



White Rock

Conservation Area Management Plan

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Intrapac Property Pty Ltd

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Contents

| | |
|-------------------------------------------------------------------------------------------------------|------------|
| Executive Summary | vii |
| 1 Introduction..... | 1 |
| 1.1 Background..... | 1 |
| 1.2 Key Terms | 5 |
| 2 Description of the environment | 5 |
| 2.1 Location | 5 |
| 2.2 Drainage and hydrology | 5 |
| 2.3 Vegetation communities | 5 |
| 2.3.1 Current vegetation state | 6 |
| 2.4 Significant flora and fauna | 11 |
| 2.5 Exotic flora | 13 |
| 2.6 Feral animals | 13 |
| 2.7 Threatening processes relating to koalas currently within Conservation Area | 13 |
| 2.7.1 Overview..... | 13 |
| 2.8 Threatening processes relating to Grey-Headed Flying Fox currently within Conservation Area | 17 |
| 3 Strategic objectives..... | 18 |
| 3.1 Overarching approach | 18 |
| 3.2 Koala and GHFF habitat management objectives..... | 19 |
| 4 Legal administration | 23 |
| 4.1 General | 23 |
| 4.2 Insurance | 24 |
| 5 Implementation roles and responsibilities | 25 |
| 5.1 General | 25 |
| 5.2 Establishment phase | 25 |
| 5.3 Maintenance phase | 27 |
| 6 Construction-related management actions | 28 |
| 6.1 Translocation of habitat features | 28 |
| 6.2 Fencing and signage | 28 |
| 6.2.1 Vandalism / Access Deterrent Infrastructure | 28 |
| 6.2.2 Construction fencing | 28 |
| 6.2.3 Erection of permanent fencing..... | 28 |
| 6.2.4 Erection of permanent signage..... | 29 |

| | | |
|-----------|-------------------------------------------------|-----------|
| 6.3 | Sediment and erosion control..... | 29 |
| 6.4 | Waste..... | 30 |
| 7 | Bushland management actions | 31 |
| 7.1 | Fire management | 31 |
| 7.2 | Bushfire/recreation trails..... | 32 |
| 7.3 | Significant flora management..... | 33 |
| 7.4 | Pest animal management..... | 33 |
| 7.5 | Revegetation..... | 34 |
| 7.6 | Weed control..... | 34 |
| 7.7 | Native tree management | 34 |
| 8 | Management zones | 35 |
| 8.1 | General..... | 35 |
| 8.2 | MZ1: Riparian restoration | 35 |
| 8.3 | MZ2: Assisted regeneration..... | 35 |
| 8.4 | MZ3: Regeneration | 36 |
| 9 | Monitoring and reporting..... | 38 |
| 9.1 | On-maintenance Monitoring | 38 |
| 9.1.1 | Vegetation Monitoring..... | 38 |
| 9.1.2 | Koala Population Monitoring..... | 39 |
| 9.1.3 | Pest Fauna Monitoring | 39 |
| 9.2 | Monitoring of infrastructure..... | 39 |
| 9.3 | Annual reports | 39 |
| 9.4 | Final Reports | 40 |
| 9.5 | CAMP Review..... | 40 |
| 10 | Work schedule | 41 |
| 10.1 | Indicative work schedule | 41 |
| 11 | Performance and Completion Criteria..... | 43 |
| 11.1 | Performance criteria | 43 |
| 11.2 | Completion criteria..... | 45 |
| 11.3 | Adaptive management..... | 46 |
| 12 | Costs..... | 47 |
| 12.1 | Construction-related management actions..... | 47 |
| 12.2 | Bushland management actions | 47 |
| 12.2.1 | Fire management | 47 |
| 12.2.2 | Pest control..... | 47 |
| 12.2.3 | Bushfire/recreation trails..... | 47 |

| | |
|--------------------------------------------------------|-----------|
| 12.2.4 Revegetation..... | 47 |
| 12.2.5 Weed control..... | 47 |
| 12.3 Monitoring and reporting..... | 48 |
| References | 50 |
| Appendix A – ICC / Intrapac Agreement | 54 |
| Appendix B - Revegetation Specifications | 55 |
| Appendix C - Weed Control Techniques..... | 57 |
| Appendix D Proposed Infrastructure Design | 61 |
| Appendix E List of Flora | 62 |

List of figures

| | |
|-------------------------------------------------------------------------------------------------|----|
| Figure 1: Subject Lots | 2 |
| Figure 2: Development footprint and proposed conservation area | 3 |
| Figure 3: The Adjacent White Rock – Spring Mountain Conservation Estate | 4 |
| Figure 4: Vegetation within the proposed Conservation Area..... | 7 |
| Figure 5: Aerial photography highlighting extent of disturbance in general area, pre 1950 | 8 |
| Figure 6: Management zones..... | 37 |

List of plates

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Plate 1: Eucalypt forest regrowth within drainage line in the lower reaches of the catchment, with low canopy structure and heavy lantana infestation. | 9 |
| Plate 2: Eucalypt forest regrowth with overabundance of small-medium size trees..... | 10 |
| Plate 3: Wattle regrowth with limited amount of eucalypt recruitment. | 10 |
| Plate 4: Wild dog observation on site during September 2016 fauna survey | 15 |
| Plate 5: Dense lantana restricting access to koala food trees | 16 |

List of tables

| | |
|---------------------------------------------------------------------------------------------------|----|
| Table 1: Vegetation communities within the Conservation Area..... | 6 |
| Table 2: Significant flora species known or that could potential occur in the study area..... | 11 |
| Table 3: Significant fauna species known, likely to potentially occurring in the study area | 12 |
| Table 4: Koala and GHFF Habitat Management Objectives..... | 19 |
| Table 5: Roles and required experience and qualifications for the establishment phase..... | 26 |
| Table 6: Indicative BFMP program..... | 31 |
| Table 7: Potential pest management strategies..... | 34 |
| Table 8: Indicative work schedule for the establishment phase..... | 42 |
| Table 9: Indicative work schedule for the maintenance phase (year 11 to 20)..... | 42 |
| Table 10: Performance criteria | 43 |
| Table 11: Completion Criteria for Years 10 and 20..... | 45 |

Abbreviations

| Abbreviation | Description |
|--------------|-----------------------------------------------------------|
| APZ | Asset Protection Zone |
| BFMP | Bushland Management Plan |
| CAMP | Conservation Area Management Plan |
| DotEE | Department of the Environment and Energy |
| EPBC Act | Environment Protection and Biodiversity Conservation 1999 |
| NC Act | Nature Conservation Act 1992 |
| RE | Regional Ecosystem |
| VM Act | Vegetation Management Act 1999 |
| WoNS | Weeds of National Significance |
| ICC | Ipswich City Council |

Executive Summary

Eco Logical Australia was engaged by Intrapac Property Pty (Intrapac) to prepare a Conservation Area Management Plan (CAMP) for the White Rock urban development within the Ripley Valley, Ipswich. The CAMP aims to satisfy requirements outlined in the ICC information request dated 24 July 2017 and address offset requirements under the *Environment Protection and Biodiversity Act 1999*.

The total combined area of the five subject lots is 472ha, with the proposed White Rock Conservation Area covering an approximate 240ha of this area. This Conservation Area will achieve multiple environmental benefits, including in-situ biodiversity offsets aimed at reducing project-related impacts. More specifically, the area administered by the CAMP includes an approximate 241ha offset area relating to koala and grey-headed flying fox (GHFF) habitat values defined within the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth). The development of the area has been considered a controlled action as part of the EPBC referral process and the CAMP and the area it administers will offset impacts to koala and GHFF habitat values within the development site.

This plan is intended to serve as a prescriptive document to ensure the offset area achieves koala and GHFF related habitat targets as prescribed by the DotEE. To achieve this, the following elements are described in detail:

- Plan objectives (specific to koala and GHFF habitat and bushland in general);
- Location of management zones;
- Management actions and responsibilities; and
- Monitoring, reporting and handover procedures.

Broad staging of management for the CAMP restoration area is as follows:

1. A legally binding agreement is signed by both ICC and Intrapac. This agreement (in preparation and to be supplied within **Appendix A** when finalised) outlines:
 - i) Intrapac's management requirements for the first ten years of management; and
 - ii) Council's commitment to own and manage the area, as well as transfer the area to its protected estate (ensuring its conservation in perpetuity) following this ten-year period.
2. A Reconfiguration of Lot (and potentially Material Change of Use) is undertaken to create a single lot for the area.
3. Rehabilitation will consist of limited initial works until the 200th lot of Stage 1 is registered (approximately 18 months after construction commences).
4. Following registration of the 200th lot, a thorough scope of management works begin. Detailed plans (e.g. bushfire management plans / revegetation details) will be provided to ICC / DotEE for approval prior to this occurring.
5. Close of Year 10: providing key completion criteria have been met, ownership and management of the area is transferred to ICC. ICC transfer the area to its conservation estate, changing tenure where appropriate to ensure the area is managed for conservation purposes and that koala habitat values within the offset area are maintained.
6. From year 10 onwards, the Conservation Area is managed in accordance with any EPBC Act requirements.

While a high level of detail is provided, the CAMP is intended to serve as a strategic document, with adaptive management principals guiding subsequent reporting requirements.

1 Introduction

1.1 Background

Eco Logical Australia was engaged by Intrapac Property Pty to prepare a Conservation Area Management Plan (CAMP) for the White Rock urban development within the Ripley Valley, Ipswich.

The White Rock urban development includes five subject lots, which themselves cover a total of 472 ha (**Figure 2**). Three of the subject lots (Lot 2 SP130834, Lot 174 S31238 and Lot 181 S313342) are within the Ripley Valley Priority Development Area (PDA).

The proposed development covers 223ha and will result in number of end uses, including residential, commercial, industrial, greenspace, recreation/sporting, educational, roads and easements for internal services. Each component of the development is described within the Urban Design Report (Roberts Day 2017).

As the project will result in the permanent clearing of vegetation, it is predicted that significant residual impacts to Koala and Grey-headed Flying Fox (GHFF) will occur. As such, environmental offsets are required as part of environmental approvals process under the *Economic Development Act 2012* (Qld) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth). This CAMP directly responds to requirements under these acts and associated offset policies.

For context, this CAMP describes the existing environment within and surrounding the proposed Conservation Area (**Figure 2**). This is based on results of the survey and desktop assessment reported within the White Rock Ecological Assessment (ELA 2017). Subsequently, plan objectives (specific to koala habitat, GHFF and bushland in general), management zones, management actions and responsibilities are established. Monitoring, reporting and handover procedures to Ipswich City Council are also described.

A key goal of Conservation Area planning is to allow eventual integration into the existing and adjacent White Rock - Spring Mountain Conservation Estate, which is managed by Ipswich City Council (**Figure 3**). The estate is zoned as conservation under Council's planning scheme and is Ipswich's biggest conservation estate with a total area of 2,633 ha. Integration of the proposed Conservation Area into the White Rock - Spring Mountain Conservation Estate will include both physical integration into the boundaries of the estate and alignment of some of the management outcomes of the estate, whilst maintaining the focus on providing a koala and GHFF offset into perpetuity.

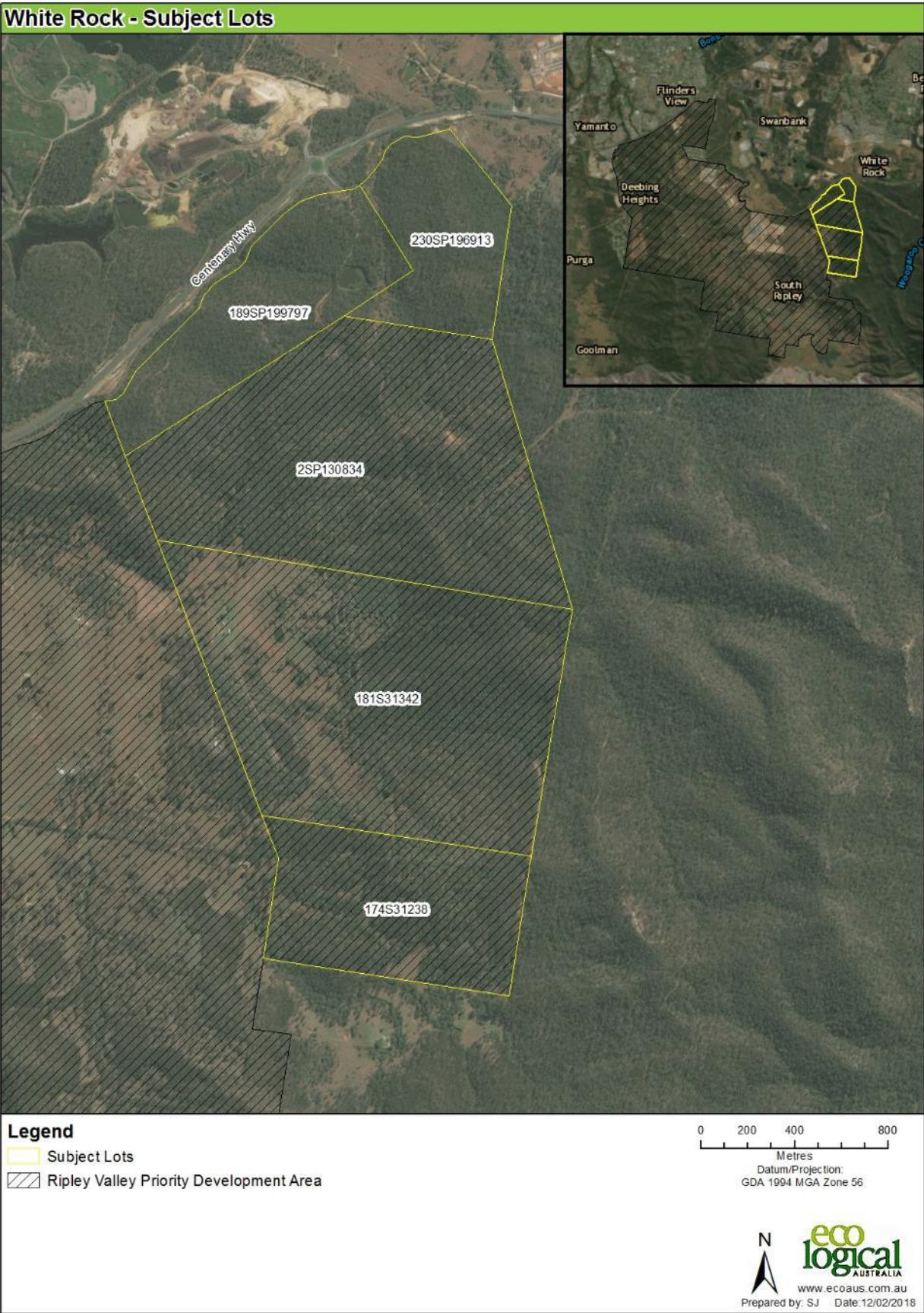


Figure 1: Subject Lots

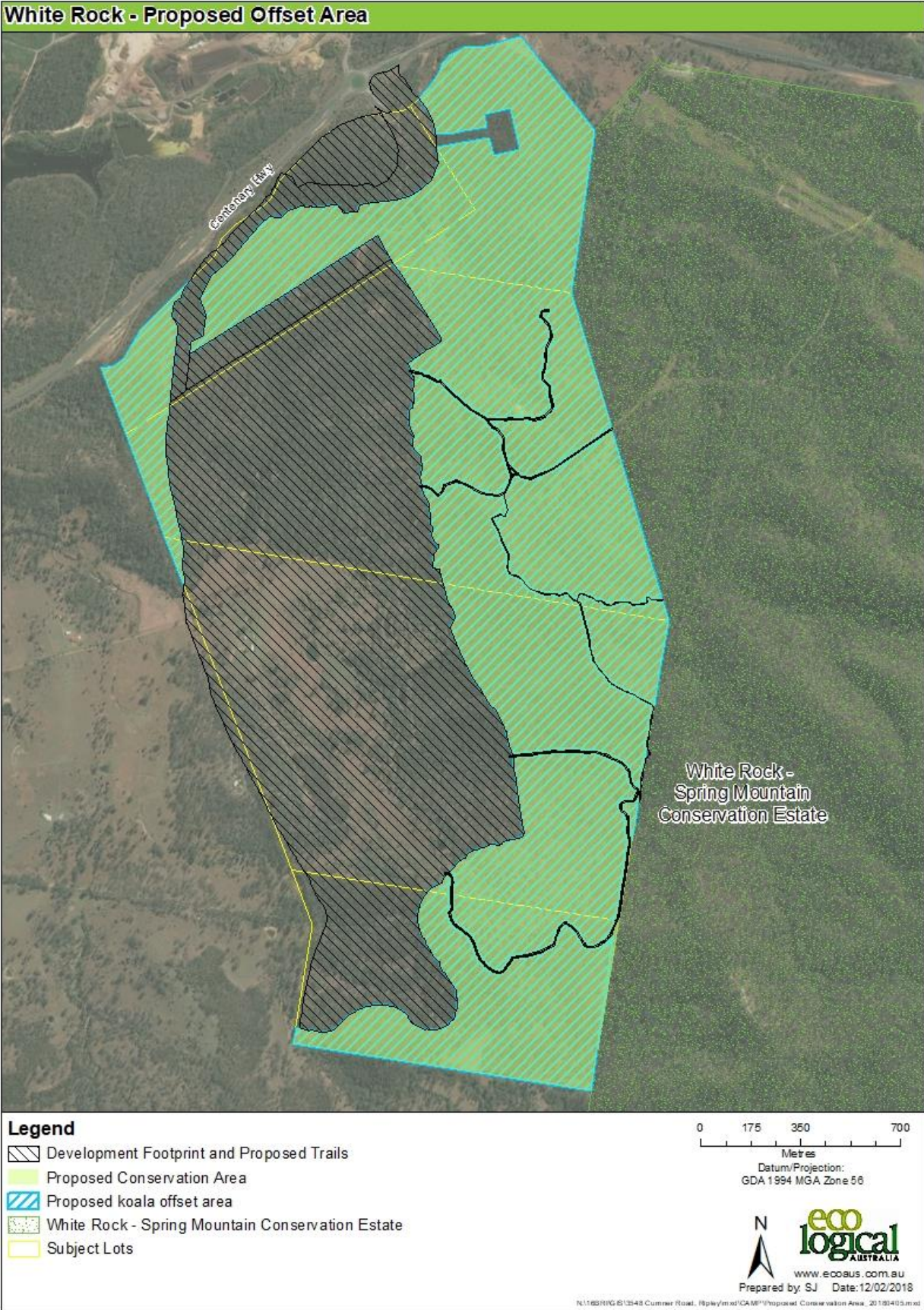


Figure 2: Development footprint and proposed conservation area

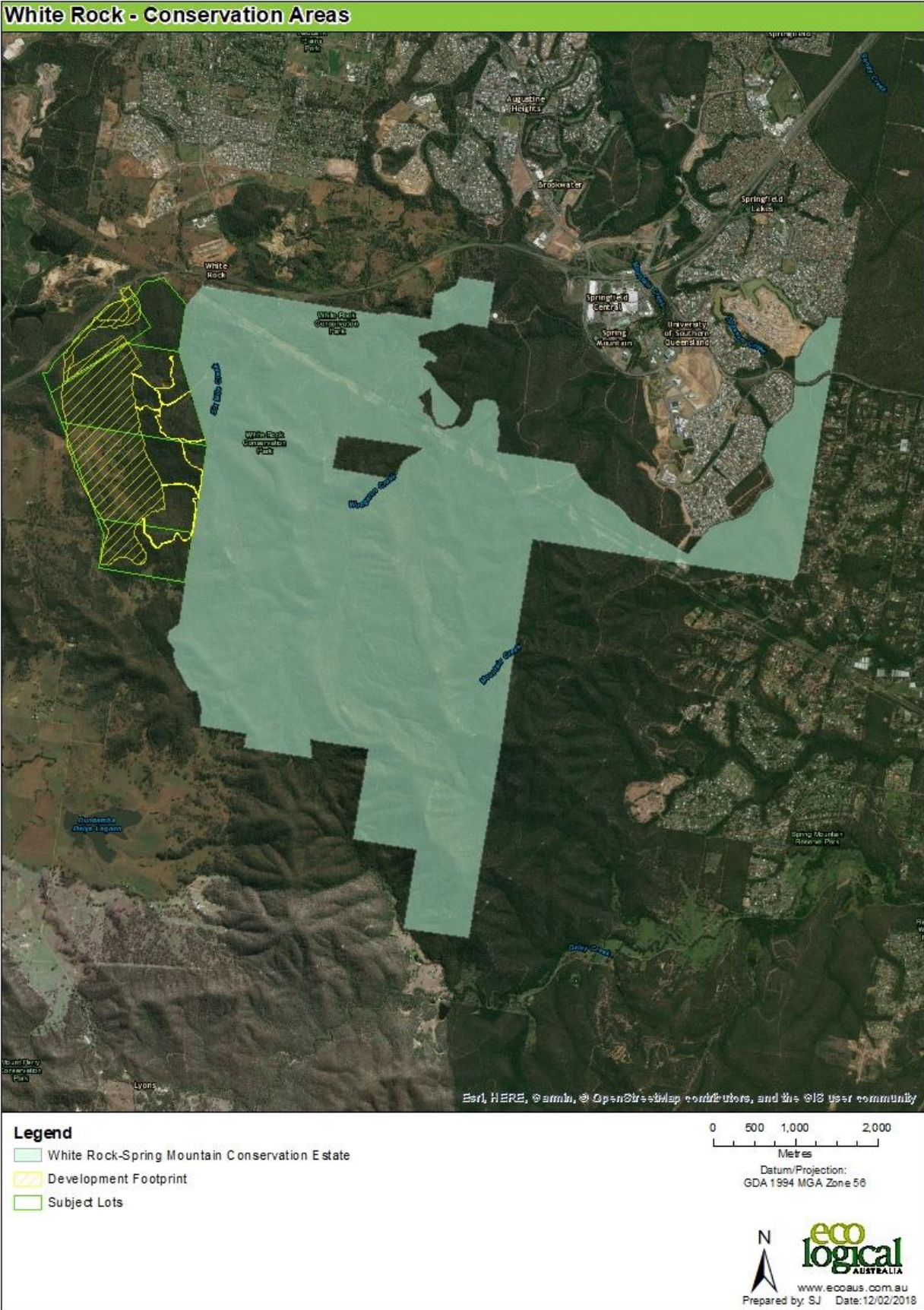


Figure 3: The Adjacent White Rock – Spring Mountain Conservation Estate

1.2 Key Terms

The following key terms are used within this plan:

- *Study area*: The overall extent of the site, over the five subject lots shown in **Figure 1**.
- *Conservation Area*: The portion of the study area to be managed for conservation in perpetuity, including areas which may be impacted by construction works but will be rehabilitated. The Conservation Area includes the Koala and GHFF offset area as well as vegetation within the recreational trail buffers that have been excluded from the offset area (see **Figure 1**). The Conservation Area also includes the refined Environment Protection Zone (EPZ), as documented within the White Rock Ecological Assessment (Eco Logical Australia 2017).
- *Development footprint*: The portion of the study area not being managed for conservation, including residential and commercial lots, roads and infrastructure (e.g. sewer, water power) and landscaping.
- *Offset Area*: The area provided as a koala and GHFF offset area, in accordance with State and Federal requirements. The offset area excludes the recreational trails and the associated 5m wide recreational trail buffer.
- *Bush regeneration* – is the management of natural areas to allow natural regeneration, including activities such as weed control.

