

# Open Space Management Statement

## 79-99 Courtney Drive, Upper Coomera

Gallery Homes

November 2019

BC-16090

BIOME

WATER AND ENVIRONMENTAL CONSULTING

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# Abbreviations and Definitions

| Term | Meaning |
|---|---|
| ACH Act | *Aboriginal Cultural Heritage Act 2003* |
| Biome | Biome Consulting Pty Ltd |
| CGC | City of Gold Coast |
| City Plan | City of Gold Coast Planning Scheme *City Plan Version 7* |
| CPTED | Crime Prevention through Environmental Design |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* |
| EVNT | Endangered, vulnerable or near threatened |
| Fauna | Refers to all animal species |
| Flora | Refers to all plant species |
| LAP | Local Area Plan |
| MLES | Matters of Local Environmental Significance |
| MNES | Matters of National Environmental Significance |
| MSES | Matters of State Environmental Significance |
| NCA | *Nature Conservation Act 1992* |
| Non-trunk infrastructure | Refers to development infrastructure that is either internal to a development or connects development to trunk infrastructure. It is the responsibility of the developer to provide non-trunk infrastructure. |
| OSMS | Open Space Management Statement |
| Planning Scheme | City of Gold Coast Planning Scheme *City Plan* |
| PMST | Protected Matters Search Tool |
| RE | Regional Ecosystems. Defined as a vegetation community that is consistently associated with a particular combination of geology, landform and soil |
| RoL | Reconfiguration of a lot |
| SDAP | State Development Assessment Provisions |
| SPP | State Planning Policy |
| SPRP | State Regulatory Planning Provisions |
| SRI | Statement of Rehabilitation Intent |
| Threatened species | Species listed under the NCA or EPBC Act as having a conservation status of near threatened, vulnerable, endangered or critically endangered. |
| Trunk infrastructure | Refers to development infrastructure that is planned for and commonly provided by local governments. Trunk infrastructure is shared between developments. |
| VMA | *Vegetation Management Act 1999* |

# Executive Summary

This report has been prepared for Gallery Homes to guide the design, management, construction and operational principles of the open space within the proposed development, located at 79-99 Courtney Drive, Upper Coomera. The open space within the subject site provides an opportunity to enhance the liveability of the proposed residential development by providing an outdoor environment where people can recreate and socialise, while still maintaining habitat for wildlife.

This report has been prepared in accordance with the City of Gold Coast Open Space Management Guideline. Guideline for the Preparation of Reports and Plans Associated with the Dedication of Public Open Space. Version 1 November 2007 and Park Design Guideline. Safe, Responsive and Sustainable Parks for Our City. January 2016 – Version 1.0.

The total area of open space proposed is 54,506 $m^2$. Three categories of open space have been proposed. These include:

- Utility Reserves (Drainage and Natural Drainage Reserves);
- Open Space Parks (Recreation); and
- Conservation Estate (Environmental Reserve).

The open space areas provide community meeting places and allow for pedestrian connectivity to community infrastructure (such as schools and convenience stores) in the local area. All open space areas are linked by footpaths.

The conservation estate totals 26,910 $m^2$ and will enable connectivity to bushland external to the site to be maintained. The conservation estate (environmental reserve) will enable the preservation of environmentally significant areas in perpetuity.

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# 1 Introduction

Gallery Homes is proposing a new residential sub-development in the rapidly developing northern Gold Coast region. Biome Consulting Pty Ltd (Biome) has been commissioned to prepare an Open Space Management Statement (OSMS) to accompany a planning application for Reconfiguration of Lots to accommodate the sub-division components. The current version of the report (V3) has been updated to reflect the latest plan of development.

The location of the sub-division is described as Lots 188-192 on RP173728, at 79-99 Courtney Drive, Upper Coomera (hereafter referred to as 'the subject site').

This report has been prepared in accordance with the City Gold Coast Open Space Management Guideline. Guideline for the Preparation of Reports and Plans Associated with the Dedication of Public Open Space. Version 1 November 2007 and Park Design Guideline. Safe, Responsive and Sustainable Parks for Our City. January 2016 – Version 1.0.

The intent of this OSMS is to guide the design, management, construction and operational principles of the open space within the proposed development.

## 1.1 Report Scope

This OSMS has been prepared in accordance with relevant documentation guidelines and policies. Specifically, the OSMS will:

- Provide a summary of the physical and statutory constraints identified from the technical studies which have informed the location and function of open space areas;
- Define the parameters for the open space context and function; and
- Address relevant codes and development compliance.

## 1.2 Vision and Goals

### 1.2.1 Vision statement

The proposed master planned community provides an opportunity to conserve bushland, Koala habitat connectivity and riparian vegetation in perpetuity. The proposed open space networks offer an opportunity to enhance the livability of the residential development by providing an outdoor environment where people can recreate and socialise, while also preserving habitat for wildlife.

### 1.2.2 Goals

The following goals for the proposed open space network provide a foundation on which to base the implementation of this Management Statement:

1. Vegetation – protect the functional values and enhance the quality, diversity and health of retained native vegetation communities;
2. Wildlife – protect and enhance the wildlife habitat on the site while maintaining connectivity to adjacent bushland areas;
3. Parkland – provide an outdoor passive recreation area where people can socialise; and
4. Walking paths and infrastructure – manage access to provide a recreational experience within the urban environment while minimising impacts to ecosystems.

# 2 Site Specifics

The following sections describe the site and its current environmental condition.

## 2.1 Site Location

The subject site is located at 79-99 Courtney Drive, Upper Coomera on Lots 188-192 on RP173728 and is located within the City of Gold Coast Local Government Area. The site comprises of five allotments with a total land area of 18.849 ha (Table 2.1).

**Table 2.1 Allotment Details**

| Street Number | Lot Plan Number | Lot Size (ha) |
|---|---|---|
| 79 | 188 RP173728 | 3.079 |
| 89 | 189 RP173728 | 3.034 |
| 91 | 190 RP173728 | 3.095 |
| 97 | 191 RP173728 | 3.739 |
| 99 | 192 RP173728 | 5.902 |



**Figure 2.1 Site Location (Google Earth, image date 2016)**

## 2.2 Climate

The Bureau of Meteorology collect weather and climate information. The nearest weather station to the site is Southport Ridgeway Avenue (station number 040190). The average annual rainfall is 1451.7mm and average temperature range is 15.3-25.0º C (Table 2.2).

**Table 2.2 Climate Data**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean minimum temperature (°C) | 28.5 | 28.3 | 27.6 | 25.9 | 23.3 | 21.2 | 20.6 | 21.4 | 23.3 | 25.2 | 26.7 | 28.1 |
| Mean minimum temperature (°C) | 20.3 | 20.5 | 19.2 | 16.5 | 13.4 | 10.6 | 9.1 | 9.8 | 12.1 | 15.0 | 17.4 | 19.2 |
| Mean Rainfall (mm) | 181.2 | 190.2 | 198.9 | 136.4 | 128.9 | 96.3 | 72.8 | 56.9 | 57.5 | 96.8 | 105.8 | 136.2 |

## 2.3 Current and Surrounding Land Use

The site is used for rural purposes. Residential dwellings and associated out buildings are present on the site. The site is grazed by livestock. Several dams are present on the site. Yaun Creek and/or its tributaries passes through Lots 188, 191 and 192.

The immediate surrounding land use pattern is characterised by rural residential allotments to the immediate west, south and north. These allotments range in size from 3 – 157 ha. Smaller lot residential developments are present to the immediate east of the site.

## 2.4 Current Land Use Zoning

Under the City of Gold Coast Planning Scheme *City Plan* (Version 7) (City Plan), the site is designated as Rural and Rural Residential (Figure 2.2). Some areas of the site are designated Rural Landscape and Environment Precinct (hatched areas in Figure 2.2).

The site falls within an Investigation Area for Future Development. The Draft Concept Plan (GHD, 2017) identifies the site as *Suburban Neighbourhood.*

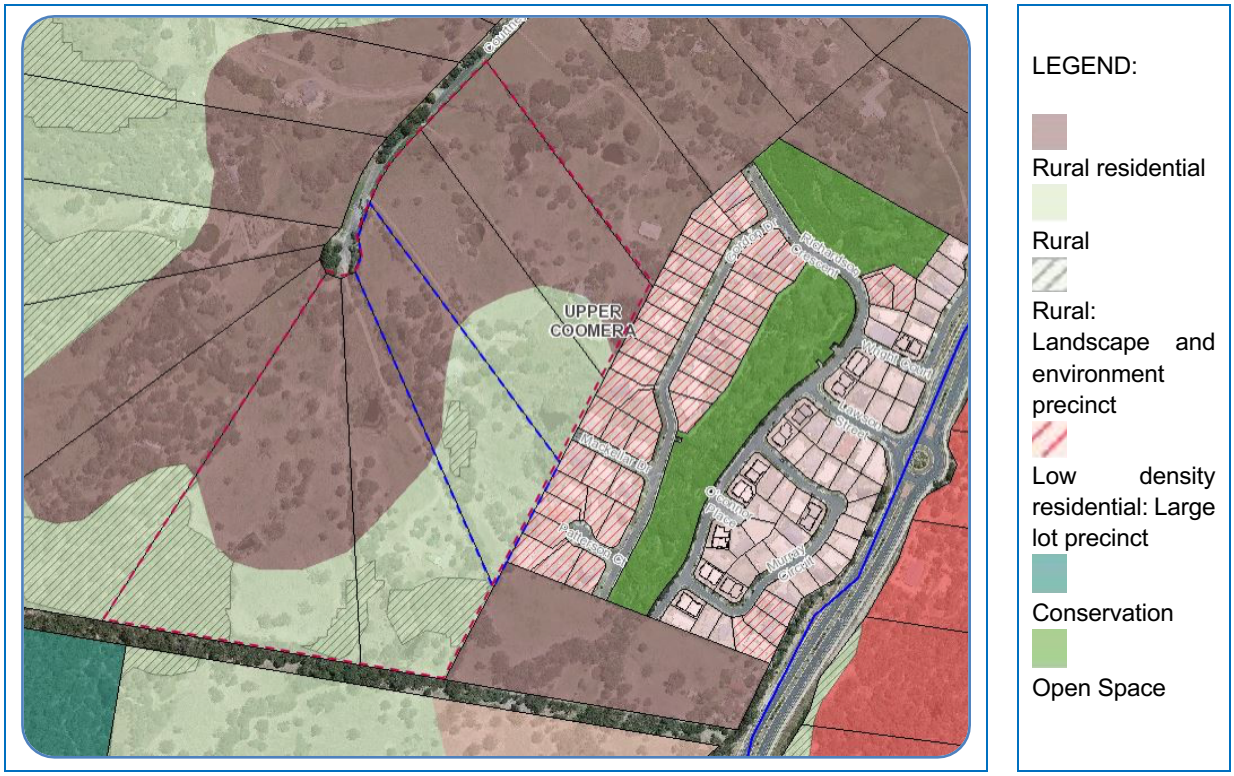



**Figure 2.2 Zones under the City Plan**

## 2.5 Draft Concept Plan

Under the City Plan, 13 non-urban areas within the urban footprint of the *South East Queensland Regional Plan 2009-2031*, were identified for investigation into land use opportunities and constraints. Courtney Drive was given the highest ranking in terms of marketability and development suitability (GHD, 2017).

The subject site falls within the Courtney South East and Courtney West Precincts of the investigation area (Figure 2.3). Three potential land use categories have been identified on the subject site – suburban neighbourhood, suburban neighbourhood (constrained) and green space. Constrained suburban neighbourhood areas require special design considerations as the land is above Reduced Level (RL) 60.

The draft concept plan recommends the amalgamation of allotments to maximise the development potential, connectivity and bushfire management.

