), vascular cambium (growth of new transport tissues), sapwood (transport of water and nutrients from the roots), heartwood (strength and structural support) and rays (internal transport and storage of sugars). Damage to branches or trunks may allow infection by plant pathogens (disease-causing organisms), disrupt the movement of vital materials and structurally weaken the tree.

### B2.4 Roots

The main functions of roots include the uptake of water and nutrients, anchorage, storage of sugar reserves and the production of some plant hormones required by the shoots. In order for roots to function, they must be supplied with oxygen from the soil. The root system of trees consists of several 'types' of roots found in different parts of the soil and is generally much more extensive than commonly thought. The importance of roots is easily overlooked because they are not visible, that is 'out of sight, out of mind'. Damage to the root system is a common cause of tree decline and death and is the most common form of damage associated with development sites.

Root growth is opportunistic and takes place wherever the soil environment is favourable. The most limiting factor for root growth is air. A number of studies have indicated that roots are much more extensive than commonly thought. In general roots extend outward from the trunk and occupy irregularly shaped areas 4 to 7 times larger than the projected crown area with an average diameter of two or more times the height of the tree. It is a fallacy that tree roots only extend to the edge of the crown.

Root systems consist of three main parts—

(a) the structural woody roots (anchorage, storage and transport);

(b) lower order roots (anchorage, storage and transport); and

(c) non-woody roots (absorption of water and nutrients, extension, synthesis of amino acids and growth regulators) (see Figure B1).

In addition to lateral root spread being underestimated, root depth in trees has also been grossly exaggerated. Deep root systems or taproots are the exception rather than the rule. Most roots of most trees are found in the very top of the soil. The vast majority of these roots are small non-woody absorbing roots which grow upward into the very surface layers of the soil and leaf litter. This delicate, non-woody system, because of its proximity to the surface, is very vulnerable to injury.