2 Description of the environment

2.1 Location

White Rock is located in the Ripley Valley south of Centenary Highway. It is located 35km from the Brisbane CBD, 15km from the Ipswich CBD, 4km east of the Ripley urban core and 8 km west from the Springfield Town Centre.

The study area is bounded to the north by the Centenary Highway. The area to the west of the study area has been cleared for agricultural purposes in lowland areas and is likely to transition into urban development in the coming years as part of the Ripley Valley Priority Development Area (PDA). The Conservation Area includes a matrix of maturing / mature vegetation that continues to the east of the boundary into White Rock - Spring Mountain Conservation Estate, which is part of a large contiguous area of vegetation associated with the Flinders Karawatha Corridor (DEHP 2014).

2.2 Drainage and hydrology

The Conservation Area is characterised by sandstone ridges in the north and east turning to basalt in the south. Waterways in the study area are ephemeral and in the upper reaches do not have distinctive riparian characteristics such as distinguishable riparian vegetation or a clear streambed. Lower in the catchment, drainage lines become formed and are characterised by sandy creek beds, various degrees of gully erosion, weed infestation and fringing riparian vegetation. Waterways are largely westward flowing, eventually leading to Little Bundamba Creek. There are a number of constructed dams within the Conservation Area.

2.3 Vegetation communities

Within the Conservation Area, eight broad vegetation communities were identified (ELA 2017). These communities, and their areas, are listed in **Table 1** and shown in **Figure 4**.

Table 1: Vegetation communities within the Conservation Area

| Community | Area (ha) |
|---------------------------------------------------------|---------------|
| Acacia +/- scattered Eucalypts | 3.78 |
| Dam | 1.15 |
| Exotic Grassland +/- sparse Acacia and Eucalypts | 5.55 |
| Forest Red Gum on alluvium | 0.80 |
| Forest Red Gum, Swamp Box, Ironbark | 8.09 |
| Narrow-leaved Ironbark, Red Gum, Silver-leaved Ironbark | 15.58 |
| Spotted Gum | 9.80 |
| Spotted Gum, Ironbark, other Eucalypts | 183.10 |
| White Mahogany, Grey Gum, Spotted Gum | 21.59 |
| Total | 249.45 |

The central part of the Conservation Area is dominated by *Corymbia citriodora* (spotted gum) forest and woodland on sandstone slopes.

The north of the Conservation Area is dominated by *Eucalyptus acmenoides* (White Mahogany), *Eucalyptus major* (Grey Gum) and Spotted Gum Forest. The lower elevations of the Conservation Area, especially in the south, are dominated by *Eucalyptus tereticornis* (Forest Red Gum), *Lophostemon suaveolens* (Swamp Box) and *Eucalyptus crebra* (Narrow-leaved Ironbark).

There is also a basalt hill in the south of the Conservation Area that contains Narrow-leaved Ironbark, Forest Red Gum and *Eucalyptus melanophloia* (Silver Leaved Ironbark).

White Rock–Spring Mountain Conservation Estate to the east of the Conservation Area consists of over 2,500 ha of mostly intact and generally remnant vegetation.

2.3.1 Current vegetation state

Aerial photography circa 1950 shown in **Figure 5** shows the bulk of the Conservation Area as cleared with only paddock trees remaining, meaning that the bulk of the Conservation Area is semi-mature regrowth.

Currently, approximately 30% of the Conservation Area is non-remnant (Category X on a regulated vegetation map). The bulk of this area is of lower condition to surrounding uncleared vegetation due to:

- Significant lantana/ other exotic plant infestation;
- Over-dense numbers of semi-mature / immature canopy species;
- Some areas dominated by pioneer species with limited canopy species recruitment;
- Limited areas remaining with low or limited woody canopy.

Plate 1 to **Plate 3** illustrate the above factors which limit site condition and transition to a stable state more conducive to koala and GHFF habitat.

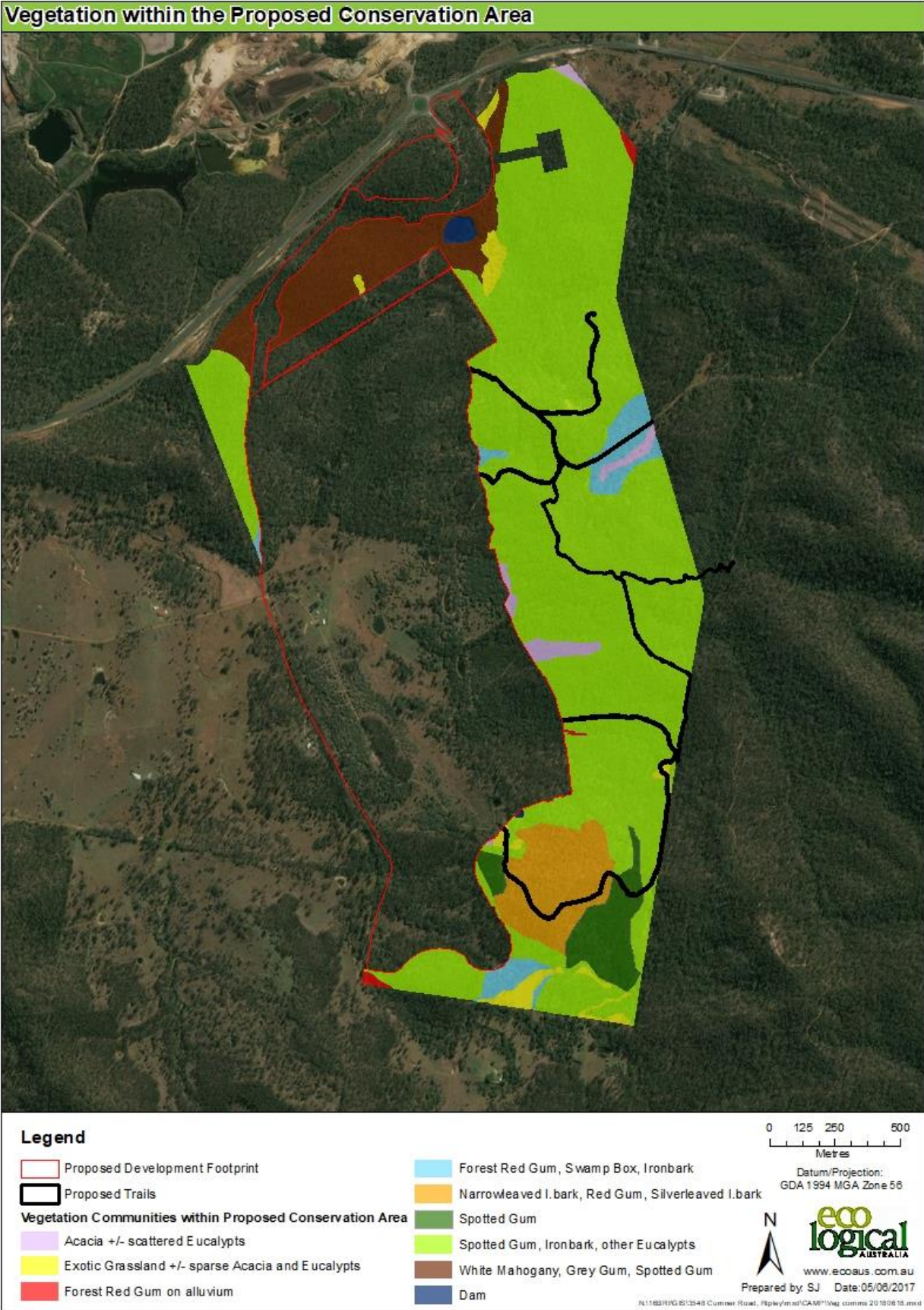


Figure 4: Vegetation within the proposed Conservation Area

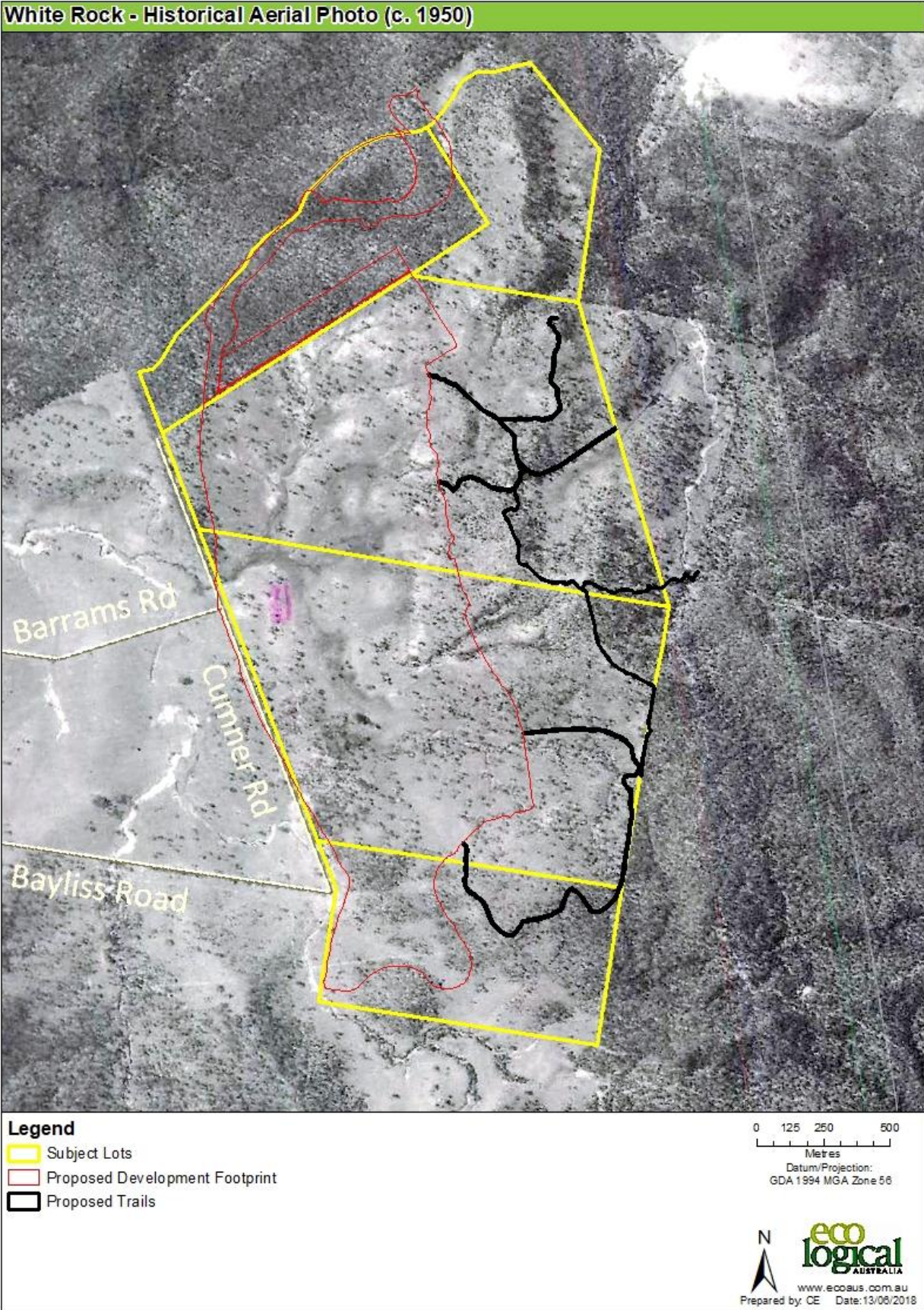


Figure 5: Aerial photography highlighting extent of disturbance in general area, pre 1950



Plate 1: Eucalypt forest regrowth within drainage line in the lower reaches of the catchment, with low canopy structure and heavy lantana infestation.



Plate 2: Eucalypt forest regrowth with overabundance of small-medium size trees.



Plate 3: Wattle regrowth with limited amount of eucalypt recruitment.

2.4 Significant flora and fauna

Within this plan, significant flora and fauna include those species listed as threatened or migratory under the EPBC, and/or endangered, vulnerable, near threatened (EVNT) or special least concern under the NC Act.

Eight significant species were identified in the Ecological Assessment (ELA 2017) as known to occur or possibly occurring in the study area, several of which occur in the adjacent White Rock Conservation Area. In addition to this, two species listed as part of ICC's working definition of MLES also are known to occur or have potential to occur in the study area.

Table 2: Significant flora species known or that could potential occur in the study area

| Species Name | Common Name | EBPC Act | NC Act | ICC MLES* | Likelihood of Presence in study area |
|----------------------------------|-----------------------|----------|--------|-----------|---------------------------------------------------------------------------------------------------------------------------|
| <i>Callitris baileyi</i> | Bailey's Cypress Pine | - | NT | - | Potential - Suitable habitat present, records north of Ipswich. |
| <i>Eucalyptus curtisii</i> | Plunket Mallee | - | NT | Yes | Potential - Suitable habitat present, records in area |
| <i>Marsdenia coronata</i> | Slender Milkvine | - | V | - | Likely - Known from White Rock – Spring Mountain Conservation Estate where it occurs on similar habitat to the study area |
| <i>Notelaea ipsviciensis</i> | Cooneana Olive | CE | E | - | Likely - Known from nearby location NE of Ipswich where it occurs on similar habitat to the study area |
| <i>Notelaea lloydii</i> | Lloyd's Native Olive | V | V | - | Likely - Known from White Rock – Spring Mountain Conservation Estate where it occurs on similar habitat to the study area |
| <i>Plectranthus habrophyllus</i> | - | E | E | - | Likely – suitable habitat present and known from White Rock – Spring Mountain Conservation Estate |
| <i>Thesium australe</i> | Austral Toadflax | V | V | - | Potential - More common further west. Most common on grasslands rather than forests and woodlands |
| <i>Melaleuca irbyana</i> | Weeping Paperbark | | E | - | Known |
| <i>Xanthorrhoea</i> spp. | Grass tree species | - | - | Yes | Known (i.e. <i>X. latifolia</i>) |

*working definition of MLES

Melaleuca irbyana was the only significant species observed on the site during recent surveys. This species is currently listed as endangered under the NC Act. Two *Melaleuca irbyana* were identified within the development footprint, with one other individual located immediately west of the development footprint. These were growing on alluvial plains with scattered eucalyptus (the most northern individual) or small areas of regrowth *Eucalyptus* spp. woodland (the two southern individuals).

Xanthorrhoea latifolia was also observed to be occasionally present in the study area with remnant areas. This species is classified as a species of iconic value as part of ICC's working list of MLES, however it is not listed as threatened under the EPBC or an EVNT species under the NC Act.

A further four species from the desktop study that were not located during the surveys are assessed as potentially or likely to occur in the study area due to the presence of suitable habitat. These are Slender Milkvine, Cooneana Olive, Lloyd's Native Olive and *Plectranthus habrophyllus*. In all cases the suitable habitat is rocky boulders and slopes and is confined to the eastern part of the study areas (i.e. the Conservation Area only)

Several significant fauna species are also likely to occur or known to occur in the study area, as shown in **Table 3**. Koala, GHFF, Powerful Owl and the Satin Flycatcher have been observed on site. With reference to the appropriate guidelines, it is predicted that significant residual impacts to Koala will occur (see Ecological Assessment by ELA 2017). The presence and quality of koala habitat is described in detail in the Ecological Assessment (ELA 2017) and associated Koala Management Plan (ELA 2017).

Table 3: Significant fauna species known, likely to potentially occurring in the study area

| Species Name | Common Name | EBPC Act | NC Act | Likelihood of Presence in study area |
|-------------------------------------|------------------------|----------|--------|-----------------------------------------------------------------------------------------|
| <i>Anthochaera phrygia</i> | Regent Honeyeater | CE | E | Potential - Suitable habitat. Records in the wider area (north of Ipswich) |
| <i>Dasyurus maculatus maculatus</i> | Spot-Tailed Quoll | E | V | Potential - Suitable habitat, known in region. |
| <i>Delma torquata</i> | Collared Delma | V | V | Potential – Suitable habitat though not recorded in the area or wider area |
| <i>Erythrorchis radiatus</i> | Red Goshawk | V | E | Likely - Suitable habitat, known in region. |
| <i>Grantiella picta</i> | Painted Honeyeater | E | V | Potential - Suitable habitat, known in region. |
| <i>Lathamus discolor</i> | Swift Parrot | CE | E | Potential – Suitable habitat (<i>Eucalyptus tereticornis</i> forest), known in region. |
| <i>Myiagra cyanoleuca</i> | Satin Flycatcher | Mi/Ma | - | Known. Observed during Survey Two. |
| <i>Ninox strenua</i> | Powerful Owl | | V | Known – observed in 2008 |
| <i>Petauroides volans</i> | Greater Glider | V | - | Potential - Suitable habitat, known in White-Rock Regional Park. |
| <i>Phascolarctos cinereus</i> | Koala | V | V | Known. Observed on site during targeted survey. |
| <i>Pteropus poliocephalus</i> | Grey-headed Flying Fox | V | - | Known. Observed on site during targeted survey. |

2.5 Exotic flora

Parts of the Conservation Area are heavily impacted by weeds. Lantana species, both *Lantana camara* (Lantana) and *L. montevidensis* (Creeping Lantana), were the dominant weed species across the site, though other species were locally dominant in specific situations (e.g. near creeks, along tracks, etc). Lantana is a significant environmental weed as it can smother other vegetation and limit wildlife movement opportunities (e.g. for Koalas and macropods).

Lantana is listed as a Weed of National Significance (WoNS) and both Lantana and Creeping Lantana are classified as restrictive invasive plants under the *Biosecurity Act 2014*. A national plan to protect native ecosystems from Lantana has also been developed by Biosecurity Queensland (2010).

Lantana has also been listed as a Key Threatening Process under the *NSW Threatened Species Conservation Act 1995*. While not relevant in a QLD legislative context, one of the reasons for this listing was the impact lantana has on the movement of Koalas between trees (NSW OEH – Listing of *Lantana camara* as a key threatening process, 2016).

Lantana also impacts fire ecology and result in more intense fires, potentially impacting habitat values for koala and GHFF.

See Appendix E for a comprehensive list of exotic flora observed within the area.

2.6 Feral animals

The introduced mammals *Rattus rattus* (Black Rat), *Bufo marinus* (Cane Toad), *Lepus capensis* (European Hare) *Sus scrofa* (Feral Pigs) and *Vulpes vulpes* (European Red Fox) were observed or identified within the study area. The native *Manorina melanocephala* (Noisy Miner) was recorded during the survey.

The European Red Fox and the Feral Pig is a restricted invasive animal under the *Biosecurity Act 2014*. Four species observed on-site (Cane Toad, European Red Fox, Feral Pig and the native *Manorina melanocephala* (Noisy Miner)) - are listed as a key threatening process under the EPBC Act:

- The biological effect of the Cane Toad;
- Predation by the European Red Fox;
- as “Aggressive exclusion of birds from potential woodland and forest habitat by over abundant Noisy Miners (*Manorina melanocephala*); and
- Predation, habitat degradation, competition and disease transmission by Feral Pigs.

2.7 Threatening processes relating to koalas currently within Conservation Area

2.7.1 Overview

The following sections note key threatening processes for koalas within the proposed Conservation Area. A key objective of this plan is to minimise these processes, and subsequent sections outline methods in which this can be achieved. The accompanying Koala Management Plan (Eco Logical Australia 2017) details these threats and amelioration techniques outside of the Conservation Area in further detail.

2.7.2 Habitat loss and fragmentation

Habitat loss and fragmentation are recognised as the primary threatening process to the koala, and has been identified as a key influence in the documented decline of koalas in SEQ (Rhodes et al 2015, DERM 2009) and Ipswich (Bussey and Ellis 2016).

Historically, the site was largely cleared as discussed in the EAR (ELA 2017). Most of the current vegetation is thus regrowth, with site inspection noting a predominantly small girth, with some areas currently dominated by unpalatable (to koalas) acacia regrowth, or small eucalypts unsuitable for browsing or resting.