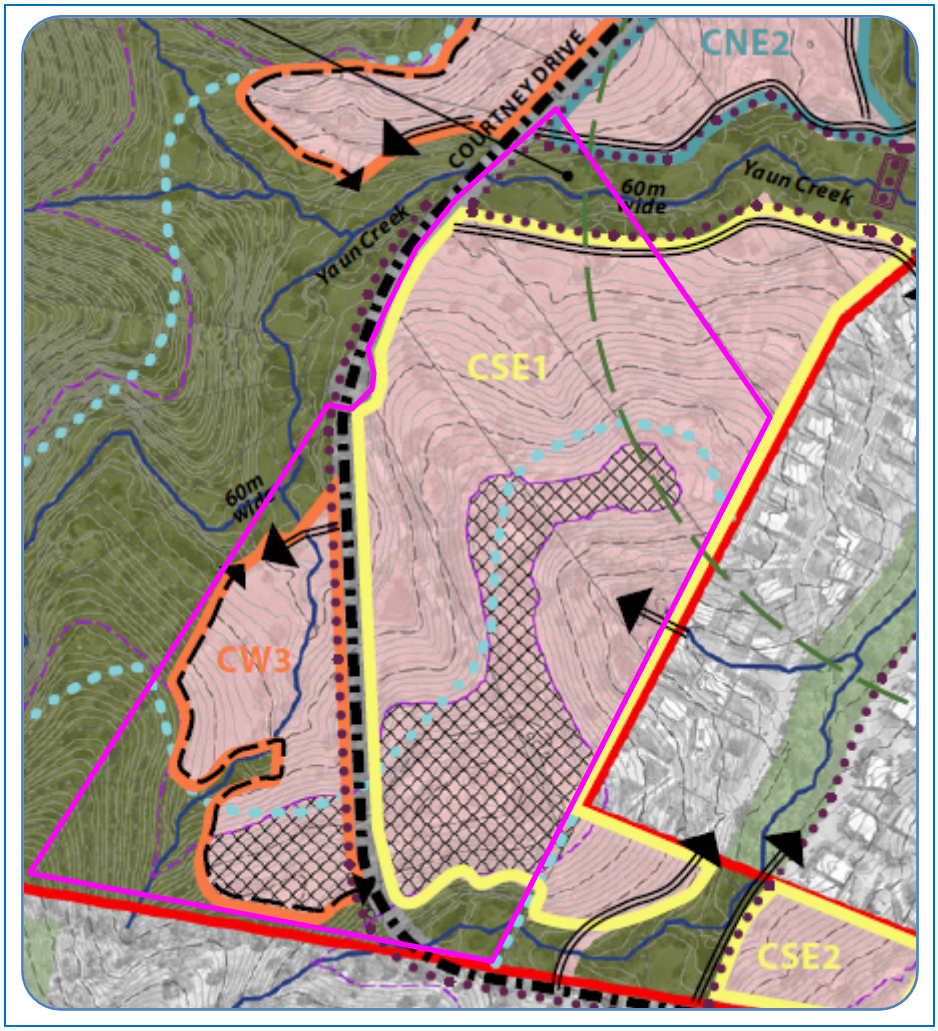



**Figure 2.3 Draft Concept Plan (GHD, 2017)**

### 2.5.1 Courtney South East Precinct

The Courtney South East Precinct includes the extension of Courtney Drive to connect with Reserve Road and the Yaun Creek Corridor at its northern edge.

GHD concluded that based primarily on slope, lot sizes that are similar to the adjoining residential area are the most appropriate response for the majority of housing in this precinct. Where properties can be amalgamated, increased density may be suitable. A density estimate of future dwellings for this precinct was determined to be 9.7-13.3 (GHD, 2017).

A large area of this precinct is greater than RL 60. These areas are considered suitable for significant earthworks to reduce the amount of land above RL 60 and achieve an extension of Courtney Drive that improves the development potential and connectivity.

Yaun Creek is considered a key character element.

### 2.5.2 Courtney West Precinct

The Courtney West Precinct is characterised by its proximity to Conservation open space, its higher elevation and several overland flow paths. The extent of development in this precinct relies on the amalgamation of the site to address bushfire management.

The density estimate of future dwellings was determined to be 8.4-10.9 (GHD, 2017).

### 2.5.3 Green Space

Green Space areas have been proposed in the concept plan. Green Space is land suitable for a conservation or open space.

This land is considered not suitable for development based on the following constraints (GHD, 2017):

- High Value and Medium Value ecological constraints;
- Extreme slopes 1:3 (33.33 %) or steeper;
- Land above RL 60 (where servicing issues, bushfire risk/ fire-fighting capabilities and scenic amenity values are anticipated to affect development potential); or
- Within 30 m from the outer bank of watercourse.

# 3 Development Proposal

The development involves reconfiguring the existing site into 207 lots, of which 196 are residential (Figure 3.1). The development will include:

- An internal road network with pedestrian footpath;
- A constructed waterway; and
- Three categories of public open space:
  - Conservation Estate (Environmental Reserve) to protect existing ecologically significant areas;
  - Utility Reserve (Drainage and Natural Drainage Reserve); and
  - Open Space Parks.

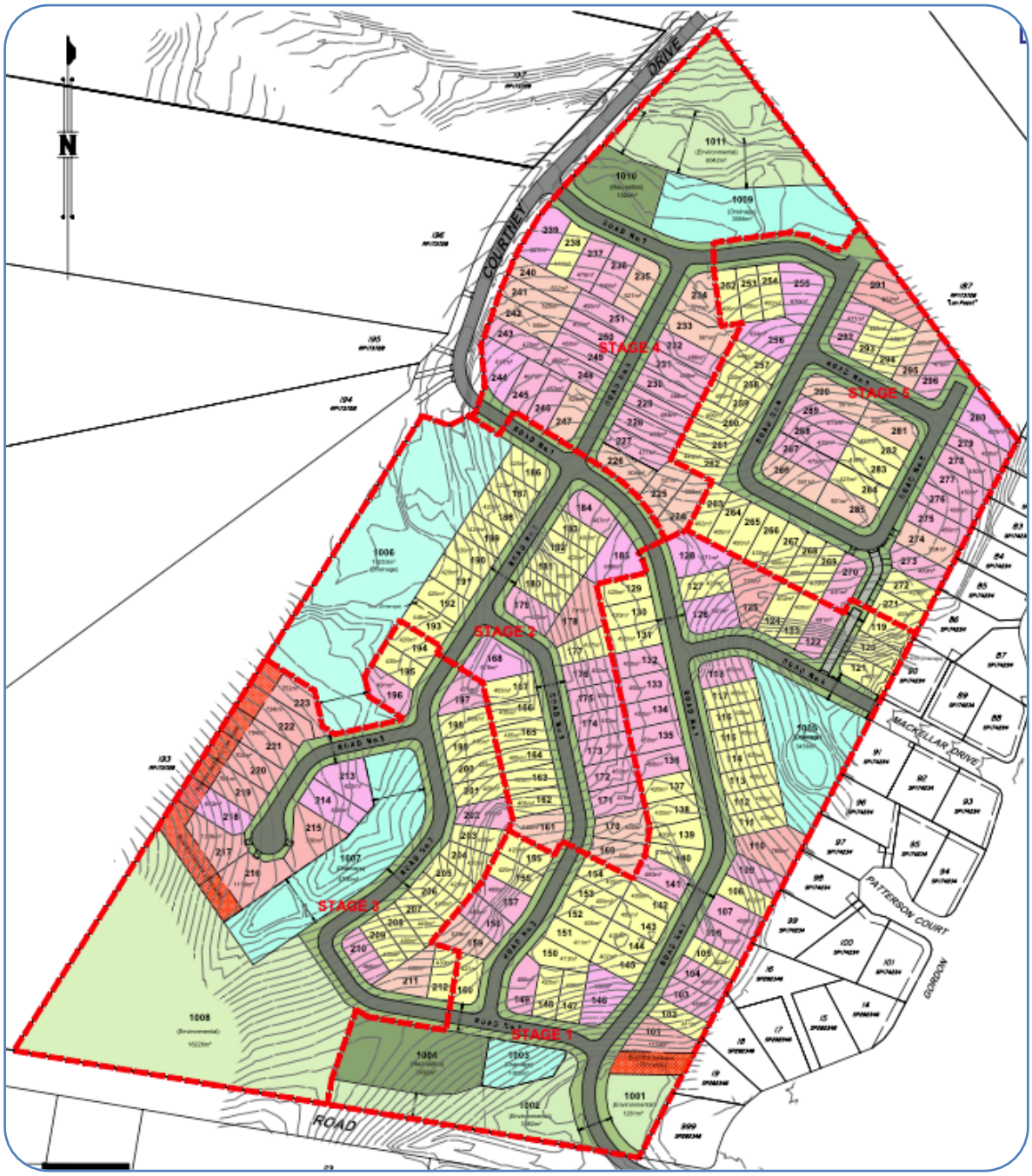



**Figure 3.1 Proposed Development Layout (Bennett and Bennett, 2020)**

## 3.1 Development Footprint

The development footprint has been situated to avoid impacts to medium priority vegetation mapped under the City Plan and regulated vegetation mapped under the *Vegetation Management Act 1999*. General priority vegetation has been avoided and incorporated into the open space network where possible. Conservation of identified Koala habitat and the establishment of regional riparian fauna linkages are incorporated into the development design.

## 3.2 Open Space Areas

The three open space categories proposed to be provided as part of the development are summarised below. Please note detailed descriptions of each category including design descriptions are included in Section 6.

### 3.2.1 Conservation Estate (Environmental Reserve)

The conservation estate of the proposed development totals an area of 2.691 ha. Management of these areas aims to conserve and enhance regulated vegetation, Koala habitat areas, wildlife movement corridors and riparian zones. Connectivity to bushland external to the site is maintained through these open space areas.

### 3.2.2 Utility Reserves

Utility Reserves include drainage reserves containing stormwater treatment devices and occupy a total area of 2.297 ha of the proposed development.

A natural drainage reserve is also planned along Yaun Creek. This will be rehabilitated and upon completion, incorporated into the conservation estate.

### 3.2.3 Open Space Park (Recreation)

The recreation parks will provide an informal setting for community residents to socialise and play.

Two recreation parks have been included in the development layout and will occupy a total area of 4,626 $m^2$. One is located adjacent to the natural drainage reserve along Yaun Creek in the north of the site and the other adjoining drainage and environmental reserves in the south-eastern corner of the site.

# 4 Development Constraints Overview

This section provides a synopsis of the site's development constraints, in relation to the open space areas, together with physical and management constraints on site. This information has been acquired from relevant planning scheme provisions and the ecological assessment prepared for the site (Biome, 2020).

Table 4.1 provides a summary of the legislative considerations.

**Table 4.1 Summary of Legislative Considerations**

| Legislation | Applicable to Development |
|---|---|
| **Commonwealth Legislation** | |
| *Environment Protection and Biodiversity Conservation Act 1999* | Referral under the EPBC Act is only required if impacts to Koala (or other threatened species or ecological communities) deemed to be significant.<br>No referral is required for this development. |
| **State of Queensland Legislation** | |
| *Nature Conservation Act 1992* | Protected Plants Survey required for the site prior to vegetation clearing.<br>Essential habitat is mapped on the site and is excluded from development. |
| *Vegetation Management Act 1999* | Regulated vegetation present on the site:<br>• Least Concern RE 12.11.5/12.11.24;<br>• Regulated vegetation intersecting a watercourse; and<br>• Essential habitat.<br>Regulated vegetation intersecting a watercourse is retained and appropriately buffered. |
| *Biosecurity Act 2014* | Restricted and invasive weeds must be controlled on the site. |
| **Local Government** | |
| City Plan | Development and constraint codes applicable to the design and designation of open space have been addressed in Section 9 of this report. |

Table 4.2 provides a summary of the management constraints, including those under the City Plan. These constraints are discussed in greater detail in Section 5 of this report.

**Table 4.2 Management Constraints**

| Constraint | Present | Absent | Comment |
|---|---|---|---|
| Easements and/or restrictions on title | | x | |
| Zoning provisions | x | | Rural and rural residential zoned land |
| Waterways and Wetlands | x | | Mapping for wetlands and watercourses identifies minor waterways on the site.<br>Buffer widths defined in the Ecological Assessment must be incorporated into the development design. |
| Nature Conservation | x | | Areas of the site are mapped under the Environmental Significance Overlay code as containing medium and general priority vegetation, state significant species and Koala habitat areas.<br>Habitat of state significant species and medium priority vegetation are conserved within public open space network and are excluded from the development. |
| Bushfire Risk | x | | State development planning mapping indicates that the site falls within a bushfire prone area.<br>City of Gold Coast mapping indicates the site falls within an area of medium to high potential bushfire hazard. |
| Nature Conservation Areas | | x | No nature conservation areas are present on the site. |
| Airport Environs | | x | |
| Aboriginal cultural heritage | | x | No known aboriginal cultural heritage sites are present on the subject site. |
| European cultural heritage | | x | |
| Acid sulphate soils - risk | | x | |
| Flood hazard | | x | |
| Erosion prone | x | | City of Gold Coast mapping indicates areas of the site have moderate landslide risks. |
| Tree Preservation Order | | x | |
| Mapped Vegetation | x | | A small area of the site in the south-western corner is mapped as Category B regulated vegetation, which is further defined as least concern RE 12.11.5/12.11.24. This area is excluded from the development footprint and will be managed for conservation within the open space network. |
| Mapped Essential Habitat | x | | Essential habitat for Koala is mapped on the site. Habitat for Koala will be conserved within the open space network. |
| Wildlife Online – threatened species | x | | Seven threatened species have been recorded within 2 km of the site. Assessment of the habitat requirements of these species concluded that two species would potentially occur on the site. |
| Observed threatened species | x | | One threatened species – Koala, observed on-site during site assessments. |
| SPRP Koala Assessable Development Area | | x | The site is not within a SPRP Koala assessable development area. |

# 5 Site Analysis

This section details the existing natural features and functions of the site in the context of its surrounds.