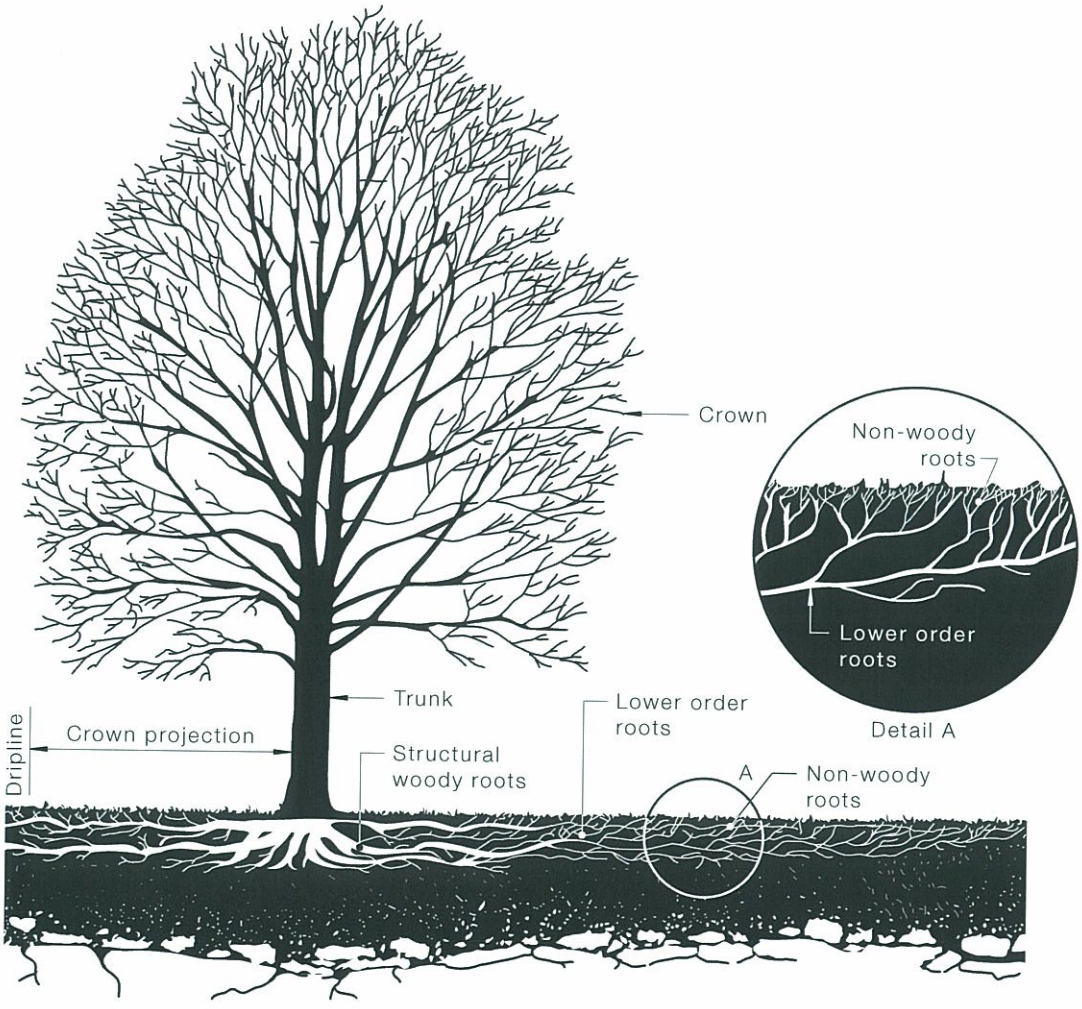



FIGURE B1 STRUCTURE OF A TREE IN A NORMAL GROWING ENVIRONMENT

## B3 EFFECTS OF DEVELOPMENT ON TREES

### B3.1 General

All parts of the tree may be damaged by development. Damage to any one part of the tree will affect its functioning as a whole. This Paragraph (B3) considers the possible impact of injury on the functioning of each main section of the tree. This highlights the specific protective measures that need to be undertaken.

### B3.2 Crown damage

The canopy of trees can be directly or indirectly damaged. Indirect damage will occur as a result of trunk and or root damage and will not be discussed here.

Usually, foliage may be lost or damaged on development sites by pruning or mechanical injury by trucks, cranes, excavators and so on. The removal of leaves reduces the level of photosynthesis and thus the production of sugars. This in turn reduces the tree's capacity to function normally and to withstand stresses imposed by a change in its environment.

Incorrect techniques of pruning such as lopping or flush cutting may produce wounds that are susceptible to infection by wood decay organisms. Similarly, mechanical damage to branches by machinery, etc. will also create wounds. Trees automatically respond to wounding and in doing so use stored sugars. Any wound places an additional load on trees that will inevitably be stressed during construction.

### B3.3 Trunk damage

Trunks of trees may be wounded mechanically during demolition and construction work. This not only predisposes a tree to potential decay but it also interferes with the transport of water, nutrients and sugars throughout the tree. Serious impacts may structurally weaken the tree.

### B3.4 Root damage

Root damage is the most common cause of damage to trees on development sites. As already mentioned in Paragraph B2.4, roots are far more extensive and closer to the surface than commonly thought. Roots can be damaged in the following ways:

(a) Removed during grading, excavation and trenching for foundations services, etc.

(b) Mechanically wounded, crushed or torn.

(c) Compaction by machinery, storage of materials, and installation of work sheds.

(d) Soil buildup.

(e) Laying of pavements.

(f) Chemical contamination of the soil by solvents, fuel, oil, diesel, herbicides, cement waste, etc.

(g) Changes in air levels through changes in drainage patterns.

(h) Changes in available water.

Apart from the actual removal of roots during excavation or trenching, soil compaction is one of the major causes of root damage on development sites. Compaction is defined as the loss of large pore spaces (macropores) within the soil with a net loss of total pore space. Macropores are essential for the exchange of gases between the soil air and the atmosphere (aeration) and the removal of excess water from the soil (drainage).