Currently, approximately 20% of koala habitat within the Conservation Area is exempt from the requirements of the *Vegetation Management Act 1999* (i.e. it is Category X). Koala food trees within the area (especially outside of the PDA's EPZ zone) may be currently be logged under sustainable timber harvesting practices.

2.7.3 Disease

Chlamydia is a disease that effects almost all koala in SEQ but symptoms are not always present.

The disease status of koalas within the area is not known, and monitoring proposed in the Koala Management Plan will aim to detect if any resident koalas show signs of Chlamydia or develop such symptoms as a result of habitat loss.

2.7.4 Pets and feral predators

Feral Cats, Wild Dogs and Foxes

Feral cats and foxes are not considered a significant threat to koalas, though there is the potential for attack on sick, injured or juvenile koalas (DECC 2008). These pest animals are also a serious threat to native species i.e. recognised as Key Threatening Processes (NSWSC 2000a, 2000b, Dickman 1996).

Wild dogs are known predators of the koala (DECC 2008), and their impact may be increased by fragmentation which increases the time spent on the ground crossing between trees.

The local koala population is likely to be subject to occasional predation from the wild dog and foxes. During surveys in September 2016, evidence of wild dog and fox was observed, including direct observation on a motion sensor camera (see Plate 4) and footprints.



Plate 4: Wild dog observation on site during September 2016 fauna survey

2.7.5 Roads and vehicle interactions

Traffic collision (usually resulting in death due to trauma) is a major threatening process to the koala (DECC 2008, DERM 2009, Rhodes et al 2015). Traffic collision risk is highest when the following factors combine:

- Speed is >40 km/h;
- Road traverses koala habitat;
- Line of sight is limited by obstructions or road curvature;
- Insufficient artificial lighting (urban and peri-urban areas);
- Koala activity is highest from dusk; and
- Koala breeding season.

Potential for collisions associated with public roads within the development footprint of the proposed urban area is further discussed in the Koala Management Plan (Eco Logical Australia, 2017). This includes mitigation measures to reduce risk of collision with Koala.

2.7.6 Fire

Bushfires, particularly intense, crown-burning fires, are a major threat to wildlife and threatened fauna such as koalas (DECC 2008). Extensive fires that burn out a large extent of habitat – particularly habitat that is isolated or fragmented, and thus limited in escape, refuge or re-colonisation potential, are particularly damaging if not catastrophic via direct mortality or indirectly (e.g. insufficient resources left to support the population).

Intensity and frequency of fire is also influenced by infestations of lantana and thick acacia regrowth within the site. For this reason, rehabilitation of the conservation area will involve targeted effort to remove lantana and thick acacia regrowth areas.

2.7.7 Exotic species

The entire study area is heavily impacted by weeds. Almost 25% of all species recorded during the April 2016 survey were exotic. Many of these species occurred in the cleared areas in the western parts of the site. However, weeds were also common in the treed areas, where there is often a dense (> 30% projected foliage cover) Lantana shrub layer.

Lantana is by far the dominant weed in the area. Approximately one third of the site has high lantana infestation (>30% lantana ground cover), whilst one third also has moderate levels of lantana infestation (5-30% lantana ground cover). The remaining one third has low (<5% lantana ground cover) or nil levels of infestation. Lantana thicket retards the movement of Koalas between trees (NSW OEH – Listing of *Lantana camara* as a key threatening process, 2016).

It was observed during the April 2016 survey that Lantana has formed dense thickets at many locations within the study area and its abundance is limiting the growth of other native species as well as limiting some wildlife movement (**Plate 5**).



Plate 5: Dense lantana restricting access to koala food trees

2.8 Threatening processes relating to Grey-Headed Flying Fox currently within Conservation Area

2.8.1 Overview

The following sections note key threatening processes for *Pteropus poliocephalus* (Grey-headed Flying Fox; GHFF) within the proposed Conservation Area. A key objective of this CAMP is to minimise these processes, and subsequent sections outline methods in which this can be achieved.

2.8.2 Habitat loss and fragmentation

The foraging behaviour of the GHFF aids the pollination and seed dispersal of many native trees and contributes to a healthy ecosystem. However, habitat loss and fragmentation for urban development and agriculture has reduced roosting and foraging sites and consequently impacted the species' distribution and size (DoE 2017b). Specifically, reliable winter foraging resources for the species have reduced, and are now limited to a narrow coastal strip in Queensland and northern NSW that contain Broad-leaved Paperbark, Spotted Gum, Swamp Mahogany and Forest Red Gum species (DoE 2017b, Eby 1996).

The species' low fecundity (only a single birth per year), and higher mortality rates since European settlement have reduced their reproductive success and have compounded impacts due to habitat loss and fragmentation (DoE 2017, McIlwee & Martin 2002).

To help reduce this threat, establishment (i.e. seeding/ planting) of tree species is proposed to increase the biomass of winter foraging resources within the conservation area. This is proposed to occur across approximately 145 ha (see **Appendix B**).

Furthermore, management of the high stem density within the existing regrowth forests will allow large trees to establish. This will potentially increase winter foraging resources for the GHFF over the life of the CAMP.

2.8.3 Anthropogenic threats

Electrocution on overhead powerlines and illegal shooting in response to impacts on commercial fruit operations are considered anthropogenic threats, however this is not relevant to this CAMP.

Sympatry and Competition

It is suggested that the Black Flying-fox is in indirect competition with the GHFF, due to a substantial southerly shift of its range since it was first described. This observation is based on the increasing displacement of GHFF in coastal areas. Moreover, in Brisbane (which is adjacent to the Ipswich Local Government Area), the numbers of GHFF, in comparison to Black Flying-foxes, declined markedly during the 1990s (Luckoff undated pers. comm. cited in Duncan et al. 1999).

The improvements of habitat due to implementation of this CAMP will also benefit the Black Flying-fox; however, the management of indirect competition with GHFF is outside the scope of this plan.

3 Strategic objectives

3.1 Overarching approach

The project will result in the loss of up to 53 ha of primary habitat and 93 ha of secondary habitat that is known to support the Koala. Likewise, vegetation communities that are proposed for removal represent varying degrees of value as GHFF foraging habitat.

Conservation Area management is focussed on the provision of an offset for these impacts for these two species. The Conservation Area will aim to increase koala and GHFF habitat value and therefore support the local populations of these species, whilst also reducing current threats in the area.

The Conservation Area has a high level of disturbance (due to previous clearing and subsequent weed / pest fauna incursion) which can be managed to improve habitat value from baseline conditions. Outside the context of this project, no current management exists or is currently planned to be undertaken within the proposed Conservation Area. For this reason, any management developed and implemented due to this project will meet requirements for offset additionality, as it is in addition to what which would have occurred if the project did not proceed.

The improvement to habitat quality will include the benefit gained from improving the current state plus preventing the decline in quality over time. The Conservation Area is also strategically located adjacent to the White Rock-Spring Mountain Conservation Estate. The additions to net core habitat size, reduction of edge to area ratio and improvements in connectivity provide significant benefit beyond the conservation benefits that can be achieved by a Conservation Area that exists in isolation.

Some conservation gains can be achieved almost immediately with the implementation of appropriate management measures (e.g. staged removal of weeds). Gains can also be achieved over the long term (approx. 20 years). For instance, removal of lantana can prevent hot fires that threaten the long term persistence of existing koala and GHFF food trees. Alternatively, assisted regeneration or tree planting takes many years to provide a conservation gain.

There is a high level of confidence that a conservation gain can be achieved in a short time. This is due to the following factors:

- Koala and GHFF habitat requirements are well known;
- These species are mobile, have large home ranges and can re-colonise improved habitat areas without human assistance;
- There have been many projects undertaken in South-east Queensland to establish koala habitat (i.e. QTFN's Peak Crossing property). This provides many lessons learnt to draw on and provides evidence of feasibility for both koala and GHFF.
- Management of woody weeds is highly feasible via chemical or mechanical/hand control methods and will significantly improve the quality of habitat;
- Where required, plantings and natural regeneration of food tree species for koala and GHFF is highly feasible. This can be managed in order to achieve outcomes-based performance indicators (i.e., replacement planting if stock dies).

- The White Rock project is a major urban development project that can help to generate adequate funds to support the management actions.
- There is evidence that the area is capable of natural regeneration (based on historical aerial photography) and as such the management regime intends to utilise and enhance the natural processes.
- Both Intrapac and ICC are large and stable financially secure organisations that are making a legally secured commitment to undertaking the improvement works.

3.2 Koala and GHFF habitat management objectives

As stated above, the overarching goal of the Conservation Area is to provide a conservation gain for the koala and GHFF. The Conservation Area will aim to increase habitat value and therefore support the local koala and GHFF population, whilst also reducing threats to the species.

The detailed koala and GHFF habitat management objectives are shown in **Table 4** and integrate key management actions and threat abatement from the Koala Management Plan (ELA 2017).

Table 4: Koala and GHFF Habitat Management Objectives

| Threatening Process-based Objectives | Associated Risks | Risk-minimisation Approach |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Exotic species: Improve the quality of vegetation and koala movement by removing and controlling invasive weed species</p> | Short-term, inefficient weed control | <ul style="list-style-type: none"> • Remove and control targeted environmental weeds using up to date control techniques • Maintenance weed removal and control for a minimum 10-year period |
| <p>Habitat loss and fragmentation: Improve ecological resilience by planting with native species (including koala food trees and key winter flowering species for the GHFF) in areas with limited natural eucalypt regeneration potential</p> | Death of planted stock, inappropriate species selection, vandalism, fire | <ul style="list-style-type: none"> • Planting and/or assisted regeneration of koala and GHFF food trees in areas dominated by Acacia trees/shrubs and weeds. This may require selective clearing of non-preferred species to allow for growth of preferred species. • If required, revegetate using local provenance native species consistent with the regional ecosystems found in the locality, avoiding damage to extant vegetation • Maintain plants until established • Prevent vehicle / bike / horse / motorbike entry at entrance points (see Appendix D for entrance designs) |
| <p>Habitat loss and fragmentation: Stabilise creek bed and banks and maintain water quality</p> | | <ul style="list-style-type: none"> • Minimise impacts of construction activities • Ensure water quality is maintained through use of erosion and sediment control • Minimise the loss of native plant cover |

| Threatening Process-based Objectives | Associated Risks | Risk-minimisation Approach |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <ul style="list-style-type: none"> Utilise native vegetation planting to assist in stabilisation where required In high erosion areas construct rock-rip raps, drop structures or undertake bank armouring |
| <p>Habitat loss and fragmentation: Protect, enhance and create koala and GHFF habitat</p> | <p>Degradation of existing habitat through vehicular access and exotic flora.</p> | <ul style="list-style-type: none"> Establish a viable habitat corridor for terrestrial and aquatic native fauna Minimise impacts associated with adjacent ongoing urban land use so residual impacts to koala and GHFF are not significant. Prevent unauthorised vehicular access. Thinning of over-abundant food trees to increase tree size (DBH). |
| <p>Fire / Habitat loss and fragmentation: Manage fire to minimise the risk of catastrophic events.</p> | <p>Uncontrolled / destructive wildfires.</p> | <ul style="list-style-type: none"> Periodic fuel reduction Control of lantana Prevent illegal access (e.g. vehicles) Signage to indicate camping (and camp fires) are not allowed Development of Bushfire Management Plan |
| <p>Feral Predators: Reduce populations of pest fauna / exotic predators of koala via period control programs.</p> | <p>Predation / disturbance of koalas from dogs; Destruction / disturbance of habitat from feral animals such as pigs; Inappropriate control of feral animals (e.g. disturbance of a pack structure that may lead to higher utilisation of the area by dogs).</p> | <ul style="list-style-type: none"> Develop and conduct pest fauna monitoring and management, with targets aimed at reducing pest species significantly; As pest fauna species will continually migrate to the site from other habitat (e.g. to the east), total elimination is not possible. Such control programs should be in cooperation with other land management authorities (e.g. DEHP and Council) and landholders in the locality to suppress the wider population of pest fauna. |
| <p>Roads and vehicle interactions / Habitat Fragmentation: Contribute to connectivity and wildlife movement.</p> | <p>Habitat / connectivity gains may not be maximised if vehicles pose a threat to koalas or disturb their habitat.</p> | <ul style="list-style-type: none"> To assist with movement, a fauna underpass will be installed along the northern access road to maintain connectivity to vegetation to the east. Seek to prevent vehicle access. |
| <p>Roads and vehicle interactions: Prevention of koalas entering the urban area or road reserves.</p> | <p>Koalas leave safe core habitat areas and enter urban zones where car strike and dog attacks may occur. The</p> | <ul style="list-style-type: none"> This will be managed via the implementation of the Koala Management Plan (ELA 2017). This plan will reduce the likelihood that koalas access the urban area. |

| Threatening Process-based Objectives | Associated Risks | Risk-minimisation Approach |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | development area is designed in an inappropriate manner (e.g. easy koala access to urban areas, features attractive to koalas such as food trees located within urban areas). | |
| Habitat conservation: Sustainable use of the Conservation Area | Future use of the Conservation Area (and embedded offset area) reduces koala and GHFF habitat value. | <ul style="list-style-type: none"> • Domestic animals (e.g. dog walking on or off leash) will be prohibited from entering the Conservation Area, similarly to current management within the White Rock – Spring Mountain Conservation Estate. • Encouragement of controlled use of the conservation lands along appropriately constructed pathways to limit creation of additional, un-managed tracks. This means that pedestrians and bicyclists will not be permitted to enter the offset area (which differs slightly to the Conservation Area – See Figure 2). |
| Roads and vehicle interactions: Prevention of vehicle and trail motorcycle access into the Conservation Area. | Disturbance of koala and GHFF populations and their habitat. Damage to track network / fencing / vegetation. Uncontrolled fires. | <ul style="list-style-type: none"> • Trail bike access will be prevented through the use of exclusion gates at the entry points to Conservation Areas (see Appendix D). • Installation of signage (consistent with ICC natural areas signage manual) denoting trail motorcycles / horses are not permitted to enter the Conservation Area. • Installation of warning signage at key entry points. • Integration of regular security patrols of the property with ICC compliance programs. |
| Habitat conservation: Conduct public education campaign to reduce potential impacts to koala, GHFF and other fauna. | Local residents are not aware of koala and GHFF conservation activities and allow / undertake inappropriate activities (vehicle access / dog access). | <ul style="list-style-type: none"> • Signage, information packages and a community engagement program will be undertaken to limit the impact of public access to the Conservation Area (e.g. ban on dogs within Conservation Area). This will be managed via the implementation of the Koala Management Plan (ELA 2017). |

| Threatening Process-based Objectives | Associated Risks | Risk-minimisation Approach |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>General: Construct the White Rock project under an Environmental Management Plan that considers potential impacts of construction on the Conservation Area / koalas and GHFF.</p> | <p>Construction activities directly or indirectly harm koalas or GHFF</p> | <ul style="list-style-type: none"> • Protection of koalas and the Conservation Area during the construction phase has been identified and minimised within the Koala Management Plan for the project (ELA 2017). • Measures within the Contractor's Construction Environmental Management Plan will also reduce impacts to GHFF. |
| <p>Disease: Understand chlamydia risk and reduce levels within area.</p> | <p>Koala populations are reduced / affected by chlamydia.</p> | <p>Koala population will be undertaken as part of the Koala Management Plan (ELA 2017).</p> |

4 Legal administration

4.1 General

The management and legal administration of the Conservation Area is divided into two key timeframes: pre and post-ICC handover. Legal administration which relate to these key timeframes are outlined in each of the subsequent sections. **Section 10** provides a detailed timeline of all activities including the activation of legally binding mechanisms relating to the Conservation Area. The proposed legally binding agreement between ICC and Intrapac as well as the proposed covenant / Voluntary Declaration are provided in **Appendix A**.

Legal administration is proposed to be undertaken in the following manner:

1. Post-ICC / DotEE consent:
 - a. the draft Asset Management Contract (AMC) between ICC / Intrapac relating to the Conservation Area is finalised and agreed upon, with its commencement prior to works in the conservation area occurring;
 - b. The Conservation Area is surveyed and a RoL is undertaken. A process to legally secure the land is also undertaken (This is still to be confirmed but a VDec under the *Vegetation Management Act 1999* framework is one such mechanism);
2. During the first 10 years (on-maintenance period): As defined within the AMC, Intrapac is responsible for management and administration of the Conservation Area. Management / monitoring / reporting actions defined in the CAMP will be undertaken with Intrapac resourcing and the Conservation Area will be owned and administered by Intrapac until the terms of the AMC have been met. DotEE will receive annual reports regarding compliance with approval conditions.
3. End of ten-year period since AMC activation (off-maintenance period): The Conservation Area and its past-management will be assessed against handover completion criteria defined within the CAMP (see **Section 11.2**). If these completion criteria have been met then the administration and management of the Conservation will be passed to ICC;
4. Post ICC-handover: The Conservation Area will be managed and administered by ICC in accordance with objectives set out within this CAMP and as per any EPBC Act approval requirements. ICC will also integrate the Conservation Area more formally into the adjacent White Rock – Spring Mountain Conservation Estate.

The following legally-binding documents will be utilised for the management of the Conservation Area:

Asset Management Contract: The AMC is a joint contract between ICC and Intrapac which governs management of the Conservation Area prior to and following handover to ICC. The document references the CAMP and other documents (such as the Bush Fire Management Plan – in preparation) regarding specific management objectives.

Development Application for the White Rock urban development: Following DA approval, Intrapac will undertake actions relating to consent conditions that are relevant to the Conservation Area. This will include the creation of an additional lot that aligns with Conservation Area boundaries, with the inclusion of a Voluntary Declaration under the *QLD Vegetation Management Act 1999* which binds future management of the area to ensure the area is protected into the future.

Voluntary Declaration (QLD *Vegetation Management Act 1999*) (VDec): The voluntary declaration will be signed and become active following appropriate consents and reconfiguration of the Conservation Area Lot. The VDec will outline the management area (using GIS files) and refer to the CAMP regarding objectives and requirements for lot owners. The VDec and its conditions are bound to the lot, ensuring any future owners are bound to its requirements.

EPBC Act Approval: Any requirements that form part of the EPBC Act approval will be integrated into an updated CAMP. Landowners / managers of the Conservation Area will be required to implement these requirements.

4.2 Insurance

During the 10 year establishment phase, the conservation area will allow public on private land (land owned by Intrapac). For this reason, appropriate public liability insurance will be obtained by Intrapac.

5 Implementation roles and responsibilities

5.1 General

The management of the Conservation Area is divided into two key timeframes: pre and post-ICC handover. Roles related to the implementation of works are outlined in each of the subsequent sections, which relate to these key timeframes.

5.2 Establishment phase

Works will need to be undertaken by a specialist bush regeneration team with experience in bushland management. The bushland regeneration contractor will report to an environmental manager (EM) who would undertake the project management role: supervising, co-ordinating and monitoring the implementation of works.

Both the EM and bush regeneration contractor will be required to prepare a risk register prior to commencement of works.

Minimum standards for the environmental manager and bush regeneration contractors have been identified in **Table 5**.

In addition:

- All persons applying herbicides must have a valid AQF 3 Chemical users certificate and all herbicides are to be used as per the Australian Pesticides and Veterinary Medicines Authority (APVMA) approved chemical label and at the associated dilution and application rates.
- Relevant permits under the *Nature Conservation Act 1992* and/or ethics approval under the *Animal Care and Protection Act 2001* may be required for actions such as fauna / threatened flora translocation and some pest management strategies.

Table 5: Roles and required experience and qualifications for the establishment phase

| Role | Role | Recommended experience |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Management | | |
| Environmental Manager (EM) | <ul style="list-style-type: none"> Auditing, supervising, co-ordinating and monitoring the implementation of works Regular communications / co-ordination with ICC and it's relevant contractors | <ul style="list-style-type: none"> Experience in auditing against contract requirements University qualification in environmental management, environmental science or similar. |
| Ecologist | <ul style="list-style-type: none"> Monitoring and associated reporting | <ul style="list-style-type: none"> Relevant university degree Proven experience with restoration monitoring Proven experience in the handling of native fauna |
| Bushland Regeneration Contractor | | |
| Team leader / Supervisor | <ul style="list-style-type: none"> Leading and supervision of the bushland regeneration team | <ul style="list-style-type: none"> Certificate III in Conservation & Land Management and / or demonstrated experience within the industry and supervising similar sites with threatened species and vegetation communities threatened species and communities |
| Trained / Leading hands* | <ul style="list-style-type: none"> As required by Team leader | <ul style="list-style-type: none"> Certificate III in Conservation & Land Management and / or demonstrated experience within the industry and proven competency in bush regeneration |
| Construction Activities | | |
| Landscaping contractor | <ul style="list-style-type: none"> Landscaping within Conservation Area related to recreational trails | <ul style="list-style-type: none"> Queensland Building & Construction Commission (QBCC) licence Other requirements, as per contract. |
| Construction Contractor | <ul style="list-style-type: none"> Consideration of this plan during construction of the adjacent urban area. | <ul style="list-style-type: none"> Queensland Building & Construction Commission (QBCC) licence Other requirements, as per contract. |

* A horticulturalist / propagation specialist may also be required.

5.3 Maintenance phase

It is expected that when the site achieves the agreed maintenance level (as set in KPIs for the CAMP) it will be handed over to ICC to complete the remainder of the management period. Following handover, the area will be managed by ICC, with key activities undertaken by personnel as outlined below:

- Weed management / infrastructure management / monitoring and reporting: ICC natural area management staff and / consultant ecologists;
- Community engagement: ICC bushcare officers;
- Vertebrate pest control: ICC Pest Animal Management officers;
- Bushfire management: Queensland Fire & Rescue Service (QFRS) in conjunction with Ipswich City Council staff.

A Bushcare group or groups may be established to assist in longer term bushland management, particularly managing 'edge effects' at the interface of bushland and urban activities. These groups may require supervision from the ranger and/or contractor.