## 5.1 Topography

The site slopes from an elevation of approximately 82 m in the south-western corner of the site, to a low point of approximately 42 m near the tributary of Yaun Creek in the north (Figure 5.1).




**Figure 5.1 Contours (Source: City Plan interactive mapping)**

## 5.2 Flooding

City Plan mapping indicates that no area of the site is subject to flooding. Biome has assessed local flooding and conveyance.

## 5.4 Landslide Hazards

Areas of the site are mapped as having moderate landslide hazards (Figure 5.2).

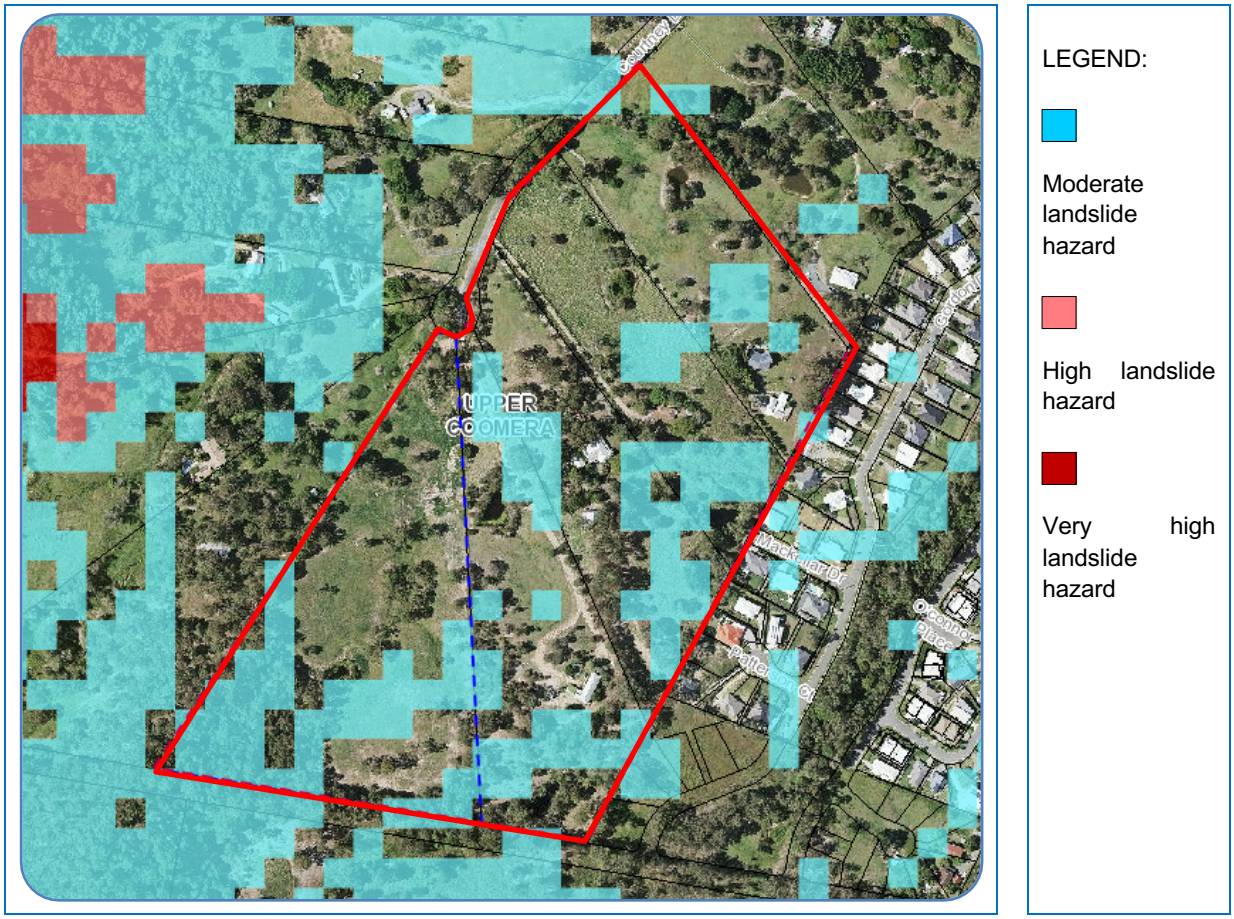



**Figure 5.2 Landslide Hazard (City Plan)**

## 5.5 Native Vegetation Communities

One native vegetation community has been identified as occurring on the site, regional ecosystem (RE) 12.11.5/12.11.24.

RE 12.11.5 is described as *Corymbia citriodora* subsp. *variegata, Eucalyptus siderophloia, E. major* open forest. The sub-dominant RE 12.11.24 is described as *Eucalyptus carnea, E. tindaliae, Corymbia intermedia* +/- *E. siderophloia* or *E. crebra* woodland.

Figure 5.3 shows the locations of the vegetation communities within the development site.




**Figure 5.3 Vegetation Management Support Map (Qld Globe, 2018)**

On-site field assessment identified four broad vegetation communities:

1. *Acacia* low open forest;
2. Spotted Gum / Grey Ironbark Open Forest (RE 12.11.5);
3. *Acacia* low open woodland/mosaic +/- landscaping around dwellings; and
4. Pasturelands +/- copses of native/exotic trees.

These vegetation communities are described in the following sections and are summarised from the Ecological Assessment (Biome, 2020). Figure 5.4 shows the locations of the vegetation communities.

Vegetation community 2 and much of community 1 will be incorporated into the Conservation Estate (Environmental Reserve).

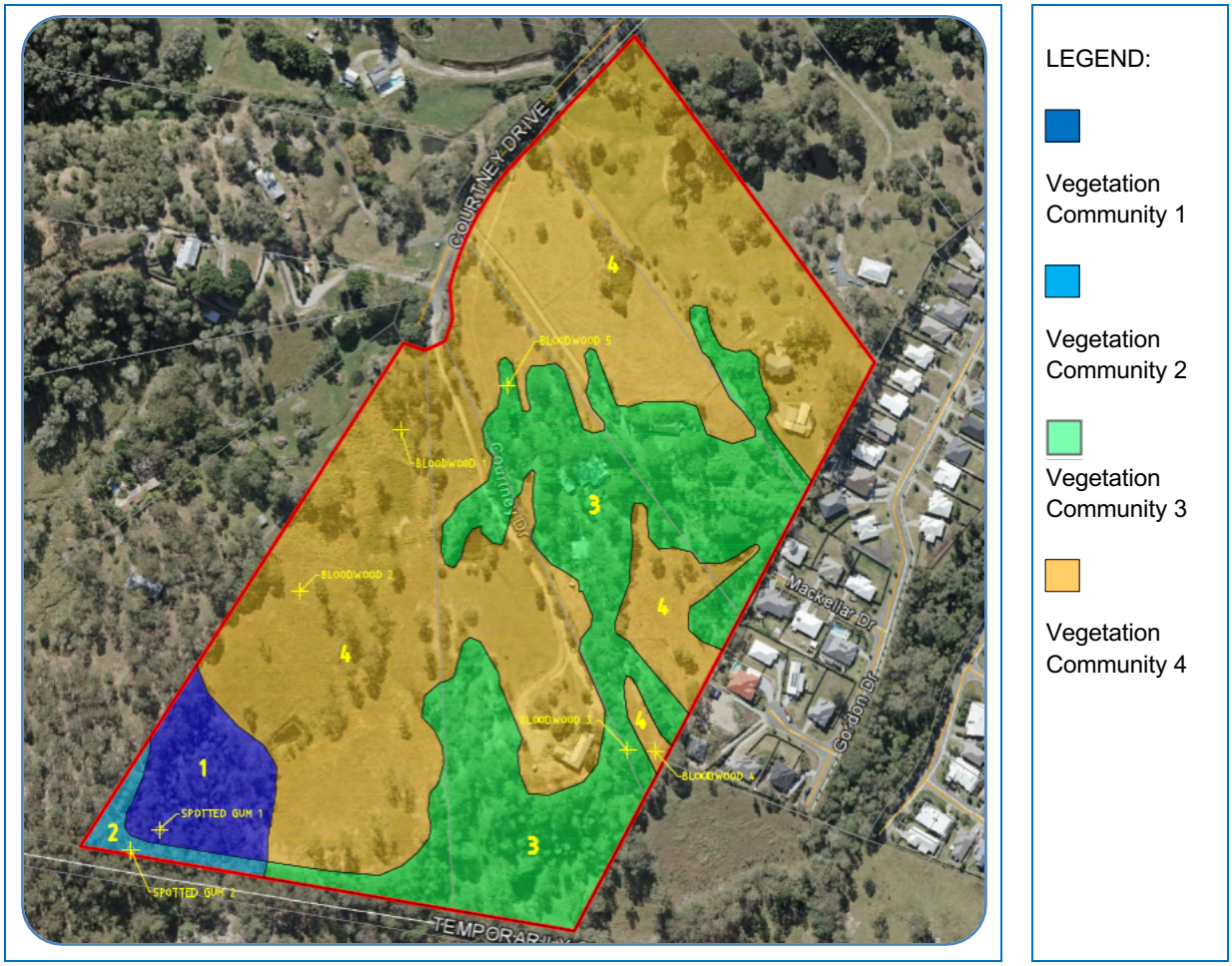



**Figure 5.4 Vegetation Communities**

### 5.5.1 Vegetation Community 1 – Acacia low open forest

Vegetation community 1 is comprised of mature *Acacia disparrima* regrowth with occasional emergent *Corymbia citriodora, Eucalyptus siderophloia, E. propinqua, and E. tereticornis*. Other common species in the mid stratum include *Lophostemon suaveolens* and *Allocasuarina littoralis*. Lantana (*Lantana camara*) dominates the shrub layer. Low level livestock grazing is presently occurring.



**Figure 5.5 Vegetation Community 1**

### 5.5.2 Vegetation Community 2 – Spotted Gum/Grey Ironbark Open Forest (RE 12.11.5)

Vegetation community 2 comprises a small area of the total subject site in the south-west corner and is an extension of a larger area of the same vegetation type beyond the site boundary. The composition of canopy trees is generally representative of RE 12.11.5. Low level grazing is presently occurring with negligible weed incursion.



**Figure 5.6 Vegetation Community 2**

### 5.5.3 Vegetation Community 3 - Acacia low open woodland/mosaic +/- landscaping around dwellings

Vegetation community 3 is primarily mature *Acacia* regrowth proximate to dwellings and outbuildings on the subject site. There are occasional larger eucalypts and small isolated thickets of lantana and vine weeds are common. Low level grazing is presently active throughout most of this community.



**Figure 5.7 Vegetation Unit 3**

### 5.5.4 Vegetation Community 4 - Pasturelands +/- copses of native/exotic trees

Vegetation community 4 covers much of the site comprising introduced pasture species, copses of endemic tree species and trees associated with landscaping. Some of the largest eucalypt trees on site occur as isolated trees or within the copses of this community.



**Figure 5.8 Vegetation Community 4**

### 5.5.5 Threatened plant species and communities

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protected matters search tool enables searches for Matters of National Environmental Significance (MNES) in a specified area. MNES include threatened species and ecological communities. Results of this database search (using a 1 km buffer to a central coordinate: Latitude -27.856753; Longitude 153.324814) identified a total of seven threated flora species, *known* or considered *likely to occur*, are recorded within a 1 km radius of the site (Table 5.1).

In addition to the protected matters search, a search of the Queensland Government Wildlife Online database was also undertaken. One threatened flora species; Floyd's Walnut (*Endiandra floydii*) was identified in this database as occurring within 2 km of the site.

**Table 5.1 Protected Matters Search Results**

| Scientific Name | Common Name | Status |
|---|---|---|
| *Baloghia marmorata* | Marbled Baloghia | V |
| *Bosistoa transversa* | Three-leaved Bosistoa | V |
| *Corchorus cunninghamii* | Native Jute | E |
| *Endiandra floydii* | Floyd's Walnut | E |
| *Macadamia integrifolia* | Macadamia Nut | V |
| *Samadera bidwillii* | Quassia | V |
| *Thesium australe* | Austral Toadflax | V |

Status: E = Endangered, V = Vulnerable

No threatened species were identified during the ecological site assessment.

## 5.6 Invasive weeds

A total of 55 non-endemic species were identified on the subject site, 15 of which are invasive plants under the Queensland *Biosecurity Act 2014* (Table 5.3).