Compaction results from loads or stress forces applied to the soil as well as shear forces. Both foot traffic and vehicle traffic exert both forces on soils. Vehicle traffic may cause significant compaction at depths of 150–200 mm (the area in which most absorbing roots are located). The degree of compaction will depend on weight of vehicles, number of movements, soil moisture levels and clay content. Soil handling, stockpiling and transporting also tend to lead to the breakdown of soil structure and thus to compaction. Vibration as a result of frequent traffic or adjacent construction activities will also compact soils.

The effects of compaction include—

(i) reduced aeration (oxygen levels decrease and carbon dioxide concentration increases to perhaps toxic levels);

(ii) low oxygen levels discourage root growth and thus the uptake of water and nutrients;

(iii) reduced infiltration of water into the soil and more run-off;

(iv) increased run-off increases soil losses by erosion;

(v) low oxygen levels also lead to chemical changes in the soil which can reduce the availability of some plant nutrients; and

(vi) the reduction in the number and diversity of beneficial soil organisms (including mycorrhizal fungi).

In summary, the effects of root loss or damage by any means could include—

(A) loss of stability if structural woody roots or even lower order woody roots are cut;

(B) reduction in water and nutrient uptake;

(C) an eventual loss of leaves, reduced photosynthesis and thus sugar production;

(D) decay as a result of wounding; and

(E) predisposition to soil borne pathogens.

It is commonly observed that trees may take many years to decline and eventually die from root damage.

## B4 CONCLUSIONS

The negative impacts of inadequate development design, planning and supervision are cumulative and very difficult to remediate after development is completed. The best way to ensure the long term retention of established trees is to follow the guidelines outlined in this Standard.

Additional guidance may be found in the documents listed in Appendix E.

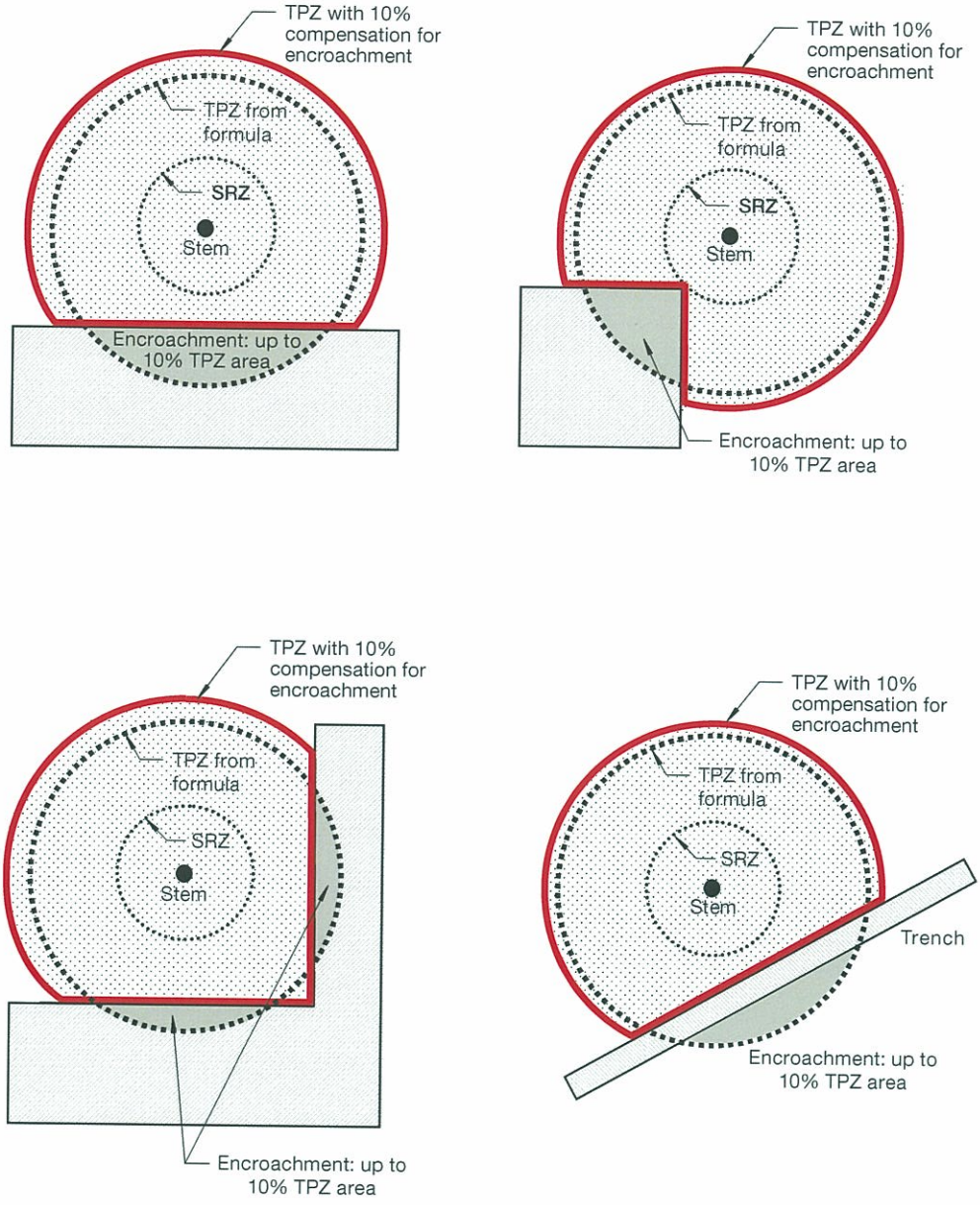
# APPENDIX C
# TREE PROTECTION ZONE SIGN EXAMPLE
(Informative)