6 Construction-related management actions

A number of actions relevant to Conservation Area management will need to be undertaken during the urban development construction phase. These actions may be undertaken by the civil construction contractor or the bushland contractor, with oversight and guidance and final signoff by the Environmental Manager (EM).

6.1 Translocation of habitat features

All tree clearance undertaken in the development footprint must follow the methods outlined in a Fauna Management Plan to be developed as part of a Construction Environmental Management Plan. Where not used in site landscaping, hollows and logs created from vegetation in the development footprint should be placed in the Conservation Area by the civil contractor under direction by the EM. Mulch is to be free of weed seed.

6.2 Fencing and signage

During the construction phase, access into the offset area is prohibited for all construction machinery, activities, materials and staff unless supervised by the EM. After construction works for each stage are complete, access restriction will be in place, which will be monitored by the EM. As such, fencing and signage will be required both during the construction phase and as required after construction is complete.

Note: Approval for all signage wording/s will need to be obtained from the ICC Natural Environment Planning Officer at the detailed design stage and prior to manufacturing of the signage.

6.2.1 Vandalism / Access Deterrent Infrastructure

Galvanised double rail pipe fencing (see Appendix D) and appropriate deterrent signage is to be erected at key access to the Conservation Area.

6.2.2 Construction fencing

Prior to the commencement of works, temporary fencing will need to be installed to ensure construction activities in the development footprint do not impact the Conservation Area. Fencing around the perimeter of the development footprint must exclude koalas from exiting the Conservation Area into the construction area. Signs on this fencing at regular intervals should identify that entry into Conservation Area is not permitted and provide the emergency phone number to report sick, injured or otherwise at-risk koalas (or other wildlife). Access into the offset area will be supervised by the EM.

6.2.3 Erection of permanent fencing

Permanent fencing (tubular steel fence – see Appendix D) will be installed along the boundary of the proposed conservation area. Other fencing (two rail timber fencing – See Appendix D) will be installed at track access points. Other devices such as pedestrian entry chicanes and vehicle exclusion devices around entrance points (see Appendix D) shall be installed before the end of construction works, to ensure that access into Conservation Areas is managed and restricted.

There are several measures related to fencing that will support the objectives of this plan. As specified in the Ecological Assessment (ELA 2017) and the Koala Management Plan (ELA 2017):

- fencing along the northern access road must be Transport and Main Roads compliant wildlife fencing.

- koala exclusion fencing is required on properties adjacent to the Conservation Area or for any residential property that adjoins a greenspace area, comprising:
 - 1.8m high side and rear yard fencing;
 - sheet metal (e.g. Colorbond) only
 - no gaps at the base
 - side fences must return to the side of the house, with the return fences setback a minimum of 1m from the front face of the house.

Fencing around other portions of the Conservation Area must be sufficient to prevent unauthorised vehicles from entering the site (e.g. styles / low rail or chain / bollards).

To allow for permitted vehicle access, including Conservation Area maintenance and emergency services, Slip Rails (4.2mW) and/or gates (see Appendix D) will be installed at vehicular access points. In addition, access tracks will be present within the Conservation Area that comply with the ICC parkland management requirements. This includes requirements to allow for emergency vehicular access and overtaking bays.

Fences will be monitored to ensure their integrity remains intact. The fence lines will be regularly checked for weeds, particularly prior to any mowing to ensure propagules are not dispersed into the Conservation Areas, with any weeds surrounding these areas to be removed during regular landscaping.

Fencing will not include barbed wire (to avoid possible entanglement and subsequent mortality of the GHFF).

6.2.4 Erection of permanent signage

All signs installed within the CAMP area will be designed, manufactured and installed in accordance with the ICC Natural Areas Signage Manual. Signs prohibiting the following actions will be placed at all access points to the Conservation Area:

- Access to the Conservation Area by motorcycles, 4WDs and domestic dogs
- creation of informal tracks or structures
- collection of firewood and bushrock
- littering and dumping
- fire (e.g. campfire)
- removal and disturbance of native flora / fauna

In addition, informational / interpretative signage will explain the value of the Conservation Area, including the threatened species found within the area and why certain actions are prohibited. This signage will also include information on what individuals can do to help, including the removal of weeds and exotics from gardens and how to manage domestic pets (such as cats and dogs) in such a way as to reduce their potential impact on bushland. Finally, signage will also include emergency phone numbers to report sick, injured or otherwise at risk koalas and other wildlife.

6.3 Sediment and erosion control

Prior to the commencement of weed control, suitable sediment and runoff control measures must be installed and maintained for the duration of the construction works. These must be in accordance with the latest version of the *Best Practice Erosion and Sediment Control* (IECA, 2010) to prevent runoff entering adjacent bushland areas and watercourses.

Other considerations include:

- Construction adjacent to drainage lines should be completed during dry periods.
- Potential chemical pollutants (e.g. fuels, oils, lubricants, paints etc.) should be stored in appropriate containers within bunded areas within construction compounds to minimise the risk of pollution of aquatic environments.

Areas of significant erosion along creeklines and gullies will also be regraded and rehabilitated. These will be identified during further rehabilitation planning (detailed design) and authorised / supervised by the EM.

6.4 Waste

All rubbish and general litter will be collected and managed by the civil contractor during the bulk earthworks phase and by the landscapers during the subdivision phase. This will be managed as per the Construction Environmental Management Plan. Rubbish and general litter in the Conservation Area will be managed by the bush regeneration contractor, with the EM identifying sources of rubbish and subsequent management required.

7 Bushland management actions

The management actions identified in this section are to be undertaken exclusively by the bushland management contractor under direction by the EM in conjunction with ICC.

7.1 Fire management

Periodic fuel reduction will be required to enhance biodiversity, assist with weed control and to minimise the risk of catastrophic wildfire. Management of fire within the Conservation Area will be directed by EM in consultation and coordination with the Rural Fire Service (RFS), ICC and DEHP (as owner of the adjacent Conservation Park, with ICC managing the area through a formal trusteeship).

The recommended fire frequency for open forests and woodlands in south-east Queensland is 3-6 years for areas with a grassy understorey and 7-25 years for areas with a shrubby understorey (DNPRSR 2012). The fire regime should not exceed the recommended frequency. Recommended fire extent, or 'patchiness' is 40-80% in each burn cycle. This means that for a given patch, 100% would be burned in the first year of management and then 40-80% of that patch re-burned at the recommended fire frequency.

Given the condition of the vegetation, it is considered likely that for the majority of the Conservation Area, the historical frequency of fire has been less than the recommended interval. As such, it is recommended that controlled burns be undertaken over the majority of the site over the first 10 years of management. To minimise the impact of the controlled burns on koalas and other native fauna, burns should be undertaken in discrete fire management areas in order to form a mosaic burn pattern. Fire management should also be staged over the first ten years, with the first five years focused on areas of high lantana density.

Follow up weed management (post-fire) will be required (see **Section 7.6**).

Fire management will be undertaken in accordance with a Bushfire Management Plan (BFMP), which will also include detail on containment line locations, site preparation management actions and timing for each sub-section. This plan should be produced prior to the commencement of construction works. The BFMP is expected to be prepared prior to Year 1 and provide a works program similar to that shown in **Table 6**.

Table 6: Indicative BFMP program

| Task | Management Year | | | | | |
|-----------------------------------------------------------------|-----------------|---|---|---|---|------|
| | 1 | 2 | 3 | 4 | 5 | 6-20 |
| Establish safe and feasible access to all proposed burn areas | X | | | | | |
| Upgrade inadequate access tracks and maintain all access tracks | X | | | | | |
| Undertake initial burn across all portions of MZ2 | X | | | | | |
| Access annual maintenance | X | X | X | X | X | X |
| Update Fire Management Plan | | | | | X | |
| Undertake prescribed burns in accordance with the BFMP | | | | | | X |

Finally, prior to construction works signage will need to be prepared to advise that campfires or other fires in the Conservation Area are prohibited with appropriate warnings of legal penalties to discourage arson and unauthorised fuel reduction burns by neighbouring residents (although the latter is considered unlikely due to the existence of a perimeter road and associated Asset Protection Zone [APZ]).

7.2 Bushfire/recreation trails

Appendix D contains specification relating to all proposed tracks within the CAMP area. Recreational trails are proposed to be installed within the Conservation Area, to allow for passive, controlled use by the community, as well as to allow for and facilitate any required maintenance actions and emergency access. Specifically, the trails will allow for:

- management and rehabilitation works including weeding, assisted regeneration actions, and any management necessary to improve ecological condition;
- management of fire breaks and emergency access;
- removal of hazardous or dumped waste (as required);
- facilitation and promotion of a sense of ownership, stewardship and care of the environment within the local community; and
- encouragement of controlled use of the conservation lands along appropriately constructed pathways to limit creation of additional, un-managed tracks.

The fire/bushland trails have been designed to avoid areas of high biodiversity value and to maximise use of current trails (to avoid additional vegetation clearing). New trails will be micro-sited (by a suitably qualified ecologist) to avoid any areas of high ecological value.

Two main track types will be utilised, including:

- Management vehicle access tracks - 4m wide fire trails and overtaking bays approximately every 200m for; and
- Hiking trails/bike tracks - 2m wide.

Once the tracks have been established they will be formalised in a way sympathetic with the Conservation Area, likely with road base or local material. All trails will require water diversion devices / drains to minimise track erosion.

The fire trail network will need to be constructed to ICC standards requiring an all-weather surface and trafficable width of up to 4 metres and appropriate turnaround areas. As the majority of the Conservation Area is located on a ridge-line the trails will not need to cross wetlands or other areas subject to frequent inundation. The shallow sandy soils across the site will require minimum soil disturbance and trails will be able to be constructed at grade.

Fire trails will be:

- Accessed through lockable slip rails (4.2m wide) and accessible at all times by fire-fighting vehicles;
- connected through to a road network or network of other fire maintenance trails;
- respond to site topography and bushfire characteristics of the site and surrounding area;
- be located, designed and constructed to protect firefighter safety and provide for movement, manoeuvring and access to water supplies for firefighting;
- be designed so that dead ends are avoided; however if a dead end exists, a turnaround of sufficient radius for a full lock by a Category 1 fire tanker should be constructed (radius 12m) and

if there is insufficient space for such a turnaround due to the topography, provision should be made to allow a maximum three-point turn (radius 10m);

- be designed and constructed to avoid adverse environmental impacts, including soil erosion, impacts on natural hydrological flows, or other land degradation;
- not alter natural hydrological flows or expose acid sulfate soils;
- be maintained to provide safe four-wheel drive access by fire-fighting vehicles.

Formalisation of these trails will also ensure that public access is contained to appropriately managed areas and minimise potential impacts associated within erosion and track widening as well as unregulated public access. **Figure 2** shows the location of proposed access trails.

7.3 Significant flora management

The significant flora species *Melaleuca irbyana* was identified in the development footprint. As such, prior to impact by construction works, the following actions should be undertaken:

- Identification of nursery suppliers to provide potential stock to be used in landscaping and regeneration, or
- Collection and propagation of seeding material.

Any planted individuals should be incorporated into revegetation works in lowland parts (suitable habitat) of the Conservation Area. These may also be utilised in green spaces within the development footprint.

Other actions may also be required, consistent with any approval to clear the species under the *Nature Conservation Act 1992* (Qld).

7.4 Pest animal management

Prior to the implementation of the pest animal management it is important to gain an understanding of the population within the site by conducting baseline survey to gain a clear understanding of the size and distribution of the target species population prior to undertaking any management actions.

Surveys will need to be undertaken for:

- Rabbits
- Introduced herbivores such as goats and deer
- Foxes
- Feral pigs
- Feral cats
- Wild dogs

Survey should utilise passive survey methods such as remote sensor cameras. Other methods include spotlighting on foot or vehicle, count of scats or sand plots. On-going monitoring will also be required to determine the level of pest species onsite and their impacts on native fauna / flora. Monitoring is to be undertaken as per best practice guidelines at timescale appropriate to the species being targeted, i.e. foxes to be monitored Autumn and Spring.

The strategies in **Table 7** have been identified as potential management options for pest species onsite.

Table 7: Potential pest management strategies

| Pest type | Monitoring | Shooting | Trapping | Den Destruction | Fencing |
|-----------------------|------------|----------|----------|-----------------|---------|
| Rabbits | X | X | X | X | |
| Introduced herbivores | X | X | X | | X |
| Foxes | X | X | X | X | |
| Feral pigs | X | X | X | | |
| Feral cats | X | X | X | | |
| Wild dogs | X | X | X | X | X |

After surveys have been undertaken, a Pest Management Strategy (PMP) will need to be prepared to guide pest management over the establishment and maintenance period.

7.5 Revegetation

Given the condition of the site, and the presence of native species throughout the site, revegetation will likely only be required in patches where canopy species are not present in sufficient numbers to meet regional ecosystem benchmarks. These patches are mostly linked to areas of more recent disturbance, either human or natural, including watercourses, around dams, adjacent to the development footprint and along tracks.

Revegetation specifications are provided in **Appendix B** based on what is considered likely to be required to meet the performance and completion criteria. Where regeneration occurs revegetation may be reduced accordingly. Where required, revegetation should be undertaken using predominantly direct seeding, especially for groundcovers and grasses. Direct seeding offers a lower upfront cost than tubestock, but depending on conditions, repeated treatments may be required.

7.6 Weed control

Weed control across the majority of the site primarily consists of management of lantana, however herbaceous and grass weeds are more prevalent in lower areas of the site and adjacent to watercourses.

Weed control specifications are provided in **Appendix C**.

7.7 Native tree management

Some areas of the Conservation Area are either dominated by native shrub species or have high tree stem densities of koala food trees, restricting the size classes of such trees to those unsuitable for koala feeding / resting.

To overcome these issues, the works schedule specifies both an initial burn near project commencement, with follow-up manual control treatments aimed at reducing densities in subsequent years.

Density reduction is not to take place in riparian revegetation areas. Density reduction treatments should aim to reduce densities of canopy species to one per 16m² where undertaken. Chemical injection is the preferred method of treatment for canopy species, while acacia control can be undertaken using chemical or mechanical means.

8 Management zones

8.1 General

Three management zones have been established to give an indication of the degree and type of effort required to reach the objectives of the rehabilitation. The zones include MZ1 Riparian Restoration, MZ2 Assisted Regeneration and MZ3 Regeneration and are mapped in **Figure 6**.

8.2 MZ1: Riparian restoration

This zone represents the portion of the Conservation Area in close proximity to drainage lines, a total area of approximately 30 ha. This zone also includes areas of exotic pasture with no canopy present and the portion of the Conservation Area adjacent to the development boundary. This zone is characterised by higher amounts of water, nutrients and disturbance and as such, exotic species are present in higher densities.

Primary management actions:

- Revegetation
- Weed control

Secondary management actions:

- Fire management
- Significant flora translocation
- Pest fauna management

Revegetation has been estimated to be required across approximately 75% of this zone at the densities shown in **Appendix B**. Where natural regeneration is not feasible, revegetation will be undertaken using mostly direct seeding with some areas of tubestock.

Weed control will include primary removal of woody weeds including Lantana and *Ligustrum lucidum* (Large-leaf Privet) in riparian areas, as well as slashing and spot spraying of exotic pasture grasses including *Chloris gayana* (Rhodes Grass). A high level of secondary and maintenance follow up is expected to be required based on the low resilience of this zone. In addition, weed control may be undertaken as preparation for revegetation.

8.3 MZ2: Assisted regeneration

This zone represents the portion of the Conservation Area that has currently low resilience or are likely to have low resilience in the future. The area comprises approximately 92 ha within the Conservation Area. This zone includes areas of dense lantana towards the south of the site and a 20m buffer on all development edge which will be subject to greater impacts in the future.

Primary management actions:

- Revegetation
- Weed control

Secondary management actions:

- Fire management
- Significant flora translocation
- Pest fauna management
- Bushfire/recreation trails
- Native tree management

Revegetation has been estimated to be required across approximately 25% of this zone, in areas of low resilience, at the densities shown in **Appendix B**. Where natural regeneration is not feasible, revegetation will be undertaken using mostly direct seeding and some areas of tubestock.

Weed control will predominantly include primary removal of Lantana and management of patches of low resilience. A high level of secondary and maintenance follow up is expected to be required based on the low resilience of this zone.

Thinning of native trees to encourage the growth of koala feed trees will be undertaken in this zone as required.

8.4 MZ3: Regeneration

This zone represents the remainder of the Conservation Area, and is a total area of approximately 134 ha. This zone is in good condition with low weed density throughout and large sections of no weeds present.

Primary management actions:

- Weed control

Secondary management actions:

- Fire management
- Significant flora planting
- Pest fauna management
- Bushfire/recreation trails
- Revegetation
- Native tree management

Revegetation has been estimated to be required across this zone as infill of trees and shrubs, at the densities shown in **Appendix B**. Where natural regeneration is not feasible, revegetation will be undertaken using tubestock. These will be mostly comprised of koala food trees and GHFF winter foraging food trees, as well as native shrubs consistent with the surrounding vegetation community.

Weed control will predominantly include secondary management, with occasional primary works in areas of lower resilience. A low level of maintenance weed control works is also expected based on the high resilience of this zone.

Thinning of native trees to encourage the growth of koala and GHFF feed trees will be undertaken in this zone as required.

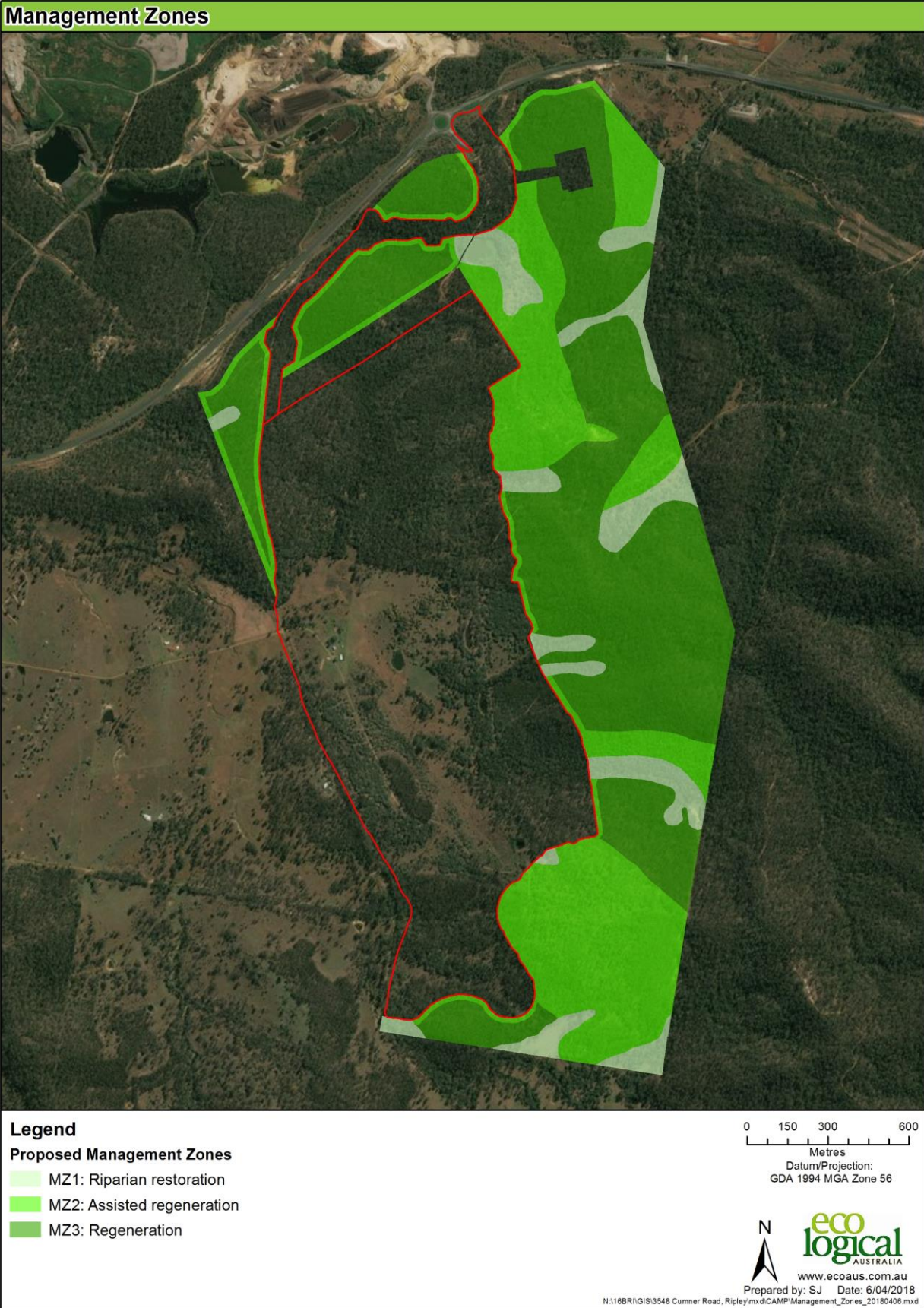


Figure 6: Management zones

9 Monitoring and reporting

Monitoring and reporting during the on-maintenance period (first 10 years) will be key to both project success as well as demonstrating success to regulatory agencies. The EM and project ecologist will monitor the vegetation for changes over time during the on-maintenance period. Information gained through the monitoring and reporting process will identify works that have and have not been successful, and the reasons for their success or failure.

The aim of monitoring is to measure the effectiveness of the control actions being undertaken to achieve the desired outcome. It will identify non-conformance and provide the land manager with the ability to implement corrective actions. Information derived from the results of monitoring will also be used in adaptive management (i.e. learning from past experience to inform future priorities and work plans). For example, as annual grass weeds are removed, herbaceous and perennial weeds may establish.