**Table 5.2 Weeds Observed On-site**

| Scientific Name | Common Name | Status |
|---|---|---|
| *Ageratum houstonianum* | Blue Billygoat Weed | |
| *Amaranthus spinosus* | Red Amaranth | |
| *Ambrosia artemisiifolia* | Ragweed | RIP |
| *Anagallis arvensis* | Scarlet Pimpernel | |
| *Asclepias curassavica* | Tropical Milkweed | |
| *Asparagus aethiopicus cv. sprengelii* | Ground Asparagus | RIP |
| *Bidens pilosa* | Cobbler's Pegs | |
| *Cinnamomum camphora* | Camphor Laurel | RIP |
| *Cirsium vulgare* | Scotch Thistle | |
| *Conyza canariensis* | Canadian Fleabane | |
| *Conyza sumatrensis* | Tall Fleabane | |
| *Corymbia torelliana* | Cadagi | |
| *Crassocephalum crepidioides* | Thickhead | |
| *Crotalaria incana* | Woolly Rattlepod | |
| *Crotalaria lanceolata* | Lance-leaved Rattlepod | |
| *Cupressus sempervirens* | Pencil Pine | |
| *Cyperus papyrus* | Papyrus | |
| *Emelia sonchifolia* | Emelia | |
| *Gomphocarpus sp.* | Cotton Bush | |
| *Hypochaeris radicata* | Flatweed | |
| *Jacaranda mimosifolia* | Jacaranda | |
| *Lantana camara* | Lantana | RIP |
| *Macrotyloma axillare* | Horse Gram | |
| *Megathyrsus maximus* | Guinea Grass | |
| *Melinis minutiflora* | Molasses Grass | OIP |
| *Murraya paniculata* | Mock Orange | OIP |
| *Neonotonia wightii* | White Glycine | |
| *Nymphaea capensis* | Cape Waterlily | |
| *Oxalis corniculata* | Yellow Wood Sorrel | |
| *Oxalis debilis var. corymbosa* | Soursob | |
| *Paspalum dilatatum* | Paspalum | |
| *Passiflora edulis* | Passionfruit | |

| Scientific Name | Common Name | Status |
|---|---|---|
| *Passiflora foetida* | Stinking Passionflower | OIP |
| *Passiflora suberosa* | Corky Passionfruit | OIP |
| *Passiflora subpeltata* | White Passionflower | OIP |
| *Polygala paniculata* | Polygala | |
| *Phytolacca octandra* | Inkweed | |
| *Psidium guajava* | Yellow Guava | |
| *Ravenala madagascariensis* | Traveller's Palm | |
| *Richardia brasiliensis* | White Eye | |
| *Schefflera actinophylla* | Umbrella Tree | OIP |
| *Senecio madagascariensis* | Fireweed | RIP |
| *Senna pendula var. glabrata* | Easter Senna | OIP |
| *Setaria sphacelata* | Setaria | |
| *Sida cordifolia* | Flannel Weed | |
| *Sida rhombifolia* | Paddy Lucerne | |
| *Solanum chrysotrichum* | Giant Devil's Fig | |
| *Solanum mauritianum* | Wild Tobacco | OIP |
| *Solanum capsicoides* | Devil's Apple | |
| *Sphagneticola trilobata* | Singapore Daisy | RIP |
| *Sporobolus africanus* | Paramatta Grass | |
| *Syagrus romanzoffiana* | Cocos Palm | OIP |
| *Tagetes minuta* | Stinking Roger | |
| *Urena lobata* | Urena Burr | |
| *Verbena bonariensis* | Purple Top | |

*Species listed under the Queensland *Biosecurity Act 2014*, where:

PIP = Prohibited invasive plants must not be kept, moved, given away or sold without a permit. The Biosecurity Act requires that all sightings to be reported to Biosecurity Queensland within 24 hours. By law, everyone has a general biosecurity obligation to take all reasonable and practical steps to minimise the risk of spreading prohibited invasive plants until they receive advice from an authorised officer.

RIP = Restricted invasive plants must not be given away, sold or released into the environment without a permit. The Biosecurity Act requires everyone to take all reasonable and practical steps to minimise the risks associated with invasive plants under their control. At a local level, each local government must have a biosecurity plan that covers invasive plants and animals in its area. This plan may include actions to be taken on certain species. Some of these actions may be required under local laws.

OIP = Other invasive plants are not prohibited or restricted, however, by law, everyone has a general biosecurity obligation to take reasonable and practical steps to minimise the risks associated with invasive plants under their control. Local governments must have a biosecurity plan that covers invasive plants and animals in their area. This plan may include actions to be taken on certain species. Some of these actions may be required under local laws.

## 5.7 Waterways

Minor waterways are mapped on the site (Figure 5.9). Field investigations identified these waterways to be degraded; primarily consisting of eroded and/or heavily weed infested ephemeral overland flow paths which discharge to dams created as stock watering points.

Under the definitions of the *Water Act 2000*, these waterways have been mapped as a drainage feature.

Yaun Creek (the waterway in the north of the site) will be rehabilitated and a buffer to the watercourse provided. This riparian linkage will facilitate fauna movement along Yuan Creek.

The waterway in the south-eastern corner of the site will also be rehabilitated to facilitate wildlife movement. Where this waterway passes under the road, a fauna underpass will be constructed (refer to Statement of Rehabilitation Intent provided as Appendix A). This will maintain the connection to the waterway within the residential community to the east, which is primarily used for storm water conveyance.

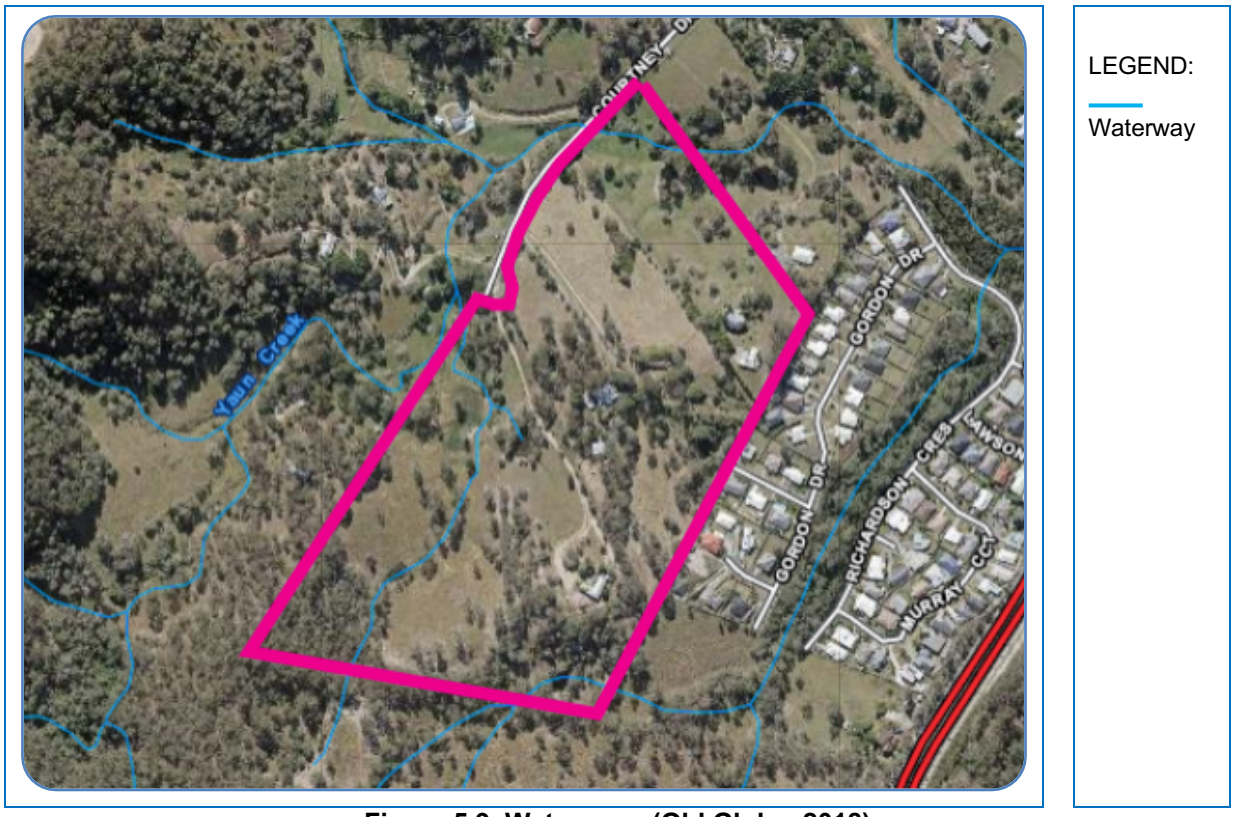



**Figure 5.9 Waterways (Qld Globe, 2018)**

The waterway running through the site from south to north (refer to figure 5.9) is heavily degraded and consists of a grassed swale that directs flow from one dam to another. In its current state, this waterway does not provide a fauna movement corridor or have any riparian vegetation communities.

Given its degraded nature, it is proposed that this waterway be realigned, with the water captured near the environmental reserve in the south-western corner and directed through the site to a large drainage area on the western site boundary.

The realigned waterway corridor will be 15 m wide and rehabilitated to resemble a natural waterway (refer to Statement of Rehabilitation Intent, Appendix A). The water will flow to a drainage reserve where it will be treated prior to its discharge into Yaun Creek.

The realignment and consequent reconstruction of this waterway will enable wildlife corridors to be created and enable water quality to be managed.

## 5.8 Fauna

The ecological site assessment identified 54 fauna species occurring on the site, including one threatened species, Koala (*Phascolarctos cinereus*) (Biome, 2018).

### 5.8.1 Threatened species

Evidence of one conservation significant species - Koala, was observed on the subject site. The Koala is listed as vulnerable under the Queensland *Nature Conservation Act 1994* (NCA) and Commonwealth EPBC Act.

Assessment of likelihood of occurrence of conservation significant species identified in database searches was also made. The database searches included the Protected Matters Search and Wildlife Online. Likelihood of occurrence assessment identified two species as having potential to occur on the site, at least on a transient basis (Table 5.4).

The protection of the sites' ecologically significant vegetation and known Koala habitat within the open space network will ensure the impacts to habitat for many fauna species is limited.

**Table 5.3 Likelihood of Occurrence Assessment**

| Scientific Name | Common Name | Status | Ecology | Likelihood of Occurrence |
|---|---|---|---|---|
| *Phascolarctos cinereus* | Koala | V, V# | Koalas inhabit dry open sclerophyll forests and woodlands occurring on fertile soils (Van Dyck, 1995; Menkhorst and Knight, 2001; Environmental Protection Agency, 2006). Communities containing denser vegetation and larger trees are generally preferred; however, Koalas can also inhabit less optimal habitat such as young forests, highly fragmented vegetation communities, and small remnants (Environmental Protection Agency, 2006). They mainly feed on *Eucalyptus* species, along with some *Corymbia*, *Angophora*, *Lophostemon*, *Melaleuca*, and *Leptospermum* species (Environmental Protection Agency, 2006). | **KNOWN TO OCCUR** This species was not directly recorded during surveys. However, scats of Koala were found during the surveys. |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | V# | The Grey-headed Flying-fox occurs in the coastal belt from Rockhampton to Melbourne. The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, *Melaleuca* swamps and *Banksia* woodlands (Eby, 1998). None of the vegetation communities used by the Grey-headed Flying-fox produce continuous foraging resources throughout the year, so the species selectively forages where food is available. As a result, patterns of occurrence and relative abundance within its distribution vary widely between seasons and between years. At a local scale, the species is generally present intermittently and irregularly (Eby & Lunney, 2002). | **POTENTIAL TO OCCUR** The site would provide seasonal foraging resources. No flying-fox camps are present on the site. |

| Scientific Name | Common Name | Status | Ecology | Likelihood of Occurrence |
|---|---|---|---|---|
| | | | The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. They most frequently travel around 15 km from a roost site to feed (Tidemann, 1998), although can travel up to 50 km as food resources change (Eby, 1991). | |

Status: V = Vulnerable under NCA, V# = Vulnerable under the EPBC Act

### 5.8.2 Habitat Trees

Habitat trees are defined under Schedule 1.2 of the City Plan as a living or dead tree greater than 80 cm diameter at 1.4 m, that has one or more hollows within its trunk or branches greater than 10 cm in entrance diameter.

While no trees on the site met with this definition, seven trees that contained hollows and were considered to perform habitat function, were recorded. The locations of these trees are shown in Figure 5.4. The clearing of hollow-bearing trees that are not able to be retained, will be offset through compensatory planting and/or nest box installation in the open space network.

## 5.9 Environmentally Significant Areas

Based on an appraisal of the site and desktop analysis against the criteria for defining environmentally significant areas, it has been concluded that the site contains habitat for nationally, state and locally significant wildlife (Koala) and natural waterways. The establishment of an open space network will enable Koala habitat on the site to be conserved in perpetuity.

Yaun Creek, where it traverses the site, will be rehabilitated to repair damage from grazing, erosion and to control invasive species. The waterway in the south-eastern corner of the site will also be rehabilitated to facilitate fauna movement to external bushland areas. The central waterway will be realigned and fabricated to resemble a natural flowpath.