A TPZ sign provides clear and readily accessible information to indicate that a TPZ has been established. Figure C1 provides an example of a suitable sign.


FIGURE C1 TREE PROTECTION ZONE SIGN

# APPENDIX D
# ENCROACHMENT INTO TREE PROTECTION ZONE
(Informative)

Encroachment into the tree protection zone (TPZ) is sometimes unavoidable. Figure D1 provides examples of TPZ encroachment by area, to assist in reducing the impact of such incursions.




NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

FIGURE D1 EXAMPLES OF MINOR ENCROACHMENT INTO TPZ

# APPENDIX E

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# AMENDMENT CONTROL SHEET

## AS 4970—2009

## Amendment No. 1 (2010)

### CORRECTION

*SUMMARY:* This Amendment applies to the Preface and Figure 1.

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## Melbourne

15 Business Park Drive
Notting Hill VIC 3168
Telephone (03) 8526 0800

## Sydney

Suite 3, Level 1, 20 Wentworth Street
Parramatta NSW 2150
Telephone (02) 9354 0300

## Brisbane

Level 5, 43 Peel Street
South Brisbane QLD 4101
Telephone (07) 3105 1460

## Adelaide

1/198 Greenhill Road
Eastwood SA 5063
Telephone (08) 8378 8000

## Perth

Level 1, 21 Adelaide Street
Fremantle WA 6160
Telephone (08) 6555 0105

## New Zealand

7/3 Empire Street
Cambridge New Zealand 3434
Telephone +64 27 777 0989

## Wangaratta

First Floor, 40 Rowan Street
Wangaratta VIC 3677
Telephone (03) 5721 2650

## Geelong

51 Little Fyans Street
Geelong VIC 3220
Telephone (03) 8526 0800

## Wimmera

597 Joel South Road
Stawell VIC 3380
Telephone 0438 510 240

## Gold Coast

Suite 37, Level 4, 194 Varsity Parade
Varsity Lakes QLD 4227
Telephone (07) 5676 7602

watertech.com.au