Finally, monitoring and reporting will help determine and quantify the costs related to weed management and the cost effectiveness of management actions.

Monitoring post-handover to ICC will be undertaken as per ICC internal requirements and any EPBC Act requirements.

9.1 On-maintenance Monitoring

On-maintenance monitoring will include:

1. Establishment of vegetation survey transects and photo monitoring points;
2. Monitoring of koala population and health, consistent with the Koala Management Plan (ELA 2017);
3. Pest Fauna Monitoring, as discussed in **Section 7.4**;
4. Establishment of permanent fire monitoring plot (for fuel reduction and ecological monitoring). Monitoring will be described in detail within the Bushfire Management Plan and can be incorporated into ICC's Fire Management Program); and
5. Monitoring of the condition of Conservation Area infrastructure (fences, security, signage, trails etc).

9.1.1 Vegetation Monitoring

Baseline data is required to be collected prior to works being commenced to establish a benchmark for performance, whilst ongoing monitoring will occur on an annual basis for 10 years after construction commences.

Photo monitoring points should be established using a permanent reference point to provide a visual reference of changes in the vegetation. Photo monitoring is to include four formal photo monitoring points in each management zone. The following method will be employed:

- Mark photo points with a star picket at the south-west corner of the transect and map the location of each photo point using GPS;
- take a digital photo of each photo point at each of the compass points with the star picket visible in the photo to act as a reference point and towards the north-east corner;
- organise the digital photos logically with each image labelled with a unique reference number indicating the location of the photo point and the date the photo is taken.

The photo points are to be installed in areas of lantana infestation and / or high canopy species density (acacia or koala food trees), and once selected the same photo points should be used for each monitoring event.

Other ad-hoc photo points (e.g. along creek lines) may also be established for reference; however full vegetation monitoring may not be carried out at these points.

A rapid assessment of lantana infestation coverage over the whole zone is also to be undertaken, consistent with the method used within the White Rock Ecological Assessment (ELA 2017).

At two of the four formal photo points in each management zone, a BioCondition plot will be established and data will be collected consistent with the BioCondition Methodology.

9.1.2 Koala Population Monitoring

Koala monitoring will be undertaken as per the specifications in the Koala Management Plan (ELA 2017). This will consist of:

- A baseline assessment of the koala population and health prior to the commencement of construction works; and
- An annual assessment of the achievement of the performance criteria detailed in the koala management plan (ELA 2017).

The results of all monitoring will be combined into a single annual report up until handover to ICC.

9.1.3 Pest Fauna Monitoring

Pest fauna monitoring is discussed in Section 7.4.

9.2 Monitoring of infrastructure

The condition and function of infrastructure within the conservation area will be monitored at a frequency dependant on the type of infrastructure and the associated risks (safety, environmental) that dilapidation may pose. This is usually undertaken on a three monthly basis. Engineers will be consulted during infrastructure design to ascertain how often infrastructure will require monitoring and maintenance.

9.3 Annual reports

An annual report is to be submitted to the land manager by the relevant contractors. The annual report is to include the following information:

- An overview of works undertaken throughout the year, with a description of any problems encountered and how they were overcome and recommendations for future works;
- All monitoring data;
- Assessments of works against relevant performance criteria;
- Photo monitoring results, showing before and after photos for worked areas;
- Vegetation monitoring results, showing changes in vegetation through time;
- Records of significant vandalism;
- Track condition;
- Erosion and erosion control works;
- Bushfire control actions / occurrence summaries (including fuel / ecological health fire plot monitoring results);
- Pest control / abundance data; and
- Any observations such as the occurrence of new weed species, rates of regeneration etc.;

Separate reporting not related to this CAMP will be required for works in the development footprint, including weed control, fencing and pre-clearance works.

Annual reporting will be followed by a site inspection with the EM and ICC to discuss the progress and compliance with this CAMP. An adaptive management approach will ensure that results from the reporting and photo monitoring will guide management practices for the next year. Annual reporting is to be made available to DotEE and ICC on request.

9.4 Final Reports

The annual monitoring report at year 10 will enable handover to ICC. This report will provide an assessment of the conservation area against the ICC handover completion criteria (**Section 11.2**).

At year 20, a final annual monitoring report will assess the conservation area against the completion criteria related to the EPBC Act offset requirements (**Section 11.2**). This report will be required to be submitted to the relevant Commonwealth Government department at year 20 to confirm offset requirements have been satisfied.

9.5 CAMP Review

This plan provides the basis of management for the first 20 years following construction commencement. This plan should be reviewed and updated at the following key milestones:

- Every 5 years after construction commences;
- At handover of the Conservation Area to ICC;
- At the end of the life of this plan (20 years after construction of the urban area commences); and
- On an ad hoc basis, depending on results of monitoring.

10 Work schedule

10.1 Indicative work schedule

The establishment phase of on-ground works has been divided the following stages:

- Preliminary works
- Management works

CAMP activities will align closely with development staging, which is still in development. However, broadly, management is expected to be as follows:

- Year 1-2: Construction activities commence. During this period, any management action related to the construction works (e.g. translocation of logs) or needing to undertake holistically across the site (e.g. pest fauna management, some bushfire management and follow up weed control) will also be commenced.
- After sale of the 200th lot of Stage 1 (approximately 18 month) - All other works within CAMP commence and are undertaken in a staged manner based on the development staging.
- Year 2-9: works continue, and are implemented consistent with the adaptive management framework.
- Year 10: Completion of establishment works. At this point it is expected that the site will be handed over to ICC to continue management.
- Year 11-20: Implementation of maintenance works

An indicative work schedule has been provided as **Table 8** and **Table 9**. As the construction timeframes are not known, assumptions have been made regarding the length of the preliminary and establishment works periods. The numbers shown correspond to financial year quarters, so preliminary works are assumed to begin in Q1 (i.e. July-September). The key to the table is provided below:

| | | |
|------------|---------------------------------|--|
| Key | Construction management actions | |
| | Bushland management actions | |

Table 8: Indicative work schedule for the establishment phase

| Task | Preliminary | | | | | | | | Management | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|--------|---|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|--------|---|---|---|--------|---|---|---|--------|---|---|---|--------|---|---|---|--------|---|---|---|--------|---|---|---|---------|---|---|---|--|--|
| | Year 1 | | | | Year 2 | | | | Year 3 | | | | Year 4 | | | | Year 5 | | | | Year 6 | | | | Year 7 | | | | Year 8 | | | | Year 9 | | | | Year 10 | | | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | | |
| Construction-related management actions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Translocation of habitat features (i.e. logs) | Installation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fencing / signage (and maintenance) | Installation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sediment and erosion control (and maintenance) | Installation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Waste | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bushland management actions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fire Management | Undertake mosaic burns as per the BFMP | | | | | | | | Undertake mosaic burns as per the BFMP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Significant flora planting (estimated timeframe) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pest fauna management | Baseline monitoring | | | | | | | | Ongoing management as per the PMP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bushfire/recreation trails (and maintenance) | Creation of fire trails and access paths | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Revegetation requirements assessed | Preliminary assessment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Revegetation works installed (maintenance of revegetation works is ongoing) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Weed control | Targeted primary weed treatment over approximately 10% of conservation area. Targeted primary weed treatment within all mosaic burn areas (post burn) | | | | | | | | Remaining primary works, secondary and maintenance staged in coordination with development works and mosaic burning. It is currently assumed that primary works will be completed by the end of Year 6. Secondary works will be started as each stage of primary works are completed and are expected to be completed by the end of Year 7. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Native tree management | Preliminary assessment | | | | | | | | Thinning undertaken as required | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring and reporting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring and annual reporting | Monitoring points installed / baseline established prior to works | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CAMP Review, aiming to minimise threatening processes to koalas. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table 9: Indicative work schedule for the maintenance phase (year 11 to 20)

| Task | Maintenance (year 11 to 20) | | | |
|------------------------------------|-----------------------------------------------------|---------------|---------------|---------|
| | Year 11 to 13 | Year 14 to 16 | Year 17 to 19 | Year 20 |
| Bushland management actions | | | | |
| Fire Management | As specified in BFMP | | | |
| Pest fauna management | As per the PMP | | | |
| Weed control | Ongoing, as required to maintain conservation goals | | | |
| Native tree management | Ongoing, as required to maintain conservation goals | | | |

11 Performance and Completion Criteria

11.1 Performance criteria

The performance criteria required for the site have been identified in **Table 10**. Performance criteria are considered as interim targets, which will guide works towards the ultimate goals and completion criteria (see **Section 11.2**) stated in this CAMP. If monitoring indicates that the management actions are not resulting in achievement of the performance criteria, the program may require revision in consultation with ICC and all other relevant authorities.

Table 10: Performance criteria

| Task | Establishment | | | Maintenance |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| | Preliminary | Management | | |
| | Years 1-2 | Years 3-9 | Years 10 | Years 11-20 |
| Construction-related management actions | | | | |
| Translocation of habitat / logs | Translocation undertaken, minimal damage to CA vegetation. | N/A | | |
| Fencing / signage / (and maintenance) | Infrastructure installed. | No more than 5% of fencing compromised at any time | | |
| Sediment and erosion control (and maintenance) | Sediment / erosion works installed | Sediment and erosion control devices checked and repaired annually in Quarter 1 | | |
| Waste | Initial waste removal undertaken, ongoing waste removed quarterly / as required | Waste removed Quarterly and as required | | |
| Bushland management actions | | | | |
| Fire Management | Fire management works undertaken as specified in the BFMP | | | |
| Significant flora management | Undertaken as per specifications in Section 7.3 / translocation plan as required. After works are complete, monitoring of translocated individuals must be undertaken | | | N/A |
| Pest fauna management | Baseline of dogs / cats / foxes established. | Undertaken as specified in Pest Management Plan. | | |
| Bushfire/recreation trails (and maintenance) | Fire access tracks established | At a minimum, bushfire management trails drivable at least one month prior to fire season as determined in BFMP. No more than 10% of designated multipurpose trails unwalkable at any time. | | |
| Revegetation requirements assessed | Revegetation requirements assessed every year prior to planting season until Year 7 | | | N/A |
| Revegetation works | N/A (preliminary assessment of requirement in conjunction with weed control works) | Revegetation is undertaken where identified to planting specifications and consistent with the Regional Ecosystem type. All revegetation to be completed by Year 7 as per the following progressive works plan: <ul style="list-style-type: none"> By end Yr 3 – works undertaken across 20% of the works area By end Yr 4 – works undertaken across 40% of the works area By end Y 5 – works undertaken across 60% of the works area By end Y6 – works undertaken across 80% of the works area By end Y7 – works undertaken across 100% of the works area Minimum 90% survival rate of revegetation or equivalent stem density (i.e. through natural regen) at the end of each year and by Year 10. | | N/A |
| Weed control | Targeted primary treatment over approximately 10% of area. Targeted primary treatment within all mosaic burn areas (post burn), estimated to be 10% pending preparation of BFMP | Primary and secondary works undertaken in all areas by the end of Year 7 as per the following progressive works plan: <ul style="list-style-type: none"> By end Yr 3 – primary works undertaken across 32.5% of the works area; secondary works to commence where primary works completed By end Yr 4 – primary works undertaken across 55% of the works area; secondary works to commence where primary works completed By end Y 5 – primary works undertaken across 77.5% of the works area; secondary works to commence where primary works completed By end Y6 – primary works undertaken across 100% of the works area; secondary works to commence where primary works completed By end Y7 – all secondary works completed Targeted primary treatment within all mosaic burn areas (post burn). | A minimum of three years of maintenance undertaken in all areas <5% coverage of mature woody weeds in any zone <25% exotic groundcover in MZ1 and MZ2 <10% exotic groundcover in each zone in MZ3 Targeted primary treatment within all mosaic burn areas (post burn). | |
| Native tree management | Identification of tree thinning areas | All thinning activities undertaken as specified in Section 7.7 by the end of Year 7 | | All management zones and portions thereof have koala food trees present consistent with the associated Regional Ecosystem type. |

| Task | Establishment | | | Maintenance |
|--------------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------|----------|-------------|
| | Preliminary | Management | | |
| | Years 1-2 | Years 3-9 | Years 10 | Years 11-20 |
| Monitoring and reporting | | | | |
| Monitoring and annual reporting | Monitoring points installed / baseline established prior to works | Annual and final monitoring undertaken in as specified in Section 9 | | |
| CAMP Review, aiming to minimise threatening processes to koalas and GHFF | N/A | CAMP reviewed and updated at Year 5, 10, 15 and 20 | | |

11.2 Completion criteria

The completion criteria are similar to the performance criteria; however, completion criteria are binding and are required for two purposes:

1. To enable handover of administration and management of the conservation area to ICC at year 10; and
2. To confirm any EPBC Act offset requirements have been satisfied.

If monitoring indicates that the management actions have not resulted in achievement of the completion criteria, the program may require revision in consultation with ICC and all other relevant authorities.

The following completion criteria are required to be met at year 10 and/or year 20 to enable handover to ICC or to demonstrate completion of EPBC Act offset requirements:

Table 11: Completion Criteria for Years 10 and 20

| Completion Criteria | Relevant to Year 10 | Relevant to Year 20 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 1. The conservation area has been legally secured, ensuring protection for conservation purposes, within two years of construction of the urban development area commencing. | ✓ | ✓ |
| 2. With exception of minor initial works, rehabilitation works commenced following registration of the 200th lot. | ✓ | ✓ |
| 3. Documented increase in koala and GHFF habitat value, as shown in an assessment against the management objectives of Table 4 | ✓ | ✓ |
| 4. All revegetation (planting works) completed by year 10, with planted tree species comprising predominantly koala food trees (including Forest Red Gum and Mountain Grey Gum) and winter foraging species for the GHFF (Broad-leaved Paperbark, Spotted Gum, Swamp Mahogany and Forest Red Gum). | ✓ | ✗ |
| 5. Minimum 90% survival rate of revegetation or equivalent stem density (i.e. due to natural regeneration) by Year 10 | ✓ | ✗ |
| 6. All management zones contain primary koala food trees and GHFF winter foraging trees in good health after 10 years. | ✓ | ✓ |
| 7. Across the planting area, tree canopy cover % within each management zone meets regional ecosystem benchmarks at year 10 and 20, as defined by the Queensland Government's <i>BioCondition Benchmarks for Regional Ecosystem Condition Assessment</i> (2019). This includes: <ul style="list-style-type: none"> • For RE 12.3.3: 53% • For RE 12.9-10.7a: 58% • For RE 12.9-10.2: 62% • For RE 12.9-10.7: 40% • For RE 12.8.17: 48% • For RE 12.8.24: 53% | ✓ | ✓ |
| 8. A density of at least 20 canopy trees (comprising Koala food trees and winter foraging resource trees for GHFF) and 250 mid or understory trees and/or shrubs per hectare will be present. | ✓ | ✓ |
| 9. Rehabilitation and management results in vegetation communities that meet the descriptions of pre-existing and/or surrounding remnant regional ecosystem types. | ✓ | ✓ |

| | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|
| 10. Pest management has been undertaken to achieve a statistically significant reduction (from baseline numbers) in pest species identified to be of primary concern (identified within the Pest Management Plan). | ✓ | ✓ |
| 11. Bushfire Management has been undertaken as specified in the relevant Bushfire Management Plan (as current at time of assessment against completion criteria) | ✓ | ✓ |
| 12. Weed management and revegetation will be undertaken progressively with work effort portioned over an approximately equal area every year between years 3 and 7 (as per work plan in Table 10). | ✓ | ✗ |
| 13. Coverage of mature woody weeds in any management zone is reduced to and maintained at <5%. | ✓ | ✓ |
| 14. Exotic groundcover in MZ1 and MZ2 is reduced to and maintained at <25%. | ✓ | ✓ |
| 15. Exotic groundcover in MZ3 is reduced to and maintained at <10%. | ✓ | ✓ |
| 16. No more than 5% of fencing is compromised | ✓ | ✓ |
| 17. No more than 10% of designated multipurpose trails unwalkable at any time | ✓ | ✓ |
| 18. All signage installed and in good condition | ✓ | ✓ |
| 19. The fauna underpass is completed with landscaping successfully established and in good health by year 10. | ✓ | ✗ |
| 20. Final monitoring undertaken as specified in Section 9 . | ✓ | ✓ |

Evidence will be documented in the monitoring reports for years 10 and 20, which will be used to enable handover to ICC and/or demonstrate compliance with EPBC Act offset requirements (see **Section 9.4**).

11.3 Adaptive management

As this is a long-term project that will be implemented over 20 years, an adaptive management approach will be implemented that enables contractors and land managers to learn from and respond to successful and unsuccessful techniques used on the site.

The success of the works will be determined by meeting the performance and completion criteria identified above. Contractors and/or land managers have the flexibility to implement different techniques to those specified within this CAMP if performance and completion criteria can still be met. Any major departures from this plan or changes to performance or completion criteria must be approved in writing by Ipswich City Council and all other relevant authorities.

12 Costs

The indicative costs to implement vegetation management works detailed in this CAMP is estimated at approximately **\$5,200,000** (ex GST) over 20 years.

These costs are based on the experience that ELA has in regard to preparing and implementing similar vegetation management plans. It should be noted that these costs may vary significantly over subsequent years of management in response to, and effectiveness of, the proposed management and impacts of civil construction impacts. These rates are also based upon costs in 2017, and on-going maintenance costs (labour and materials) may increase over time with inflation.

12.1 Construction-related management actions

The costs for construction and associated management actions identified as the responsibility of the civil construction contractor / developer have not been included in the costs provided.

12.2 Bushland management actions

12.2.1 Fire management

The indicative BFMP program identified in **Section 7.1** has been used to estimate a cost for bushfire management, noting that this is subject to change.

12.2.2 Pest control

The costs for pest control have been estimated, however the final cost will be dependent on pest species numbers, density and impacts identified during baseline survey and on-going monitoring.

12.2.3 Bushfire/recreation trails

The cost to install bushfire/recreation trails has not been included as these are expected to be undertaken by the civil construction contractor under supervision of the EM

12.2.4 Revegetation

The total cost of revegetation is estimated at approximately \$1,100,000, assuming a large proportion of direct seeding. If tubestock was used instead, this cost would need to be revised. For the remainder of the vegetation, tubestock planting has been assumed. As single seeding event has been assumed, with a minimum density of 10kg/ha of seed. However, multiple treatments may be required depending on management success, climatic conditions, etc.

Direct seeding has been estimated at \$1/m² for site preparation and supply and manual broadcast of at least 10kg/ha of native seed indicative of the targeted regional ecosystem. Additional treatments, if required, would likely be less as site preparation works may not be required. Tubestock plantings would cost approximately \$3.00 per tree and shrub including planting, water crystals, fertiliser and initial watering, and an approximately \$2.00 per grass, sedge and groundcover including planting, water crystals. Irrigation, undertaken over a minimum 12 week period, has been calculated separately.

12.2.5 Weed control

Regeneration works and weed control have been calculated at \$2,000 for a team of four bush regenerators per day. The cost of bush regeneration works includes travel and the costs of herbicide, vehicles and equipment which are required to implement the proposed works.

12.3 Monitoring and reporting

All monitoring, mapping and reporting works have been calculated using the rate for a qualified and trained expert at \$160 – \$200 per hour. This rate is the same for various disciplines, including Restoration Ecologist, Fauna Ecologist or Bushfire Consultant.

Table 8: Indicative management costs

| Treatment | Preliminary | | Management | | | | | | Maintenance | |
|-------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Years 8-10 | Years 11-20 | Total |
| Fire management | \$5,116 | \$5,116 | \$5,116 | \$5,116 | \$5,116 | \$5,116 | \$5,116 | \$15,347 | \$51,155 | \$102,310 |
| Significant flora translocation | \$- | \$- | \$- | \$- | \$- | \$- | \$24,435 | \$- | \$- | \$24,435 |
| Pest fauna management | \$2,558 | \$2,558 | \$2,558 | \$2,558 | \$2,558 | \$2,558 | \$2,558 | \$7,673 | \$25,578 | \$51,155 |
| Revegetation | | | | | | | | | | |
| Seed collection, cleaning, storage | \$52,682 | \$52,682 | \$52,682 | \$52,682 | \$- | \$- | \$- | \$- | \$- | \$210,729 |
| Site Preparation | \$- | \$- | \$23,211 | \$23,211 | \$23,211 | \$23,211 | \$23,211 | \$- | \$- | \$116,053 |
| Jute Matting / Mulch | \$- | \$- | \$13,626 | \$13,626 | \$13,626 | \$13,626 | \$13,626 | \$- | \$- | \$68,129 |
| Direct Seeding, supply and install | \$- | \$- | \$86,296 | \$86,296 | \$86,296 | \$86,296 | \$86,296 | \$- | \$- | \$431,482 |
| Tubestock, supply and install | \$- | \$- | \$37,087 | \$37,087 | \$37,087 | \$37,087 | \$37,087 | \$- | \$- | \$185,435 |
| Replacement tubestock, supply and install | \$- | \$- | \$- | \$3,709 | \$3,709 | \$3,709 | \$3,709 | \$3,709 | \$- | \$18,544 |
| Irrigation | \$- | \$- | \$13,092 | \$13,092 | \$13,092 | \$13,092 | \$13,092 | \$- | \$- | \$65,459 |
| Weed control | | | | | | | | | | |
| Primary weed control | \$104,420 | \$104,420 | \$208,841 | \$208,841 | \$208,841 | \$208,841 | \$- | \$- | \$- | \$1,044,205 |
| Secondary weed control | \$- | \$117,503 | \$117,503 | \$235,006 | \$235,006 | \$235,006 | \$235,006 | \$- | \$- | \$1,175,029 |
| Maintenance weed control | \$- | \$- | \$50,358 | \$50,358 | \$100,717 | \$100,717 | \$100,717 | \$302,150 | \$- | \$705,018 |
| Long-term maintenance | \$- | \$- | \$- | \$- | \$- | \$- | \$- | \$- | \$848,098 | \$848,098 |
| Native tree management | \$8,727 | \$8,727 | \$8,727 | \$8,727 | \$8,727 | \$8,727 | \$8,727 | \$- | \$- | \$61,088 |
| Monitoring and reporting | | | | | | | | | | |
| Monitoring and annual report | \$7,673 | \$7,673 | \$7,673 | \$7,673 | \$7,673 | \$7,673 | \$7,673 | \$23,020 | \$- | \$76,733 |
| CAMP Review | \$- | \$- | \$- | \$- | \$4,476 | \$- | \$- | \$4,476 | \$8,952 | \$17,904 |
| Totals | \$181,176 | \$298,679 | \$626,770 | \$747,981 | \$750,134 | \$745,657 | \$561,252 | \$356,375 | \$933,783 | \$5,201,806 |

**indicative pending preparation of BFMP ^if required*

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Appendix A – ICC / Intrapac Agreement

In preparation and to be supplied when finalised

Appendix B - Revegetation Specifications

Revegetation is intended to increase the resilience of a given site and to mimic the natural vegetation community being recreated. Where present in sufficient numbers, regeneration from naturally occurring seed stock will be utilised, however if regeneration is not present then direct seeding or planting may be required.