## 5.10 Surrounding Environment

The surrounding environment influences the value of the proposed open space and its contribution to the amenity of the area.

### 5.10.1 Scenic Amenity

To the north, west and south of the site, the land use is currently rural residential. Some open space areas will be visible from these allotments and from Courtney Drive.

A residential development is located to the east of the site. A proposed drainage reserve is located behind some of these dwellings. The outlook of these dwellings will not be compromised by the construction of the drainage reserve and may be improved with the removal of weeds and sympathetic landscaping.

### 5.10.2 Pedestrian and Vehicle Access

Current access to the site is via Courtney Drive. Vehicle access will also be via Mackellar Drive to the east. Connectivity to the future developments to the south have been provided (refer to Figure 3.1).

The proposed development layout will incorporate a network of internal roadways and interconnecting pedestrian footpaths. The footpaths will allow for safe pedestrian movement to public open space recreation areas within and external to the development. The footpaths will connect to those external to the site and allow for pedestrian access to community infrastructure such as schools and convenience stores.

### 5.10.3 Ecological Corridors

Ecological corridors are necessary to allow the movement of fauna between patches of habitat that are of insufficient size to support a population in isolation. They allow individuals to seek mates and alternate foraging resources. Ecological corridors are of importance to species with limited mobility.

The proposed environmental open spaces serve to increase the conservation value of connecting bushland habitat in the south. Open space areas in the north along Yaun Creek and along the waterway on the south-eastern corner will function as a riparian linkage to bushland located to the east and west (Figure 5.10). The rehabilitation of these areas will create valuable linkages to facilitate fauna movement through the local area.



**Figure 5.10 Ecological connectivity in the local landscape**

### 5.10.4 Open Space Linkages

An analysis of public open space in the surrounding locality has identified several public open space areas within a 1 km radius of the site (Figure 5.11). These open space areas include conservation parks and recreation parks. They cater for informal and formal recreation as well as habitat protection.

The level of pedestrian connectivity to open space areas and community facilities, in terms of dedicated footpaths and cycleways, is relatively high, particularly from the residential development located to the immediate east. These pathways extend to community facilities such as schools in the local area.

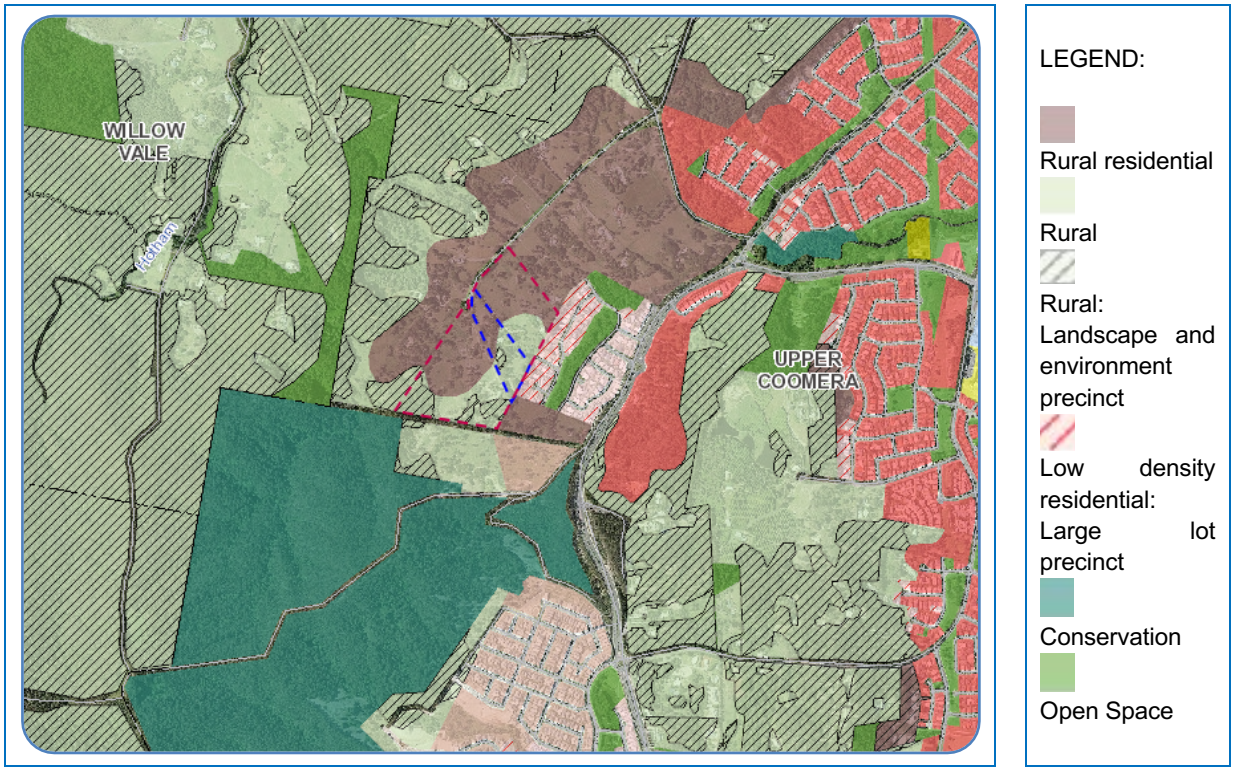



**Figure 5.11 Open space areas in local area**

## 5.11 Bushfire Hazard Areas

The Bushfire Hazard overlay identified areas within the site as having a bushfire hazard rating of medium and high (Figure 5.12). Confirmed medium or high bushfire hazard areas are considered as designated bushfire prone areas for the purposes of the *Building Code of Australia* and *AS3959-1999 Construction of Buildings in Bushfire-Prone Areas*, and all building work must be carried out in a manner consistent with this standard.

A Bushfire Risk Management Plan is to be prepared for the site to guide bushfire mitigation and management.

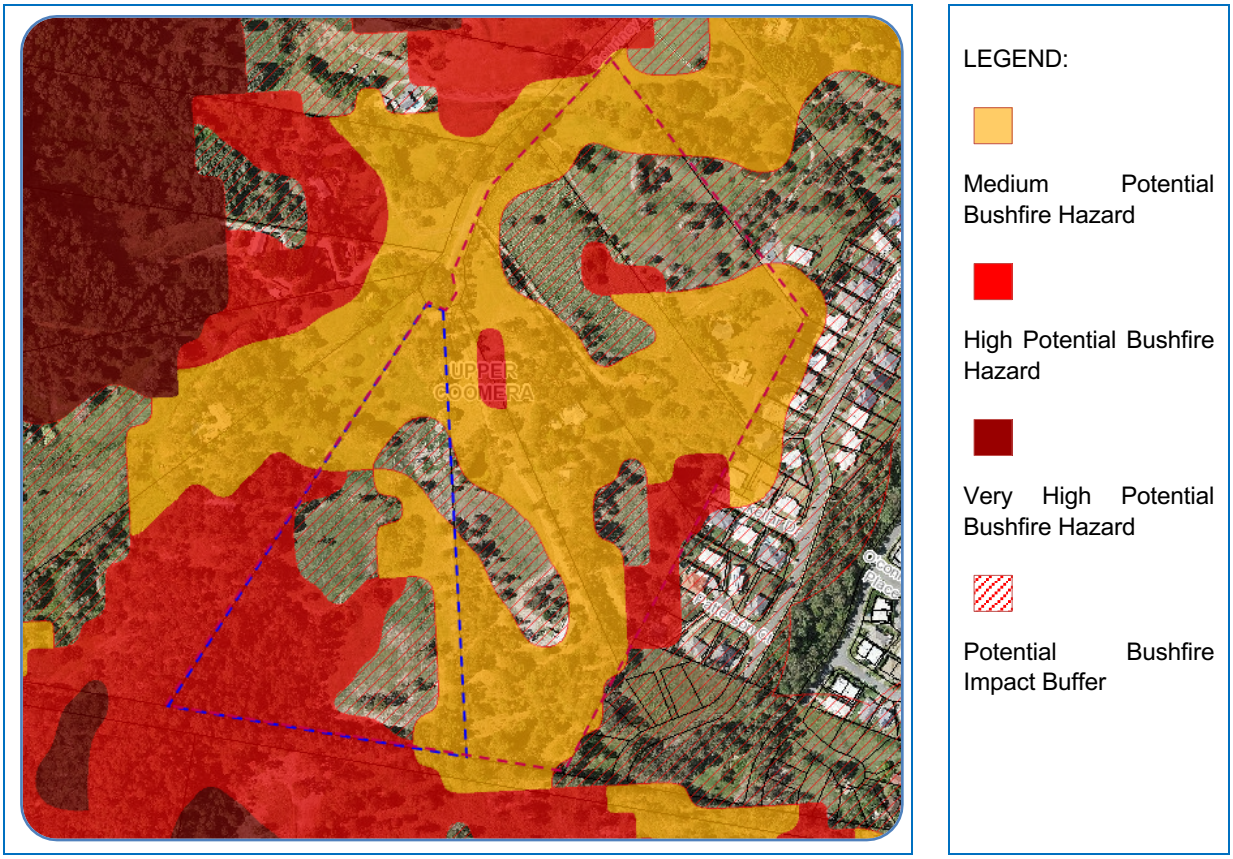



**Figure 5.12 Bushfire Hazard**

## 5.12 Cultural Heritage

The Aboriginal and Torres Strait Islander Cultural Heritage Register was consulted to determine if any cultural heritage studies have been conducted over the site. The register contains information about cultural heritage studies recorded under Part 6 of the *Aboriginal Cultural Heritage Act 2003* (ACH Act), cultural heritage management plans registered under Part 7 of ACH Act, designated landscape area recorded under previous legislation, registered cultural heritage bodies, and details about statutory Aboriginal and Torres Strait Islander parties for an area.

No cultural heritage studies for the site were recorded on the register.

Should unrecorded cultural heritage sites or materials be discovered during construction, work at that location will cease until Traditional Owners are contacted to provide advice on the significance of the finds and discuss management and mitigation options.

## 5.13 Existing Infrastructure and Infrastructure Requirements

The following sections provide a summary of the infrastructure in the local area that potentially impact the proposed development or are required to facilitate the development. These sections have been prepared in reference to the Local Government Infrastructure Plan (LGIP). The LGIP is an overarching document that outlines where required trunk infrastructure will be delivered, when it will be delivered and how it will be delivered. Trunk infrastructure includes water supply, sewerage, public parks and land for community facilities and transport networks.

Constraints identified in the Draft Concept Plan (GHD, 2017) will be mitigated through bulk earthworks to reduce the RL to 60 m. This will enable sewer and water supply to be connected to the residences.

## 5.14 Stormwater Management

The construction phase of the development has the potential to impact on the water quality of downstream environments, especially within Yaun Creek. Water quality impacts are a result of disturbance and suspension of soils during periods of heavy rain, which are conveyed downstream causing turbidity and sedimentation. These impacts can be managed through the implementation of sediment erosion control measures that intercept stormwater and collect sediment loads prior to discharge. Uncontrolled erosion and sediment transportation off the site and into downstream environments have the potential to cause adverse ecological harm.

A Stormwater Management Plan has been prepared which will incorporate recommendations to be implemented during the construction and operational phases of the development. Six drainage bio-retention systems have been planned for the site to provide on-site detention, capture pollutants and treat stormwater prior to discharge.

No stormwater treatment will be undertaken in areas proposed for public open space managed for conservation or recreation.

## 5.15 Wastewater Management

The City of Gold Coast planning scheme identifies the location of current and future wastewater networks within the city.

Figure 5.13 identifies the location of current and future sewerage connection areas in relation to the subject site. The site is not mapped as being within the ultimate or existing sewerage connection area. As described earlier, bulk earthworks to reduce the RL to 60 m will be undertaken to enable sewerage connection to the development.