Planting should be done via a low impact method such as hand digging or hand auger. The holes dug for each plant should be at least 2x the width and 2x the depth of the rootball. Fertiliser should be added to each hole dug as per the label specifications. Water crystals or wetting agents should be added to each plant hole. This will increase the water holding capacity of the soil and reduce watering schedules. Initial watering of the plantings is essential to ensure that the soil forms around the rootball and no air pockets are left. This will be required unless sufficient rainfall (approx 10mm) occurs on the day of planting. Hand watering (using water suitable for agricultural purposes) of 5 litres on the day of planting and 2 litres per follow-up over a 12 week period for tube stock is advised.

Tree guards may need to be installed on each tree or shrub to protect seedlings from extreme weather (frosts and heat), herbivorous grazing and herbicide drift during maintenance. If used, bio-degradable tree guards are recommended. Following the revegetation works, consistent watering will be needed for a period of at least 12 weeks following planting to ensure the establishment of the plants. This may need to be provided through an artificial irrigation setup, with the scale needed determined by rainfall and temperature experienced at the planting site. As such, it is recommended that revegetation be undertaken in the autumn where typically temperatures are lower and rainfall higher than in spring.

The use of mulch is very important because it provides organic matter to the top soil, improves soil structure and aeration, water infiltration, nutrient availability, and is also useful in the suppression of weed growth. Mulch should be installed to a depth of 100 mm where required (in heavily disturbed areas for example). Mulch should comprise of un-composted wood (preferably wood waste), with a particle size of 15 mm to 40 mm, with no fines, and good air filled porosity. Mulch should not contain any weed seeds, be derived from diseased trees, nor from any part of the tree lower than 1 m above the ground. It is assumed that sufficient mulch will be available from the development site.

If areas of high erosion are identified, it is recommended that jute matting is used instead. Jute matting must be comprised of 100% biodegradable jute fibres with a minimum weight of 680g/m² (~6 mm thickness). Jute must be pegged with at least 3 x 150 mm pins per m² and each roll overlapped by 100 mm. Jute mesh is not acceptable.

Estimated revegetation requirements are shown in the table below, including equivalent direct seeding. Natural regeneration will also reduce the revegetation requirements of the site.

| Zone | Description | Reveg Area (m2) | Revegetation densities (m2)* | | | Totals |
|---------------|----------------------------|-----------------|------------------------------|--------|--------------|-----------|
| | | | Tree | Shrub | Groundcovers | |
| MZ1 | MZ1: Riparian restoration | 223,130 | 1/50 | 1/25 | 3 | 682,776 |
| MZ2 | MZ2: Assisted regeneration | 231,062 | 1/50 | 1/25 | 3 | 707,051 |
| MZ2 | MZ3: Regeneration | 1,002,002 | 1/200 | 1/100 | - | 15,030 |
| Totals | | 1,456,194 | 14,094 | 28,188 | 1,362,576 | 1,404,858 |

Seed collection

For the growth of the plants used in the revegetation works, it is preferable that seeds are collected from local provenance species. Groundcovers, shrubs and trees should ideally be collected from within 5km of the site.

Native grasses typically have much larger dispersal mechanisms and should preferably be collected from within a 15km radius of the site. Should seed not be available within this radius, Council may provide written approve for seed supply from other nearby areas.

Species must be substituted with species of a similar form, e.g. trees for tree, grasses for grasses, etc. Only native species are to be used.

Record keeping of seed collection and planting locations are to follow the Florabank guidelines (Mortlock, 2000). The bush regeneration contractor is responsible for recording this information.

Appendix C - Weed Control Techniques

The table below lists all exotic flora observed during initial ecological assessments.

Exotic flora observed on-site

| Species | Common Name | Family | Species | Common Name | Family |
|----------------------------------------------------|--------------------------|---------------|------------------------------------------|----------------------|----------------|
| <i>Ageratina riparia</i> | mistflower | Asteraceae | <i>Lantana camara</i> | lantana | Verbenaceae |
| <i>Ageratum houstonianum</i> | blue billygoat weed | Asteraceae | <i>Lantana montevidensis</i> | creeping lantana | Verbenaceae |
| <i>Alternanthera pungens</i> | khaki weed | Amaranthaceae | <i>Lepidium africanum</i> | common peppergrass | Brassicaceae |
| <i>Ambrosia artemisiifolia</i> | annual ragweed | Asteraceae | <i>Leucaena leucocephala</i> | Coffee bush | Mimosaceae |
| <i>Ammi majus</i> | bishop's weed | Apiaceae | <i>Ligustrum lucidum</i> | large-leaved privet | Oleaceae |
| <i>Axonopus compressus</i> | | Poaceae | <i>Ludwigia peploides</i> | | Onagraceae |
| <i>Axonopus fissifolius</i> | | Poaceae | <i>Macroptilium atropurpureum</i> | siratro | Fabaceae |
| <i>Baccharis halimifolia</i> | groundsel bush | Asteraceae | <i>Macroptilium lathyroides</i> | | Fabaceae |
| <i>Bidens pilosa</i> | | Asteraceae | <i>Medicago polymorpha</i> | burr medic | Fabaceae |
| <i>Calyptocarpus vialis</i> | creeping Cinderella weed | Asteraceae | <i>Megathyrus maximus var. coloratus</i> | | Poaceae |
| <i>Celtis sinensis</i> | Chinese elm | Ulmaceae | <i>Melinis repens</i> | red natal grass | Poaceae |
| <i>Chamaecrista rotundifolia var. rotundifolia</i> | | Caesalpiaceae | <i>Mimosa pudica</i> | | Mimosaceae |
| <i>Chloris gayana</i> | rhodes grass | Poaceae | <i>Opuntia stricta</i> | | Cactaceae |
| <i>Chloris virgata</i> | feathertop rhodes grass | Poaceae | <i>Paspalum dilatatum</i> | paspalum | Poaceae |
| <i>Cichorium intybus</i> | chicory | Asteraceae | <i>Paspalum urvillei</i> | vasey grass | Poaceae |
| <i>Cirsium vulgare</i> | spear thistle | Asteraceae | <i>Passiflora foetida</i> | | Passifloraceae |
| <i>Conyza bonariensis</i> | | Asteraceae | <i>Passiflora suberosa</i> | corky passion flower | Passifloraceae |
| <i>Conyza canadensis</i> | | Asteraceae | <i>Rumex crispus</i> | curled dock | Polygonaceae |
| <i>Cortaderia selloana</i> | pampas grass | Poaceae | <i>Senecio madagascariensis</i> | fireweed | Asteraceae |
| <i>Cyclospermum leptophyllum</i> | | Apiaceae | <i>Senna pendula</i> | | Caesalpiaceae |

| Species | Common Name | Family | Species | Common Name | Family |
|---------------------------------|--------------------|---------------|-----------------------------------------------------|-------------------|-------------|
| <i>Cynodon dactylon</i> | | Poaceae | <i>Setaria pumila</i> <i>subsp. subtesselata</i> | | Poaceae |
| <i>Daucus carota</i> | wild carrot | Apiaceae | <i>Sida cordifolia</i> | | Malvaceae |
| <i>Desmodium triflorum</i> | | Fabaceae | <i>Sida rhombifolia</i> | | Malvaceae |
| <i>Digitaria ciliaris</i> | summer grass | Poaceae | <i>Solanum mauritianum</i> | wild tobacco | Solanaceae |
| <i>Eleusine indica</i> | crowsfoot grass | Poaceae | <i>Sonchus oleraceus</i> | common sowthistle | Asteraceae |
| <i>Emilia sonchifolia</i> | | Asteraceae | <i>Sporobolus fertilis</i> | | Poaceae |
| <i>Eragrostis tenuifolia</i> | elastic grass | Poaceae | <i>Stylosanthes hamata</i> | | Fabaceae |
| <i>Gomphocarpus physocarpus</i> | balloon cottonbush | Apocynaceae | <i>Taraxacum officinale</i> | dandelion | Asteraceae |
| <i>Gomphrena celosioides</i> | gomphrena weed | Amaranthaceae | <i>Verbena rigida</i> | | Verbenaceae |
| <i>Hypochaeris radicata</i> | catsear | Asteraceae | <i>Xanthium occidentale</i> | | Asteraceae |
| <i>Indigofera spicata</i> | creeping indigo | Fabaceae | | | |

Weed control involves a combination of mechanical, physical and chemical techniques to remove the weeds and prevent regrowth. Weed control will be undertaken in all management zones. A selection of the best suited weed control method within the site depends on a number of factors including:

- the species or combination of weeds being targeted
- the density of the weeds
- resources available (time, labour, equipment and finances)
- weather conditions of the day

Weed control techniques

Focus of control activities is woody weeds with the ability to outcompete canopy species (e.g. lantana, celtis, camphor laurel etc). Detail of specific weed control techniques to be used such as cut and paint, scrape and paint, herbicide spraying and hand weeding are given in Chenoweth EPLA and Bushland Restoration Services (2012). Management techniques for different types of weeds are provided below.

Annual grasses

Annual grasses, such as Green panic (*Panicum maximum* var. *trichoglume*), should be spot sprayed where isolated or in low concentrations. Larger patches of annual grasses may be slashed/sprayed in late spring to early summer, after flowering, but prior to seed set. For most species, slashing/brush cutting prior to late spring through to early summer will promote vigorous growth and should not occur. However, some annual grasses can grow and produce seed at any time of the year dependent on climatic conditions such as high rainfall and warm temperatures. Monitoring of annual species should be undertaken and if new growth occurs, the same treatment will be applied to the new growth to prevent seed production. Individual plants should be hand removed, bagged and disposed of appropriately offsite.

Perennial grasses

Perennial grasses, such as *Paspalum dilatatum* (Paspalum) and *Pennisetum clandestinum* (Kikuyu Grass), will be spot sprayed where isolated or in low concentrations. Larger patches may be slashed prior to seed production in spring or summer (depending on the growth cycle of the species) and the regrowth spot-sprayed 2-3 weeks later when it is actively growing and approximately 10 cm in length. Monitoring of these species will occur and if new seed production occurs, the same treatment will be applied again as required. However, slashing will not reduce the presence of exotic grasses on its own and must always be combined with targeted removal to reduce densities and allow for native regeneration. Individual plants should be hand removed, bagged and disposed of appropriately offsite.

Woody weeds

If woody weeds invade the site, including species that were present before earthworks such as *Ligustrum* spp., *Leucaena leucocephala* and *Lantana camara* will be controlled by the basal bark spray or cut and paint using herbicide. The most appropriate method to be used depends on the size of the individual to be removed and will be determined by the bush regeneration contractor. Primary weed control should use techniques that will not encourage flushes of secondary weed growth. All seedlings of woody weeds will be spot-sprayed with a selective herbicide where possible.

Creepers and climbers

The control of creepers, including *Asparagus asparagoides* (Bridal Creeper) and *Anredera cordifolia* (Madeira Vine) varies depending on the species. For the most part, seedlings will be hand pulled, while mature plants can be controlled by the stem-scrape method or spot spraying using a non-selective herbicide. The precise method to be used will be determined by the bush regeneration contractor depending on the species, size and reproductive status of the individual. All vegetative material removed should be bagged, removed from site and disposed of appropriately.

Herbaceous weeds

Where individual plants of other herbaceous weeds, including *Conyza bonariensis* (Flax-leaf Fleabane) and *Verbena bonariensis* (Purpletop), are found, they will be spot-sprayed prior to flowering. Where large swaths of these species occur they will be sprayed using a non-selective herbicide. If high densities of mature stands occur, weeds may be slashed first using a brush cutter and any subsequent regrowth sprayed. Regular monitoring of these species will be required to prevent seed production. All vegetative material that is pulled out and has the potential to regrow if deposited on ground will be bagged and removed from site.

Management of weed waste

All exotic vegetation material should be removed from site and composted at a registered green waste disposal facility. Fruiting parts and tubers should be bagged before being removed from site.

Herbicide use

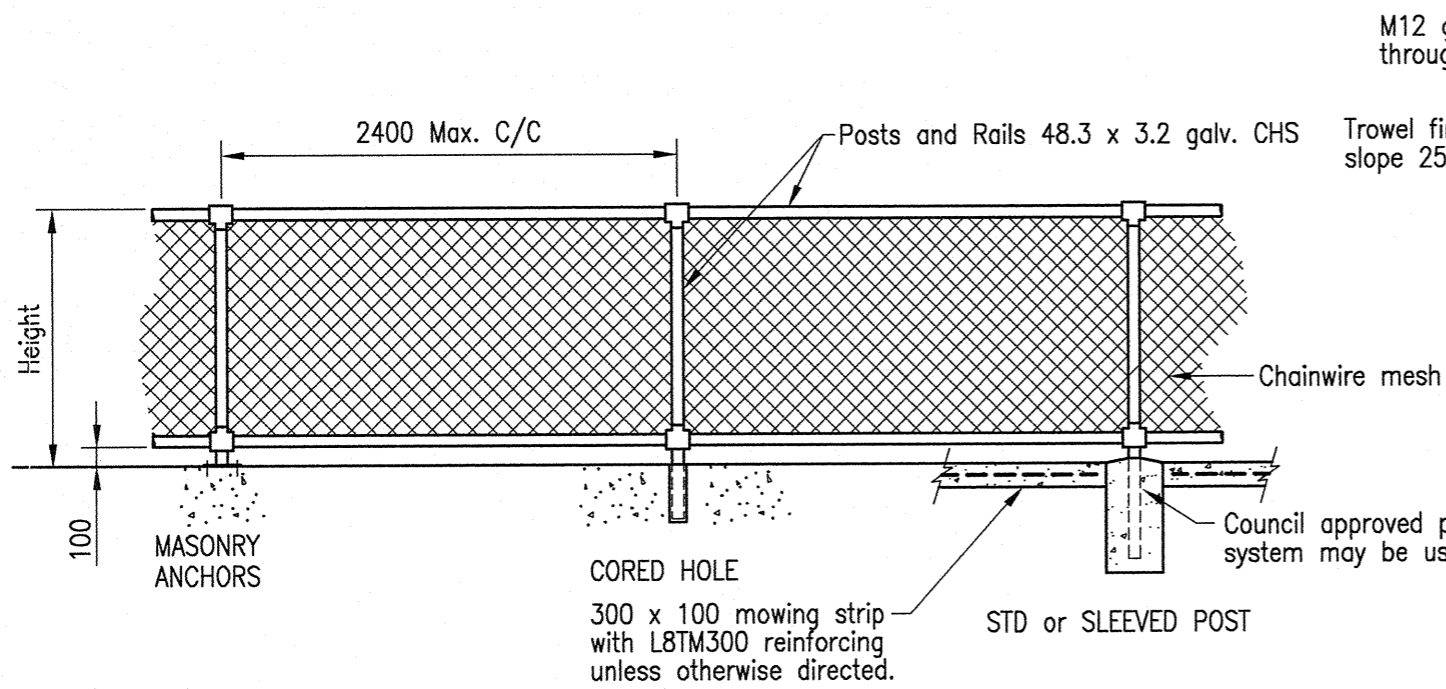
The use of herbicide to control weeds should be carefully considered. Herbicide use should assess potential long-term impacts of the technique including whether the proposed works actually address the source of the weed infestation. However, herbicide application forms an important and useful component of an integrated weed management approach and can be the most appropriate method to control some weed species.

Herbicide use should occur during the active growing season for plants to encourage the chemical uptake into the plant. The selection of herbicides should also consider the type of weed and the location. Where non-selective herbicides are required for use, glyphosate is the most suitable. If herbicides are required to be used near waterways, a glyphosate-based herbicide formulated for use near waterways will be used (e.g. RoundUp® Biactive™, without surfactants).

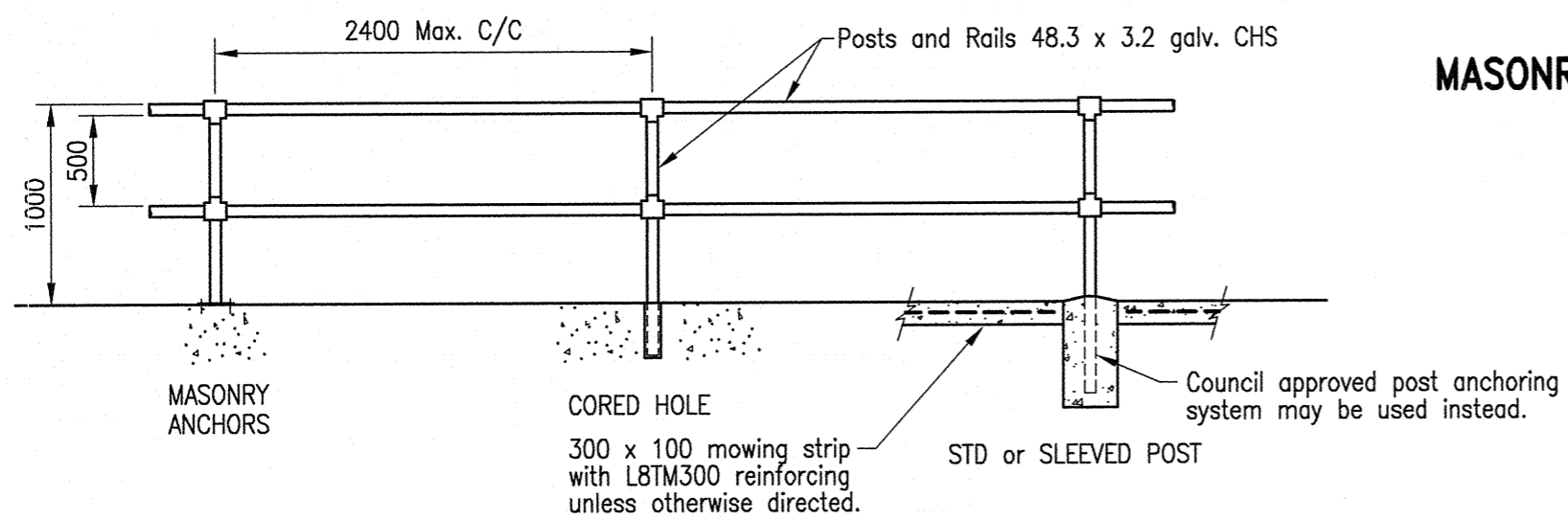
Broad-leaf selective herbicide may be used as per Queensland Government Guidelines. However, this type of herbicide is extremely toxic to aquatic life and must not be used in, or adjacent to, waterways. Registration and records must be kept.

Appendix D Proposed Infrastructure Design

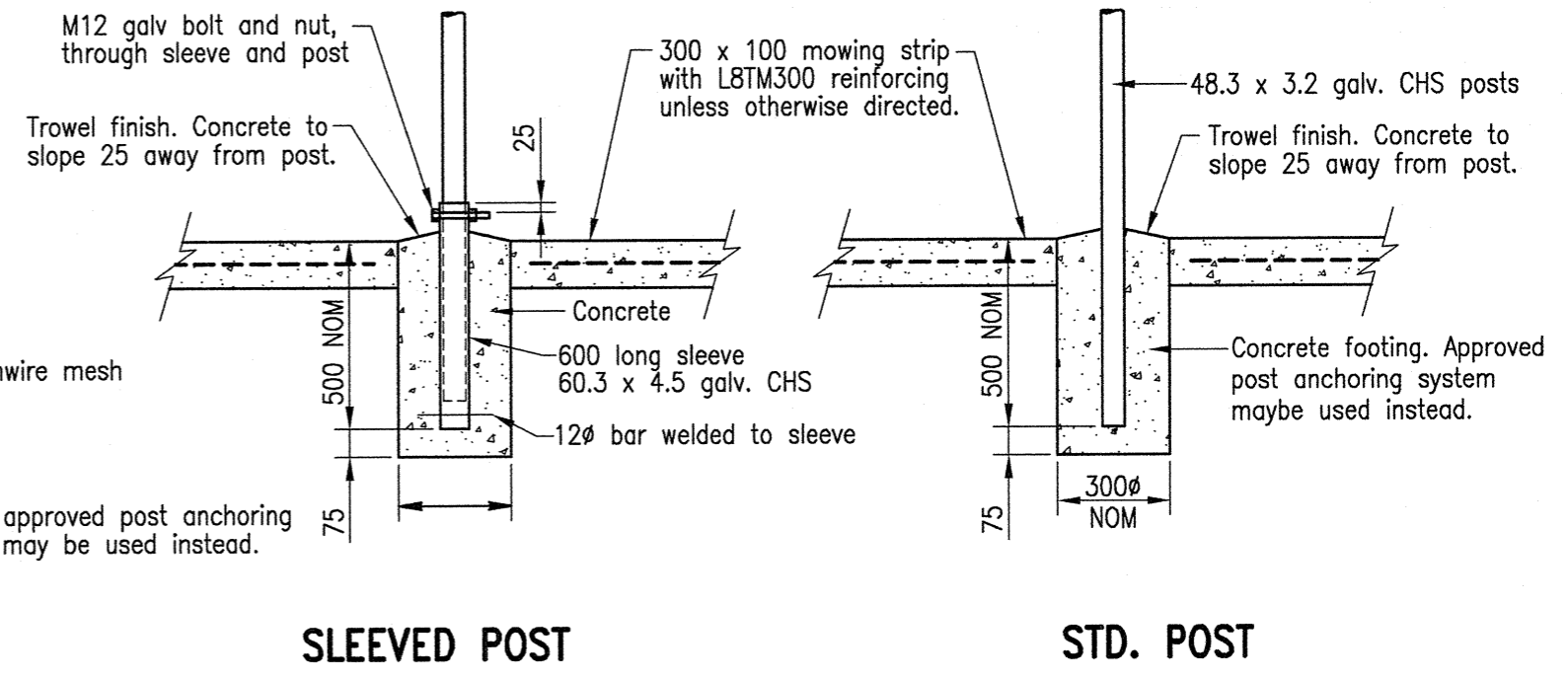
Insert ICC designs



TYPE 1 - A (Height - 1100)
TYPE 1 - B (Height - 1350)

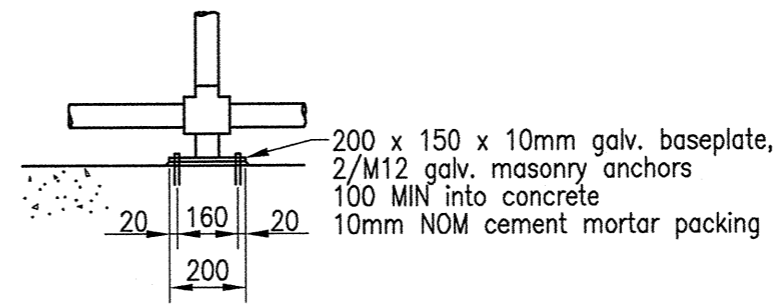


TYPE 2

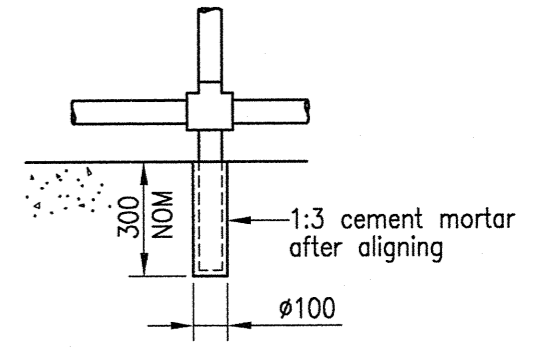


SLEEVED POST

STD. POST



MASONRY ANCHORS



CORED HOLE

FOOTING DETAILS

NOTES

1. Refer project drawings for type of footing to be adopted.
2. Construction of posts & rails shall be done using standard coupling connections only. (no welds)
3. Galvanised chainwire to be 2.6mm thick x 50 mesh to AS 2423.
4. 12Ø bars, Grade 250 steel to AS 3679, Galvanised to AS 4680.
5. Hexagonal head bolts to AS 1111. Nuts to AS 1112. Washers to AS 1237. Galvanised to AS 1214 and AS 4680.
6. All rails and posts galvanised pipe to AS 1163 and AS 4792.
7. Concrete N25 in accordance with AS 1379 and AS 3600.
8. Council approved post anchoring system can be used. Refer Std. Drg. SR.25 for details.
9. All dimensions in millimetres unless noted otherwise.
10. Reinforcing Fabric to AS 4671, 50mm Top and Edge cover, Lap Fabric 250mm.

| REVISIONS | | | | | |
|-----------|----------|------|---------------------------------------------------------------------------------|----------|------|
| AMENDMENT | INITIALS | DATE | AMENDMENT | INITIALS | DATE |
| F | | | | L | |
| E | | | | K | |
| D | | | | J | |
| C | | | Notes 4,5 and 6 Aust. Stds updated. Post and Rail sizes amended. Note 10 added. | I | |
| B | | | Post anchor system and compulsory mowing strip added | H | |
| A | | | ORIGINAL ISSUE | G | |

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 CHIEF OPERATING OFFICER (ES)
 DATE 14/9/20

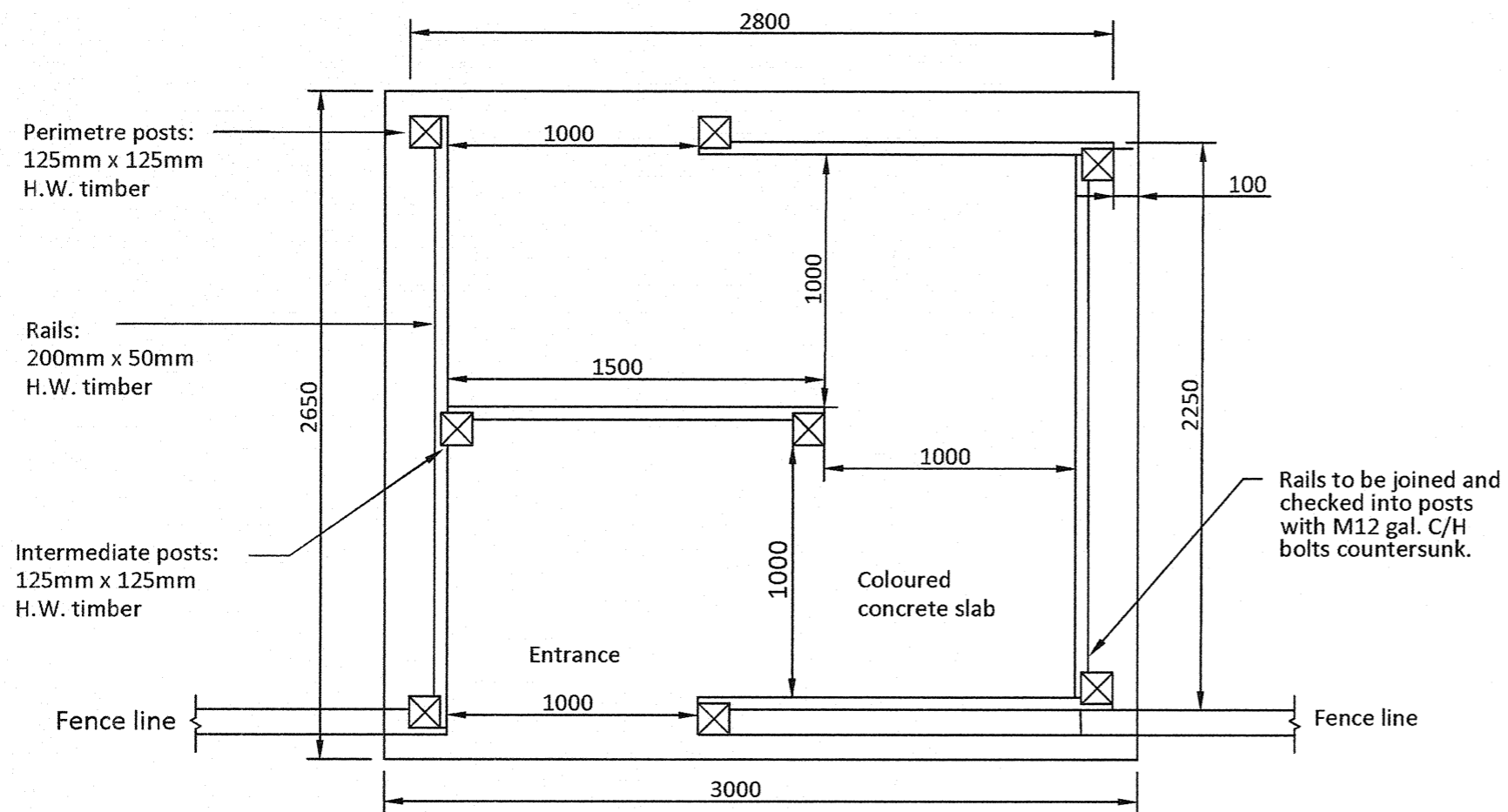
STANDARD DRAWING

**TUBULAR STEEL FENCE
 WITH & WITHOUT CHAIN WIRE**

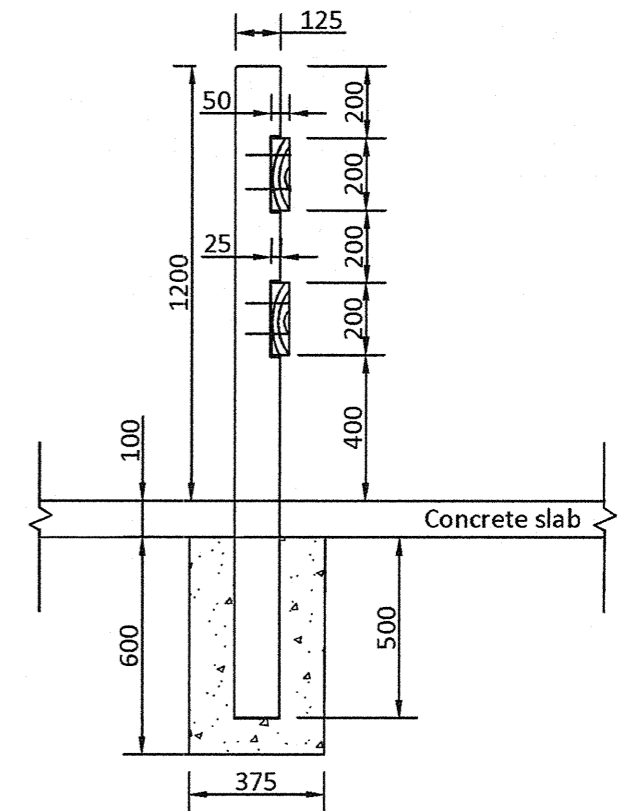
ROADWORKS

SR.33

REV: C DRAWER: 100



PLAN
Scale: 1:25



SIDE POST ELEVATION
Scale: 1:20

NOTES:

- All timber to be durability Class 1 hardwood timber, F14, cut free from sapwood.
- Ensure all timber has smooth external surfaces edges and chamfers, free from splinters.
- Post to be set vertical with chamfered top.
- Apply 5mm chamfer to all edges.
- Where coloured finish is required, paint all timber with 1 No. coat of oil based primer and 2 No. coats of approved acrylic exterior paint. Colour to be approved by ICC.
- Where natural finish is required, paint all timber with 1 No. coat of approved clear water repellent following fabrication. Following construction, paint assembly with 1 No. coat of the same.
- Concrete footings are to be no fines concrete, 10mm max. aggregate size and shall be ready mixed or hand mixed in accordance with AS1379-2007. Any concrete slurry to be cleaned from posts.
- Concrete slab to be 100mm thick reinforced, coloured in earth hue ie. CCS 'Paperbark'. ICC to approve.
- This pedestrian entry must only be used for ICC Reserves and approved Parks wherein no formalised and DDA compliant pathways exist, ie. tracks and trails. Refer to SP.87 for the alternate Park Entry detail.

| REVISIONS | | | | | |
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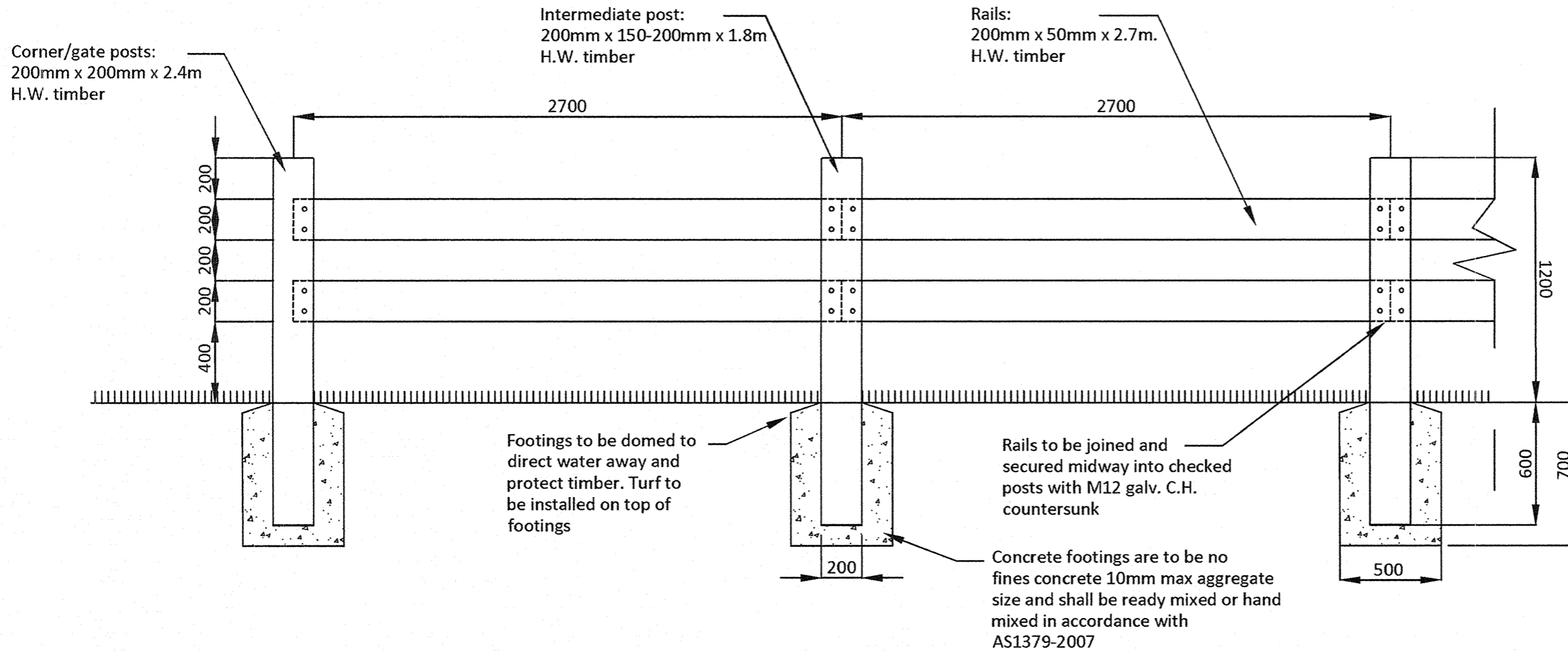
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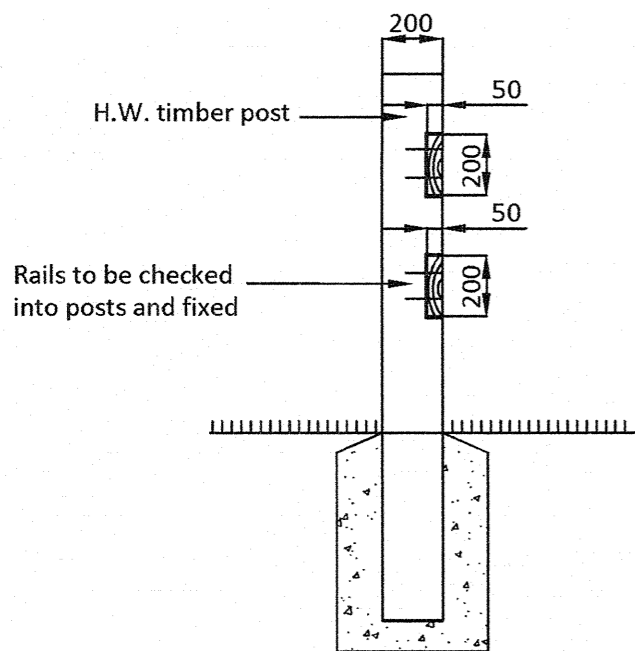
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DATE 29-7-13

STANDARD DRAWING
**FENCE: NATURAL AREAS/BUSHLAND TWO RAIL
PEDESTRIAN ENTRY**

PARKS
SP.101
REV: A | DRAWER: 100



FRONT ELEVATION
Scale: 1:25



SIDE POST ELEVATION
Scale: 1:25

- NOTES:**
1. All timber to be durability class 1 H.W. timber F14, cut free from sapwood.
 2. Concrete footings are to be no fines concrete, 10mm max aggregate size and shall be ready mixed or hand mixed in accordance with AS1379-2007.
 3. Ensure smooth surface, free from splinters to all external timber faces, edges and chamfers.
 4. Apply 5mm chamfer to all edges.
 5. Where a coloured finish is required, paint timber with 1 no. coat of oil based primer and 2 no. coats of approved acrylic exterior paint. Colour as specified by ICC.
 6. Where a natural finish is required, paint timber with 1 no. coat of approved clear water repellent following fabrication. Following installation, paint assembly with 1 no. coat of the same.

| REVISIONS | | | | | |
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| B | | | | H | |
| A | | | | G | |

ORIGINAL ISSUE

IPSWICH CITY COUNCIL
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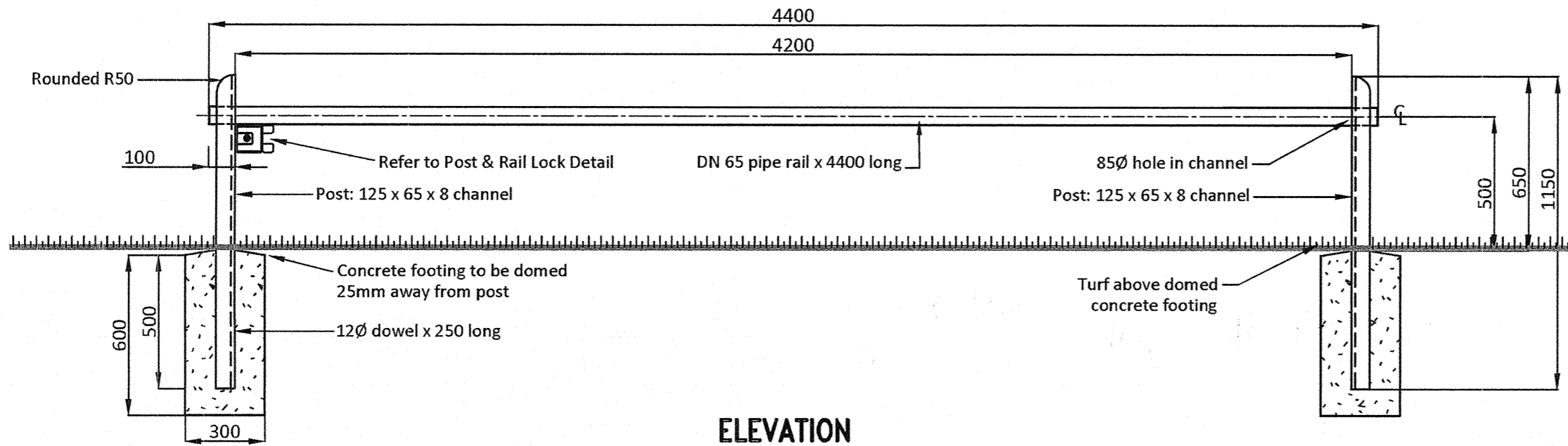
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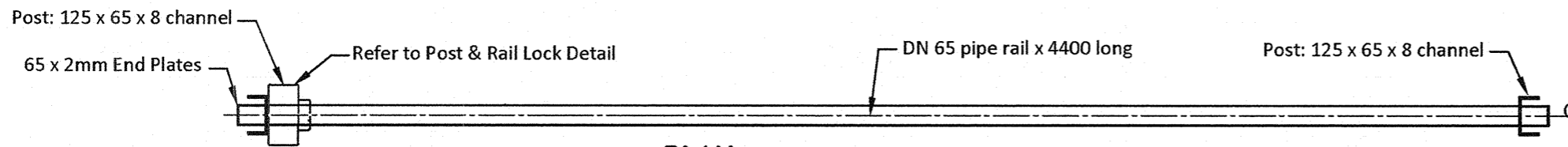
 CHIEF OPERATING OFFICER (WPR)
 DATE: 29-7-13