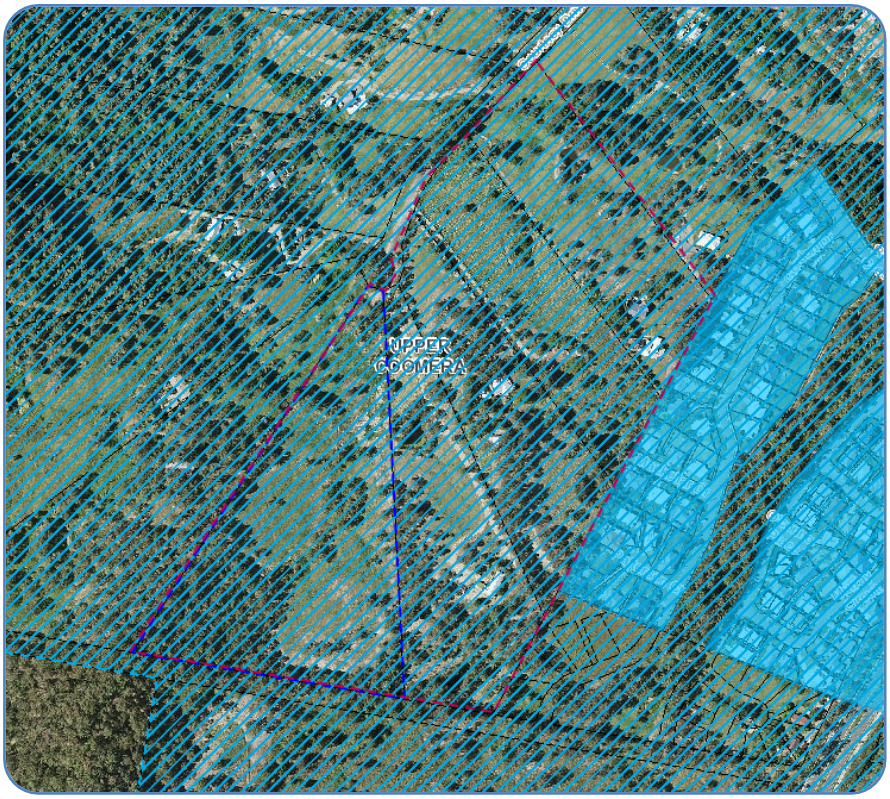



**Figure 5.13 Sewerage connection**

### 5.15.1 Potable water connection

The City of Gold Coast planning scheme identifies the location of current and future potable water networks within the city.

Figure 5.14 identifies the location of current and future potable water connection areas in relation to the subject site. The site is not mapped as being within the ultimate potable water connection area. However, as described earlier, bulk earthworks to reduce the RL to 60 m will be undertaken to enable potable water connection to the development.




LEGEND:

Ultimate potable water connection area

Existing potable water connection area

**Figure 5.14 Potable Water Supply Network**

# 6 Open Space Dedication and Design Description

The total open space proposed will have an area of approximately 54,506 $m^2$. Three categories of open space are proposed, each with differing functions and opportunities.

A summary of each of the open space categories that are applicable to the proposed development is provided below and discussed in further detail in the following sections.

## 6.1 Open Space Category 1 – Utility Reserve

Utility reserves are defined by the City of Gold Coast as parcels of land that do not provide any formalised terrestrial recreation function but may informally contribute to the City's park network.

Within the classification of Utility Reserves are four categories:

1. Utility reserve;
2. Drainage reserve;
3. Natural drainage reserve; and
4. Access linkage.

Two classifications of Utility Reserve are proposed for the subject site; Drainage and Natural Drainage Reserve.

### 6.1.1 Drainage Reserve

A waterway/drainage reserve is defined as land associated with waterways, creeks, drainage lines and stormwater infrastructure. These types of parks are usually maintained as a natural area. They are part of the stormwater network where the primary purpose is water flow and drainage. Drainage Reserves may have footpath connections or other recreational embellishments but the development or potential of the park for recreational use is encumbered due to the presence of the drainage, the stormwater device or to the wetness of the area. Drainage reserves occupy an area of 22,970 $m^2$.

### 6.1.2 Natural Drainage Reserve

The primary purpose is natural drainage and may buffer waterways which serve to support water quality. These parks may contain recreational connections and may also provide some local scale wildlife corridor values and urban/suburban amenity.

The total area of natural drainage reserves within the proposed development is 6,042 $m^2$. Yaun Creek and associated buffers will form the natural drainage reserve. This area, along with the environmental reserves, will be rehabilitated to provide regional riparian fauna linkages. Drainage reserves will contribute to the site's passive recreational opportunities and scenic amenity.

## 6.2 Open Space Category 2 – Open Space Parks

The City of Gold Coast defines recreation parks as open space areas that positively contribute to the Recreation Facilities Network.

Within the classification of Recreation Parks are five categories:

1. Local parks;
2. District parks;
3. City parks;
4. Open space linkage;
5. Amenity space; and
6. Water body.

Recreation areas of the open space network within the proposed development fall into the Local Park classification.

### 6.2.1 Local Recreation Parks

Local parks generally serve the needs of the immediate neighbourhood (within 400 m or 5 minutes' walk) by providing limited recreational opportunities, and catering for short visits only. Most local parks will be used for informal social activities and informal sporting activities. Typical facilities include shaded seating areas, open space areas for 'kick and play' and shaded pathway connectivity throughout the park.

The open space provisions of the City Plan require a minimum of 20 $m^2$ of land per dwelling dedicated to recreation. Specific to this development 3,920 $m^2$ of recreation parks are required. The total area of the recreation park in the proposed development is 4,626 $m^2$.

The function of the recreation parks in the context of this development is to:

- Provide passive recreational opportunities for the community; and
- Provide an outdoor area to gather and socialize.

## 6.3 Open Space Category 3 – Conservation Estate (Environmental Reserve)

Conservation Estate is defined by the City of Gold Coast as 'areas of land, predominantly with native vegetation cover, managed principally for nature conservation purposes'. The Conservation Estate is broken down into four categories.

1. Conservation area;
2. Environmental reserve;
3. Bushland reserve; and
4. General reserve.

Areas of high ecological significance on the subject site fall into the Environmental Reserve classification and will be managed for conservation.

The total area of proposed environmental reserve is 26,910 $m^2$ (which includes the natural drainage reserve along Yaun Creek). The function of the environmental reserve is to:

- Provide a continued ecological conservation corridor;
- Provide nature observation and passive recreation opportunities;
- Retain vegetation and ecosystems of ecological significance, particularly, Koala and riparian habitat; and
- Provide a level of protection for existing natural value and habitat for flora and fauna.

# 7 Open Space Assessment

For each open space area, an assessment regarding its purpose and management has been made. A Statement of Landscape Intent has been prepared by Zone Planning and presents the design concepts for each of the open space areas (Appendix B). Extracts from the Statement of Landscape Intent have been used to illustrate the open space design.

## 7.1 Open Space Category 1 – Utility Reserve (Drainage Reserve)

Five separate drainage reserves are proposed for the development. In total, they occupy an area of 22,970 $m^2$. They incorporate existing overland flow paths or drainage channels and associated dams created originally for livestock watering (refer to Figure 3.1).

### 7.1.1 Drainage Reserve 1

***Size, Shape and Location***

Drainage Reserve 1 is roughly rectangular and is in the south-eastern corner of the proposed development. The total area of the reserve is 1,005 $m^2$ (Figure 7.1).

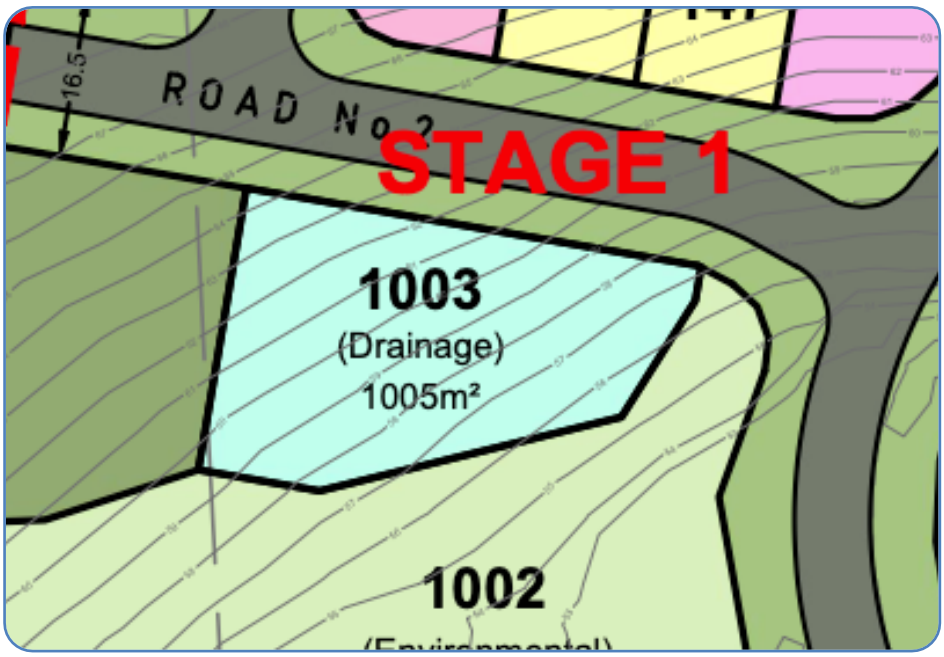



**Figure 7.1 Drainage Reserve 1**

***Function and Connectivity***

The drainage reserve will include a stormwater treatment and detention basin. This reserve will maintain connectivity to the adjacent environmental and recreation reserves.

A Statement of Landscape Intent has been prepared by Zone Planning which details landscaping of this drainage reserve. The Statement of Rehabilitation Intent prepared by Biome Consulting provides a concept design for the fauna underpass.

***Access***

Pedestrian access to Drainage Reserve 1 will be from the internal road network and pedestrian walkway. Maintenance access will be via the road frontage.

### 7.1.2 Drainage Reserve 2

***Size, Shape and Location***

Drainage Reserve 2 is roughly triangular and is located at the south of the Mackellar Drive entrance on the eastern side of the proposed development. The total area of the reserve is 3,456 $m^2$ (Figure 7.2).

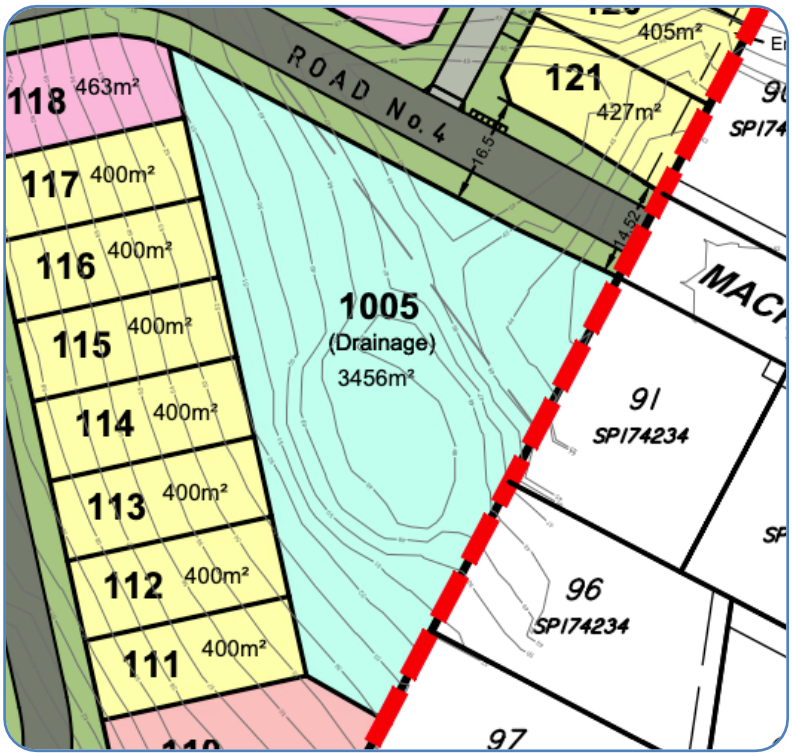



**Figure 7.2 Drainage Reserve 2**

***Function and Connectivity***

The primary function of Drainage Reserve 2 is stormwater treatment and detention. It will provide informal, passive recreation opportunities, although the space will be dominated by a bioretention basin.

This location will not have any habitat or drainage linkages to retained bushland given its location adjacent to an established development and planned residential housing.

A Statement of Landscape Intent has been prepared by Zone Planning.

***Access***

Pedestrian access to Drainage Reserve 2 will be from the internal road network and footpath located to the north. Maintenance access will be via the road frontage.

### 7.1.4 Drainage Reserve 3

***Size, Shape and Location***

Drainage Reserve 3 is rectangular and is located on the western side of the proposed development. A fabricated waterway flows into this drainage reserve from the south. The total area of the reserve is 10,253 $m^2$ (Figure 7.3).

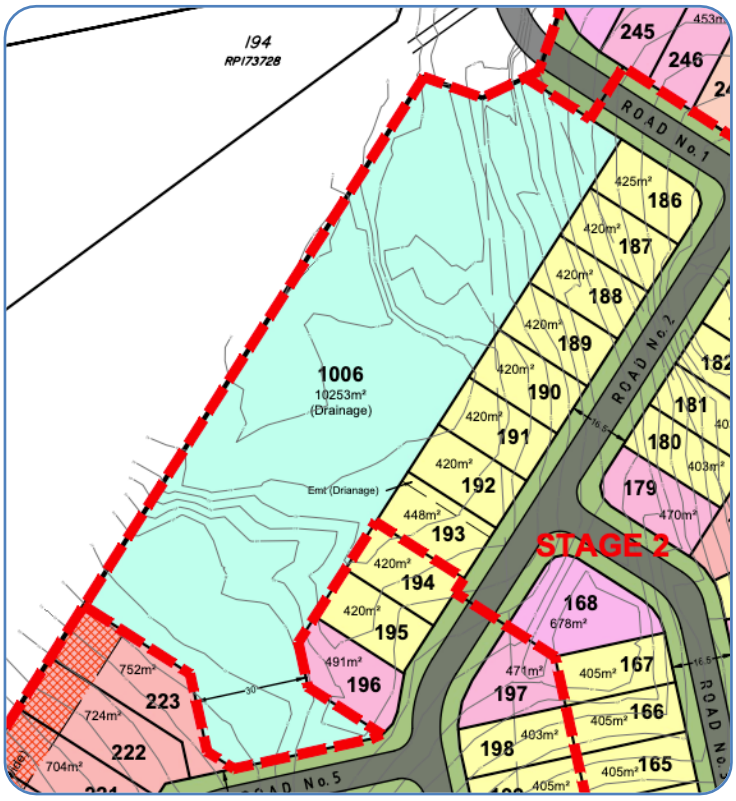



**Figure 7.3 Drainage Reserve 3**

***Function and Connectivity***

The primary function of Drainage Reserve 3 is for stormwater treatment and detention along with conveyance of upstream catchment flows. It will provide informal, passive recreation opportunities, although the space will be dominated by a detention basin.

This reserve will provide a welcoming area of green space to one of the major access points to the development. It will maintain connectivity to adjacent residential rural allotments.

A Statement of Landscape Intent has been prepared by Zone Planning.

***Access***

Pedestrian access to Drainage Reserve 4 will be from the internal road network and footpath to the east. Residential blocks 186-196 back onto this reserve.

Maintenance access will be via the road frontage.

### 7.1.5 Drainage Reserve 4

***Size, Shape and Location***

Drainage Reserve 4 is located to the immediate south of Drainage Reserve 3. It is roughly rectangular in shape and is also directly connected to an environmental reserve (Figure 7.4). The total area of this reserve is 4,700 $m^2$.

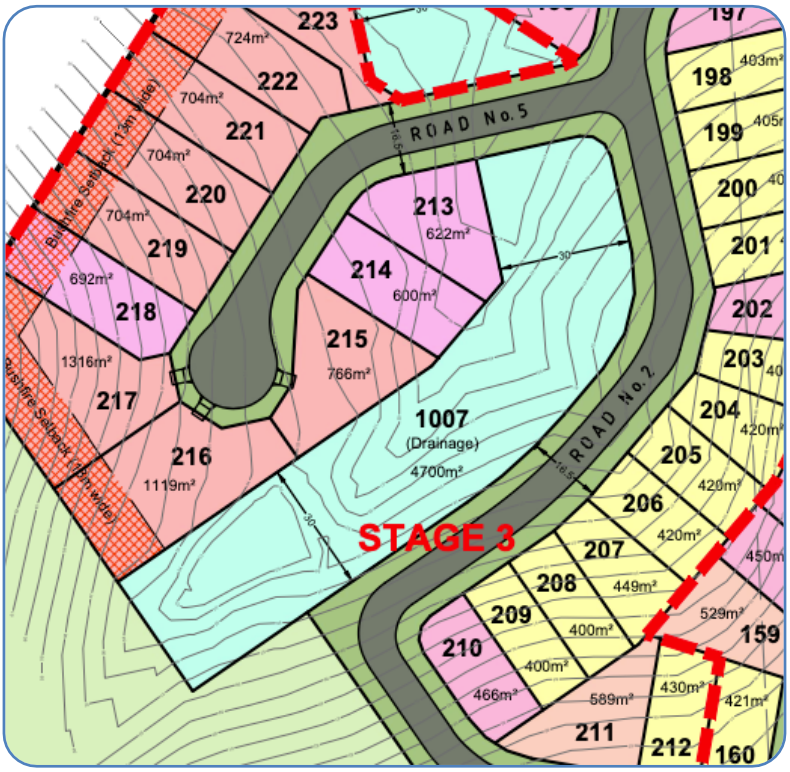



**Figure 7.4 Drainage Reserve 4**

***Function and Connectivity***

The primary function of Drainage Reserve 4 is for stormwater treatment and detention along with conveyance of upstream catchment flows. It will provide informal, passive recreation opportunities.

This reserve will contain a fabricated waterway. The waterway realigns an existing overland flow path and will be constructed to look like a natural system. A chain of pools will capture and detain stormwater runoff from the catchment within the environmental reserve to the south. Details of the fabrication of the waterway are provided in the State of Rehabilitation Intent.

A Statement of Landscape Intent has been prepared by Zone Planning.

***Access***

Pedestrian access to Drainage Reserve 4 will be from the internal road network and footpath to the north.

Maintenance access will be via the road frontage.

### 7.1.6 Drainage Reserve 5

***Size, Shape and Location***

Drainage Reserve 5 is approximately rectangular in shape and is in the north of the proposed development. It is directly connected to the Yaun Creek Natural Drainage Reserve to the north and the recreation park to the immediate west. The total area of the drainage reserve is 3,556 $m^2$ (Figure 7.5).

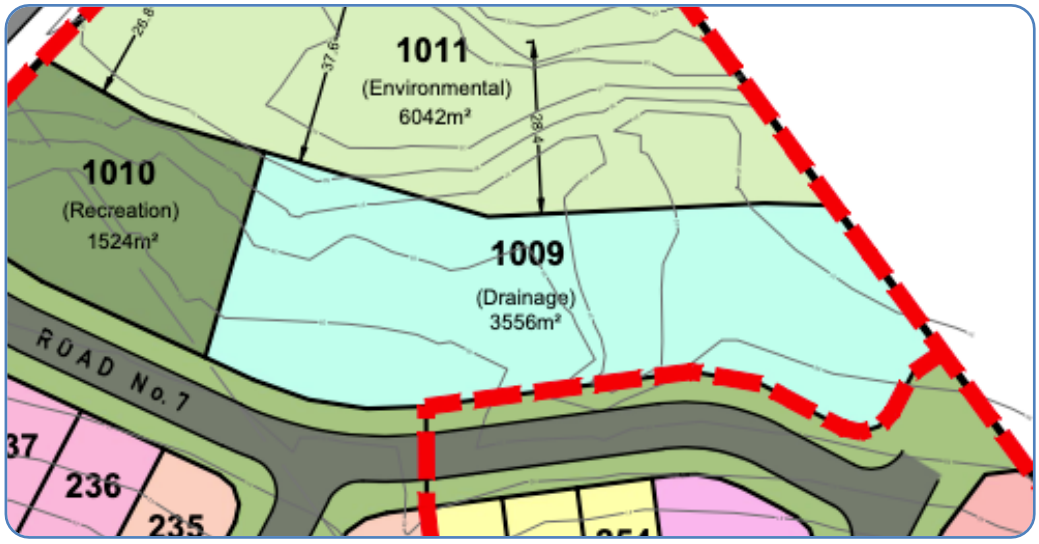



**Figure 7.5 Drainage Reserve 5**

***Function and Connectivity***

The primary function of Drainage Reserve 5 is stormwater treatment and detention. It will provide informal, passive recreation opportunities, although the space will be dominated by a bio-retention basin.

Drainage Reserve 5 will be directly connected to Natural Drainage Reserve to the immediate north and the recreation park to the west. The location of this drainage reserve will effectively increase the buffer to Yaun Creek.

A Statement of Landscape Intent has been prepared by Zone Planning.

***Access***

Pedestrian access to Drainage Reserve 5 will be from the internal road network.

Maintenance access will be via the road frontage.

### 7.1.7 Drainage Reserve Embellishments

Signage will be erected at the main access point to the drainage reserves. No picnic or play nodes are planned for any of the drainage reserves. A Statement of Landscape Intent has been prepared by Zone Planning which provides details of the fencing and street front access control for each of the drainage reserves. At the boundary of the residential allotments and the drainage reserves, 50% transparent POS interface is proposed. Along the road frontage, standard council bollards placed 1.5 m apart are to be installed.

### 7.1.8 Landscape Design

The landscape design for the drainage reserves will incorporate native, endemic species suitable for drainage and detention areas. The planting palate will not obstruct the line of sight for park users and will increase the scenic amenity of the development. A Statement of Landscape Intent has been prepared by Zone Planning and provides a suitable planting palette.

### 7.1.9 Safety

All drainage reserves will be planned and designed in accordance with Crime Prevention through Environmental Design (CPTED) principles. This will increase people's comfort levels as they will feel and be safer. CPTED principles include landscaping to provide clear sight lines across the open space and to potential hazards (such as standing water) to increase the capacity for passive and active surveillance.

### 7.1.10 Bushfire Hazard Management

Sections of the proposed development site have been identified as having a medium to high bushfire hazard rating. Mitigation of bushfire hazards is detailed in the Bushfire Management Plan.

### 7.1.11 Environmental Impact and Protection

All the planned drainage reserves are located within areas where existing waterways or dams are present. The environmental impacts associated with creating drainage reserves is therefore considered negligible.

The rehabilitation of drainage reserves to remove weeds and establish plants to assist in storm water treatment will serve to enhance their ecological values.

### 7.1.12 Maintenance

In accordance with the City's *Planning Scheme Policy: Land Development Guidelines* and notwithstanding normal cadastral survey requirements, 1.5 m marker posts shall be located adjacent to each corner peg of dedicated Public Open Space areas. The purpose of these marker posts is to reduce fencing errors and to better define the City's maintenance responsibility.

The parks will be maintained regularly (e.g. mowing and weed management) and landscaped in accordance with the Statement of Landscape Intent. The drainage reserves will be maintained by the developers for a yet-to-be specified establishment and maintenance period. This will be further defined in the Open Space Management Plan (to be prepared in the operational phase of the development).

### 7.1.13 Ownership

Ownership will be transferred to the City of Gold Coast upon the completion of the maintenance period.

## 7.3 Open Space Category 1 – Utility Reserve (Natural Drainage Reserve)

The Natural Drainage Reserves detailed in the following sections will become part of the environmental reserve once rehabilitation has been established and will be managed for conservation.

### 7.3.1 Natural Drainage Reserve 1 – Yaun Creek

***Size, Shape and Location***

The total area of the Natural Drainage Reserve 1 is 6,042 $m^2$. It is triangular and located in the northern-most corner of the proposed development (Figure 7.6). The Natural Drainage Reserve incorporates buffers to Yaun Creek which will be extensively rehabilitated.

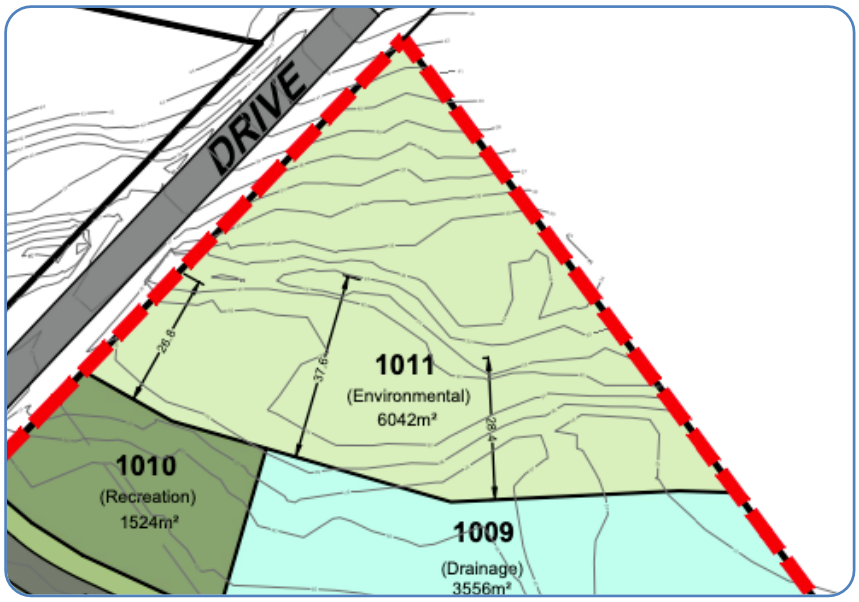



**Figure 7.6 Natural Drainage Reserve 1**

***Function and Connectivity***

The Natural Drainage Reserve serves as a buffer to Yaun Creek, which is currently in a degraded state due to bank erosion resulting from a lack of riparian vegetation and unrestricted livestock access. When rehabilitated, it will provide passive recreation and nature observation opportunities while enhancing its ecological function. The rehabilitation of this waterway will provide valuable linkages along Yaun Creek and facilitate fauna movement. A Statement of Rehabilitation Intent has been prepared to support this development application and set out the rehabilitation approach. The rehabilitation of this reserve will increase riparian connectivity along Yaun Creek external to the development.

This reserve is directly connected to Drainage Reserve 5 and a recreation reserve, located to the south. As the drainage reserve and recreation park will be planted with endemic trees, this will effectively provide a total corridor width of greater than 60 m to Yaun Creek.