STANDARD DRAWING
FENCE: NATURAL AREAS/BUSHLAND TWO RAIL TIMBER

PARKS
SP.100
 REV: A DRAWER: 100

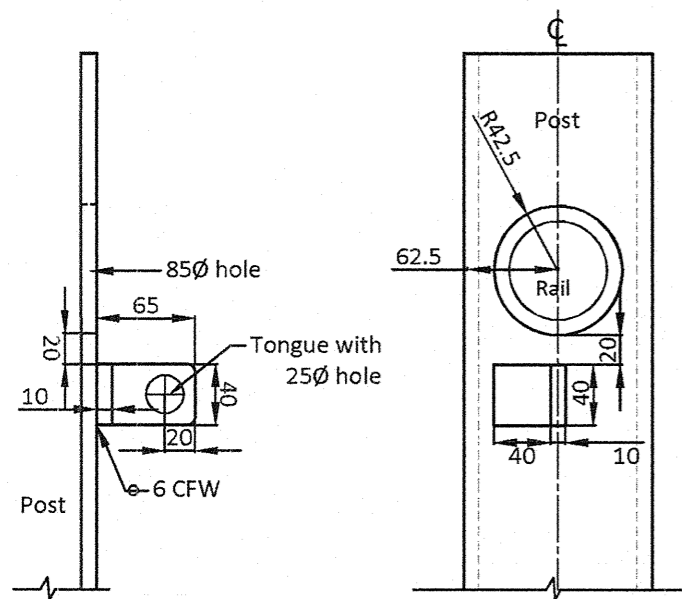


ELEVATION
Scale: 1:20



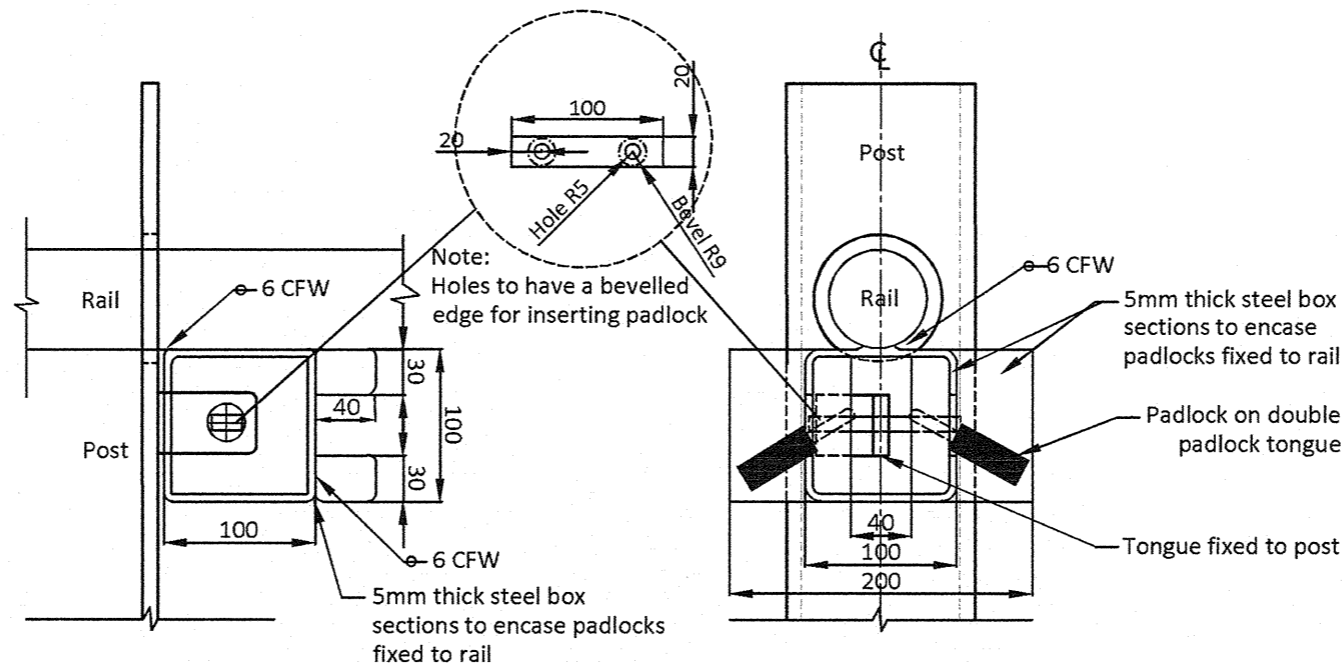
PLAN
Scale: 1:20

INSET
Double Padlock Tongue



POST LOCK DETAIL
SIDE ELEVATION
Scale: 1:5

POST LOCK DETAIL
END ELEVATION
Scale: 1:5



POST & RAIL LOCK DETAIL
SIDE ELEVATION
Scale: 1:5

POST LOCK & RAIL DETAIL
SIDE ELEVATION
Scale: 1:5

NOTES

1. All pipes medium black tube to AS 1074.
2. All welds to AS 1554.
3. All welding symbols to AS 1101.3.
4. Type 1 - 6mm plate key to fit through slotted hole in pipe and accept padlock. Padlock to be keyed to Council's requirements.
5. Steel plates, Grade 250 to AS 3678.
6. Dowel, Grade 250 to AS 3679.
7. Channels, Grade 250 to AS 3679.
8. All fabricated work, including plate key, shall have smooth ground edges.
9. All steelwork to be hot dip galvanised after fabrication to AS 4680.
10. Concrete N20 in accordance with AS 1379 and AS 3600.
11. Paint all cut CCA surfaces with CUPRINOL or equivalent.
12. Gate must have an unobstructed opening width of 4200mm.

| REVISIONS | | | | | |
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DATE 29-7-13

STANDARD DRAWING
FENCE - METAL LOCKABLE SLIDE RAIL
OPTION B: NATURAL AREAS/BUSHLAND RESERVES

PARKS
SP.86
REV: A DRAWER: 100

Appendix E List of Flora

Names follow Bostock and Holland (2013).

211 species including 60 exotic

| Family | Species | Common Name | Exotic |
|---------------|---------------------------------------------------|--------------------------|--------|
| Acanthaceae | <i>Brunoniella australis</i> | blue trumpet | |
| Acanthaceae | <i>Pseuderanthemum variabile</i> | pastel flower | |
| Adiantaceae | <i>Adiantum hispidulum</i> var. <i>hispidulum</i> | | |
| Adiantaceae | <i>Cheilanthes sieberi</i> | | |
| Amaranthaceae | <i>Alternanthera nana</i> | hairy joyweed | |
| Amaranthaceae | <i>Alternanthera pungens</i> | khaki weed | Y |
| Amaranthaceae | <i>Gomphrena celosioides</i> | gomphrena weed | Y |
| Apiaceae | <i>Ammi majus</i> | bishop's weed | Y |
| Apiaceae | <i>Cyclosporum leptophyllum</i> | | Y |
| Apiaceae | <i>Daucus carota</i> | wild carrot | Y |
| Apocynaceae | <i>Alstonia constricta</i> | bitterbark | |
| Apocynaceae | <i>Gomphocarpus physocarpus</i> | balloon cottonbush | Y |
| Apocynaceae | <i>Parsonsia brisbanensis</i> | broad-leaved monkey vine | |
| Apocynaceae | <i>Parsonsia straminea</i> | monkey rope | |
| Araliaceae | <i>Hydrocotyle laxiflora</i> | stinking pennywort | |
| Asteraceae | <i>Ageratina riparia</i> | mistflower | Y |
| Asteraceae | <i>Ageratum houstonianum</i> | blue billygoat weed | Y |
| Asteraceae | <i>Ambrosia artemisiifolia</i> | annual ragweed | Y |
| Asteraceae | <i>Baccharis halimifolia</i> | groundsel bush | Y |
| Asteraceae | <i>Bidens pilosa</i> | | Y |
| Asteraceae | <i>Calotis cuneifolia</i> | burr daisy | |
| Asteraceae | <i>Calyptocarpus vialis</i> | creeping Cinderella weed | Y |
| Asteraceae | <i>Cassinia laevis</i> | | |
| Asteraceae | <i>Chrysocephalum apiculatum</i> | yellow buttons | |
| Asteraceae | <i>Cichorium intybus</i> | chicory | Y |
| Asteraceae | <i>Cirsium vulgare</i> | spear thistle | Y |
| Asteraceae | <i>Conyza bonariensis</i> | | Y |
| Asteraceae | <i>Conyza canadensis</i> | | Y |
| Asteraceae | <i>Cyanthillium cinereum</i> | | |
| Asteraceae | <i>Emilia sonchifolia</i> | | Y |
| Asteraceae | <i>Euchiton sphaericus</i> | | |
| Asteraceae | <i>Hypochaeris radicata</i> | catsear | Y |
| Asteraceae | <i>Senecio madagascariensis</i> | fireweed | Y |
| Asteraceae | <i>Sonchus oleraceus</i> | common sowthistle | Y |
| Asteraceae | <i>Taraxacum officinale</i> | dandelion | Y |
| Asteraceae | <i>Xanthium occidentale</i> | | Y |
| Blechnaceae | <i>Doodia aspera</i> | prickly rasp fern | |
| Brassicaceae | <i>Lepidium africanum</i> | common peppergrass | Y |
| Cactaceae | <i>Opuntia stricta</i> | | Y |

| Family | Species | Common Name | Exotic |
|-------------------|-----------------------------------------------------------|---------------------|--------|
| Caesalpiniaceae | <i>Chamaecrista rotundifolia</i> var. <i>rotundifolia</i> | | Y |
| Caesalpiniaceae | <i>Senna pendula</i> | | Y |
| Campanulaceae | <i>Lobelia purpurascens</i> | white root | |
| Campanulaceae | <i>Wahlenbergia gracilis</i> | sprawling bluebell | |
| Casuarinaceae | <i>Allocasuarina littoralis</i> | | |
| Commelinaceae | <i>Commelina cyanea</i> | | |
| Commelinaceae | <i>Murdannia graminea</i> | murdannia | |
| Convolvulaceae | <i>Evolvulus alsinoides</i> | | |
| Convolvulaceae | <i>Polymeria calycina</i> | pink bindweed | |
| Cyperaceae | <i>Baumea rubiginosa</i> | soft twigrush | |
| Cyperaceae | <i>Cyperus difformis</i> | rice sedge | |
| Cyperaceae | <i>Cyperus gracilis</i> | | |
| Cyperaceae | <i>Cyperus polystachyos</i> | | |
| Cyperaceae | <i>Eleocharis equisetina</i> | | |
| Cyperaceae | <i>Eleocharis sphacelata</i> | tall spikerush | |
| Cyperaceae | <i>Fimbristylis dichotoma</i> | common fringe-rush | |
| Cyperaceae | <i>Gahnia aspera</i> | | |
| Cyperaceae | <i>Schoenoplectus validus</i> | | |
| Cyperaceae | <i>Schoenus brevifolius</i> | | |
| Cyperaceae | <i>Scleria mackaviensis</i> | | |
| Dennstaedtiaceae | <i>Pteridium esculentum</i> | common bracken | |
| Ericaceae | <i>Leucopogon leptospermoides</i> | | |
| Ericaceae | <i>Melichrus urceolatus</i> | honey gorse | |
| Ericaceae | <i>Monotoca scoparia</i> | prickly broom heath | |
| Euphorbiaceae | <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> | | |
| Fabaceae | <i>Crotalaria montana</i> | | |
| Fabaceae | <i>Desmodium triflorum</i> | | Y |
| Fabaceae | <i>Dillwynia floribunda</i> | | |
| Fabaceae | <i>Glycine tomentella</i> | woolly glycine | |
| Fabaceae | <i>Hardenbergia violacea</i> | | |
| Fabaceae | <i>Hovea lorata</i> | | |
| Fabaceae | <i>Hovea planifolia</i> | | |
| Fabaceae | <i>Indigofera spicata</i> | creeping indigo | Y |
| Fabaceae | <i>Jacksonia scoparia</i> | | |
| Fabaceae | <i>Macroptilium atropurpureum</i> | siratro | Y |
| Fabaceae | <i>Macroptilium lathyroides</i> | | Y |
| Fabaceae | <i>Medicago polymorpha</i> | burr medic | Y |
| Fabaceae | <i>Stylosanthes hamata</i> | | Y |
| Goodeniaceae | <i>Goodenia hederacea</i> | | |
| Goodeniaceae | <i>Goodenia rotundifolia</i> | | |
| Hemerocallidaceae | <i>Dianella caerulea</i> | | |
| Hemerocallidaceae | <i>Dianella longifolia</i> | | |
| Hemerocallidaceae | <i>Dianella revoluta</i> | | |
| Hydrocharitaceae | <i>Ottelia ovalifolia</i> | swamp lily | |
| Juncaceae | <i>Juncus usitatus</i> | | |

| Family | Species | Common Name | Exotic |
|---------------|-----------------------------------------|----------------------------|--------|
| Lamiaceae | <i>Mentha diemenica</i> | native mint | |
| Lamiaceae | <i>Plectranthus graveolens</i> | flea bush | |
| Lamiaceae | <i>Plectranthus parviflorus</i> | | |
| Lamiaceae | <i>Teucrium argutum</i> | | |
| Lauraceae | <i>Cassytha filiformis</i> | dodder laurel | |
| Laxmanniaceae | <i>Eustrephus latifolius</i> | wombat berry | |
| Laxmanniaceae | <i>Laxmannia gracilis</i> | slender wire lily | |
| Laxmanniaceae | <i>Lomandra longifolia</i> | | |
| Laxmanniaceae | <i>Lomandra multiflora</i> | | |
| Loranthaceae | <i>Amyema miquelii</i> | | |
| Malvaceae | <i>Sida cordifolia</i> | | Y |
| Malvaceae | <i>Sida rhombifolia</i> | | Y |
| Marsileaceae | <i>Marsilea hirsuta</i> | hairy nardoo | |
| Menyanthaceae | <i>Nymphoides indica</i> | water snowflake | |
| Mimosaceae | <i>Acacia amblygona</i> | fan-leaf wattle | |
| Mimosaceae | <i>Acacia cincinnata</i> | | |
| Mimosaceae | <i>Acacia concurrens</i> | | |
| Mimosaceae | <i>Acacia disparrima</i> | | |
| Mimosaceae | <i>Acacia fimbriata</i> | Brisbane golden wattle | |
| Mimosaceae | <i>Acacia glaucocarpa</i> | hickory wattle | |
| Mimosaceae | <i>Acacia implexa</i> | lightwood | |
| Mimosaceae | <i>Acacia julifera</i> | | |
| Mimosaceae | <i>Acacia leiocalyx</i> | | |
| Mimosaceae | <i>Acacia maidenii</i> | Maiden's wattle | |
| Mimosaceae | <i>Acacia salicina</i> | doolan | |
| Mimosaceae | <i>Leucaena leucocephala</i> | Coffee bush | Y |
| Mimosaceae | <i>Mimosa pudica</i> | | Y |
| Mimosaceae | <i>Neptunia gracilis forma gracilis</i> | | |
| Moraceae | <i>Ficus opposita</i> | Rough leaved fig | |
| Moraceae | <i>Ficus platypoda</i> | Rock fig | |
| Myrtaceae | <i>Angophora leiocarpa</i> | rusty gum | |
| Myrtaceae | <i>Angophora subvelutina</i> | | |
| Myrtaceae | <i>Corymbia citriodora</i> | spotted gum | |
| Myrtaceae | <i>Corymbia intermedia</i> | pink bloodwood | |
| Myrtaceae | <i>Corymbia tessellaris</i> | Moreton Bay ash | |
| Myrtaceae | <i>Eucalyptus acmenoides</i> | | |
| Myrtaceae | <i>Eucalyptus crebra</i> | narrow-leaved red ironbark | |
| Myrtaceae | <i>Eucalyptus fibrosa</i> | | |
| Myrtaceae | <i>Eucalyptus melanophloia</i> | silver leaved ironbark | |
| Myrtaceae | <i>Eucalyptus moluccana</i> | gum-topped box | |
| Myrtaceae | <i>Eucalyptus tereticornis</i> | forest red gum | |
| Myrtaceae | <i>Lophostemon confertus</i> | brush box | |
| Myrtaceae | <i>Lophostemon suaveolens</i> | swamp box | |
| Myrtaceae | <i>Melaleuca irbyana</i> | | |
| Myrtaceae | <i>Melaleuca quinquenervia</i> | swamp paperbark | |

| Family | Species | Common Name | Exotic |
|-----------------|---------------------------------------------------|-------------------------|--------|
| Myrtaceae | <i>Melaleuca viminalis</i> | | |
| Nymphaeaceae | <i>Nymphaea gigantea</i> | | |
| Oleaceae | <i>Ligustrum lucidum</i> | large-leaved privet | Y |
| Onagraceae | <i>Ludwigia octovalvis</i> | willow primrose | |
| Onagraceae | <i>Ludwigia peploides</i> | | Y |
| Orchidaceae | <i>Cymbidium canaliculatum</i> | | |
| Oxalidaceae | <i>Oxalis thompsoniae</i> | | |
| Passifloraceae | <i>Passiflora foetida</i> | | Y |
| Passifloraceae | <i>Passiflora suberosa</i> | corky passion flower | Y |
| Philydraceae | <i>Philydrum lanuginosum</i> | frogsmouth | |
| Phyllanthaceae | <i>Breynia oblongifolia</i> | | |
| Phyllanthaceae | <i>Glochidion ferdinandi</i> | | |
| Picrodendraceae | <i>Petalostigma pubescens</i> | quinine tree | |
| Poaceae | <i>Ancistrachne uncinulata</i> | hooky grass | |
| Poaceae | <i>Aristida calycina</i> | | |
| Poaceae | <i>Aristida queenslandica</i> | | |
| Poaceae | <i>Aristida ramosa</i> | purple wiregrass | |
| Poaceae | <i>Aristida vagans</i> | | |
| Poaceae | <i>Axonopus compressus</i> | | Y |
| Poaceae | <i>Axonopus fissifolius</i> | | Y |
| Poaceae | <i>Bothriochloa biloba</i> | | |
| Poaceae | <i>Bothriochloa bladhii</i> subsp. <i>bladhii</i> | | |
| Poaceae | <i>Bothriochloa decipiens</i> | | |
| Poaceae | <i>Capillipedium spicigerum</i> | spicytop | |
| Poaceae | <i>Chloris gayana</i> | rhodes grass | Y |
| Poaceae | <i>Chloris truncata</i> | | |
| Poaceae | <i>Chloris virgata</i> | feathertop rhodes grass | Y |
| Poaceae | <i>Cortaderia selloana</i> | pampas grass | Y |
| Poaceae | <i>Cymbopogon refractus</i> | barbed-wire grass | |
| Poaceae | <i>Cynodon dactylon</i> | | Y |
| Poaceae | <i>Dichanthium sericeum</i> | | |
| Poaceae | <i>Digitaria ciliaris</i> | summer grass | Y |
| Poaceae | <i>Eleusine indica</i> | crowsfoot grass | Y |
| Poaceae | <i>Entolasia stricta</i> | wiry panic | |
| Poaceae | <i>Eragrostis brownii</i> | Brown's lovegrass | |
| Poaceae | <i>Eragrostis elongata</i> | | |
| Poaceae | <i>Eragrostis interrupta</i> | | |
| Poaceae | <i>Eragrostis parviflora</i> | weeping lovegrass | |
| Poaceae | <i>Eragrostis tenuifolia</i> | elastic grass | Y |
| Poaceae | <i>Eremochloa bimaculata</i> | poverty grass | |
| Poaceae | <i>Heteropogon contortus</i> | black speargrass | |
| Poaceae | <i>Imperata cylindrica</i> | blady grass | |
| Poaceae | <i>Leersia hexandra</i> | swamp rice grass | |
| Poaceae | <i>Megathyrsus maximus</i> var. <i>coloratus</i> | | Y |
| Poaceae | <i>Melinis repens</i> | red natal grass | Y |

| Family | Species | Common Name | Exotic |
|------------------|---------------------------------------------------|-----------------------|--------|
| Poaceae | <i>Microlaena stipoides</i> var. <i>stipoides</i> | | |
| Poaceae | <i>Oplismenus aemulus</i> | creeping shade grass | |
| Poaceae | <i>Ottochloa gracillima</i> | pademelon grass | |
| Poaceae | <i>Panicum effusum</i> | | |
| Poaceae | <i>Paspalidium distans</i> | shotgrass | |
| Poaceae | <i>Paspalum dilatatum</i> | paspalum | Y |
| Poaceae | <i>Paspalum scrobiculatum</i> | ditch millet | |
| Poaceae | <i>Paspalum urvillei</i> | vasey grass | Y |
| Poaceae | <i>Sacciolepis indica</i> | Indian cupscale grass | |
| Poaceae | <i>Sehima nervosum</i> | | |
| Poaceae | <i>Setaria pumila</i> subsp. <i>subtesselata</i> | | Y |
| Poaceae | <i>Sporobolus caroli</i> | fairly grass | |
| Poaceae | <i>Sporobolus creber</i> | | |
| Poaceae | <i>Sporobolus fertilis</i> | | Y |
| Poaceae | <i>Themeda triandra</i> | kangaroo grass | |
| Polygonaceae | <i>Persicaria orientalis</i> | princes feathers | |
| Polygonaceae | <i>Rumex crispus</i> | curled dock | Y |
| Polypodiaceae | <i>Drynaria rigidula</i> | | |
| Polypodiaceae | <i>Platyserium bifurcatum</i> | | |
| Proteaceae | <i>Banksia Integrifolia</i> | | |
| Proteaceae | <i>Persoonia cornifolia</i> | broad-leaved geebung | |
| Proteaceae | <i>Persoonia sericea</i> | silky geebung | |
| Rhamnaceae | <i>Alphitonia excelsa</i> | soap tree | |
| Rubiaceae | <i>Pomax umbellata</i> | | |
| Sapindaceae | <i>Dodonaea triangularis</i> | | |
| Sapindaceae | <i>Dodonaea viscosa</i> | | |
| Scrophulariaceae | <i>Eremophila debilis</i> | winter apple | |
| Smilacaceae | <i>Smilax australis</i> | barbed-wire vine | |
| Solanaceae | <i>Solanum mauritianum</i> | wild tobacco | Y |
| Sparrmanniaceae | <i>Grewia latifolia</i> | dysentery plant | |
| Thelypteridaceae | <i>Christella dentata</i> | creek fern | |
| Thymelaeaceae | <i>Pimelea linifolia</i> | | |
| Typhaceae | <i>Typha orientalis</i> | broad-leaved cumbungi | |
| Ulmaceae | <i>Celtis sinensis</i> | Chinese elm | Y |
| Ulmaceae | <i>Trema tomentosa</i> | | |
| Verbenaceae | <i>Lantana camara</i> | lantana | Y |
| Verbenaceae | <i>Lantana montevidensis</i> | creeping lantana | Y |
| Verbenaceae | <i>Verbena rigida</i> | | Y |
| Violaceae | <i>Hybanthus stellarioides</i> | | |
| Xanthorrhoeaceae | <i>Xanthorrhoea latifolia</i> | | |
| Xyridaceae | <i>Xyris complanata</i> | yellow-eye | |

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