***Access***

Pedestrian and maintenance access are provided via Courtney Drive.

### 7.3.2 Natural Drainage Reserves 2 and 3

***Size, Shape and Location***

Natural Drainage Reserves 2 and 3 are discussed together as they both protect a minor waterway which flows through the south-eastern corner of the site (Figure 7.7). The total area of these natural drainage reserves is 4,643 $m^2$.

The drainage reserve on the eastern side of the internal road is triangular (reserve 2). The reserve on the western side of the internal road is irregularly shaped (reserve 3). This reserve has direct connectivity to a recreation and drainage reserve to the immediate north.

Both of the natural drainage reserves incorporate buffers to a waterway which will be extensively rehabilitated to enable wildlife movement corridors to be maintained.

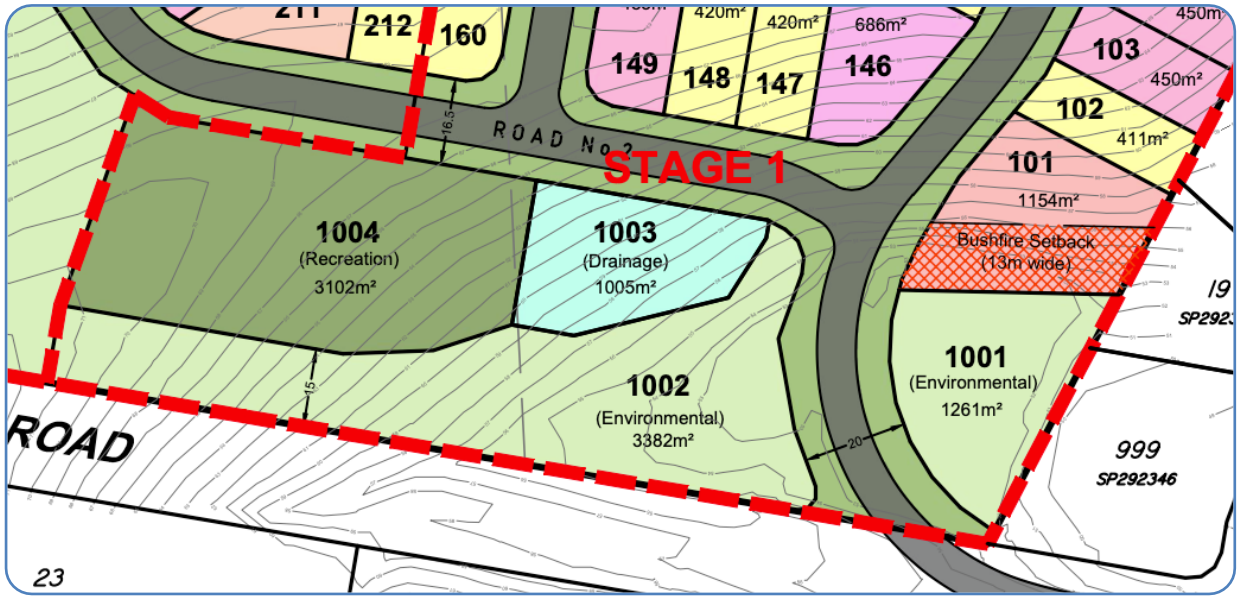



**Figure 7.7 Natural Drainage Reserves 2 and 3**

***Function and Connectivity***

The Natural Drainage Reserves 2 and 3 serve as a buffer to a waterway, which is currently in a degraded state. When rehabilitated, it will provide passive recreation and nature observation opportunities while enhancing its ecological function. The rehabilitation of this waterway will provide valuable linkages to the drainage reserve and bushland to the east. Wildlife movement will be facilitated by the construction of a fauna underpass beneath the internal road.

A Statement of Rehabilitation Intent has been prepared to support this development application and set out the rehabilitation approach. A concept design of the fauna underpass is also presented in this document.

The drainage and recreation reserves located to the north of natural drainage reserve 3 effectively increase the buffer to the waterway.

***Access***

Pedestrian and maintenance access are provided via the internal road network.

### 7.3.3 Natural Drainage Reserve Embellishments

No embellishments for the natural drainage reserves are planned, as its primary intent is to buffer the waterways.

### 7.3.4 Landscape Design

Landscaping will focus on recreating pre-clearing communities within the waterway buffers. A Statement of Rehabilitation Intent has been prepared which sets out the rehabilitation approach for the open space network. This has been provided as Appendix A of this report. A Rehabilitation Management Plan will be prepared to guide the detailed rehabilitation and on-going maintenance of this reserve during the operation phase of the development.

### 7.3.5 Safety

Egress/access points have been incorporated into the design along Courtney Drive and the internal road network, to allow multiple escape routes if people are in a position of danger.

### 7.3.6 Bushfire Hazard Management

Sections of the proposed development site have been identified as having a medium to high bushfire hazard rating. Mitigation of bushfire hazards is detailed in the Bushfire Management Plan.

### 7.3.7 Maintenance

A maintenance regime, including weed management, will be specified within the Rehabilitation Management Plan (to be prepared during the operational phase of the development).

All the natural drainage reserves will be maintained by the developers for a yet-to-be specified establishment and maintenance period. This will be further defined in the Rehabilitation Management Plan and the Open Space Management Plan (to be prepared in the operational phase of the development). Once rehabilitation of the waterways has been established, they will become part of the environmental reserve open space and managed for conservation.

### 7.3.8 Environmental Impact and Protection

The natural drainage reserves are located along existing waterways. The environmental impacts associated with creating these drainage reserves is therefore considered negligible.

The rehabilitation of these reserves to reflect pre-clearing ecosystems will serve to enhance its ecological values. Rehabilitation is expected to decrease erosion by stabilizing stream banks and slow overland inflows.

### 7.3.9 Ownership

Ownership will be transferred to the City of Gold Coast at the end of the maintenance phase, which will be specified in the Rehabilitation Management Plan.

## 7.5 Open Space Category 2 – Open Space Parks (Local Recreation Park)

Two recreation parks are proposed for the development. Both have direct connectivity to other open space areas.

### 7.5.1 Local Recreation Park 1

***Size, Shape and Location***

The larger of the two recreation parks is in the south-eastern corner of the site and has a total area of 3,102 $m^2$. It is roughly rectangular (Figure 7.8).

***Function and Connectivity***

The Recreation Park 1 will cater for informal social and play activities. It is located within 400 m of approximately 75% of the proposed residences. The Recreation Park is linked to the residential dwellings by the internal road network. Natural Drainage Reserve 3 and Drainage Reserve 1 have direct connectivity to this recreation park.

A Statement of Landscape Intent has been prepared by Zone Planning which shows the landscape intent for the recreation park (Appendix B).

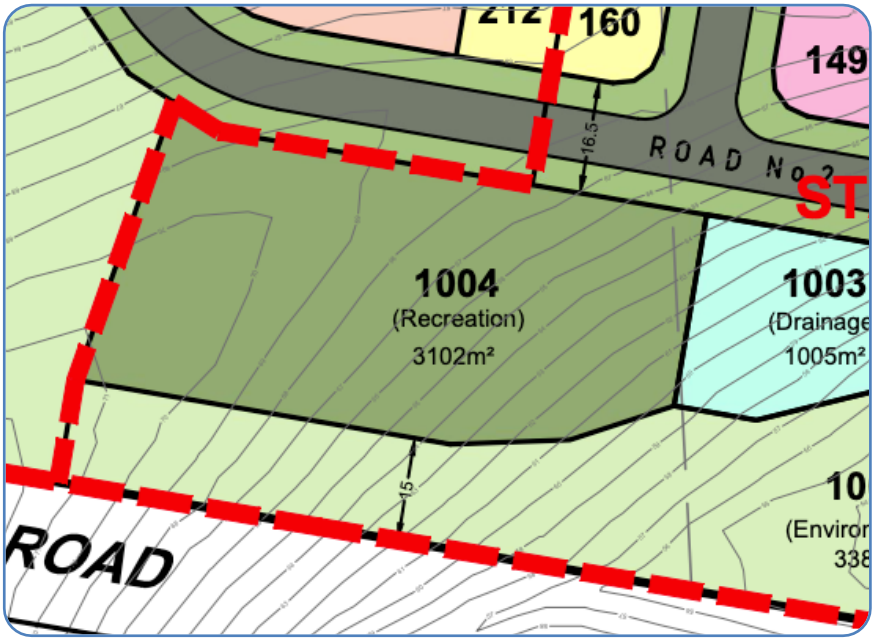



**Figure 7.8 Recreation Park 1**

***Access***

Pedestrian access is via the internal road, located to the immediate north. Maintenance access will be via the internal road network.

***Recreation Reserve 1 Embellishments***

Bollards along street frontages will be erected to prevent accidental or intentional vehicle access to the Recreation Parks.

An informal kick about space is to be provided within the recreation park. A shaded playground is also proposed in the northern sector of the park. It will feature a climbing structure and swing set. Seating will also be installed.

This recreation reserve has direct connectivity to other open space areas which will provide for passive recreation opportunities and nature observation.

### 7.5.2 Local Recreation Park 2

***Size, Shape and Location***

The total area of Recreation Park 2 is 1,524 $m^2$. This park has a rectangular shape and directly adjoins the Natural Drainage Reserve 1 (located to the north) and Drainage Reserve 5 (Figure 7.9).

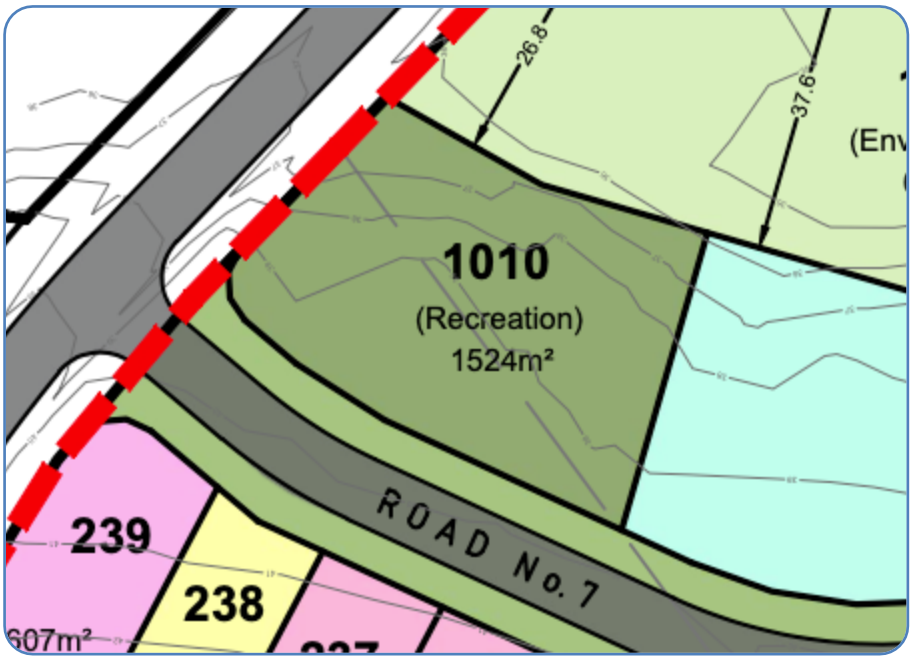



**Figure 7.9 Recreation Park 2**

***Function and Connectivity***

Recreation Park 2 will provide a kick and play area. This parks' direct connectivity with the drainage reserves will effectively increase the buffer to Yaun Creek.

This recreation park is linked to residential dwellings by a network of footpaths and is accessed via the internal road network.

***Recreation Reserve 2 Embellishments***

Bollards along street frontages will be erected to prevent accidental or intentional vehicle access to the Recreation Parks. At the boundary of the park and the residential allotment, a 50% transparent POS interface is proposed.

An informal kick about space is to be provided within the recreation park. This recreation reserve has direct connectivity to other open space areas which will provide for passive recreation opportunities and nature observation.

### 7.5.3 Landscape Design

Landscaping will consist of endemic species that will enable unimpeded vision through the parks, while providing shaded spots. Ground cover will consist of maintained lawn. A Statement of Landscape Intent has been prepared (Appendix B).

### 7.5.4 Safety

The Recreation Parks will be planned and designed in accordance with Crime Prevention through Environmental Design (CPTED) principles. This will increase people's comfort levels as they will feel and be safer. CPTED principles include landscaping to provide clear sight lines across the open space and to potential hazards (such as roadways) to increase the capacity for passive and active surveillance.

### 7.5.5 Bushfire Hazard Management

Sections of the proposed development site have been identified as having a medium to high bushfire hazard rating. Bushfire hazard mitigation has been detailed in the Bushfire Management Plan.

### 7.5.6 Maintenance

Regular mowing and weed management will be conducted. A maintenance schedule will be formulated in the planned Open Space Management Plan (to be prepared during the operational phase of the development).

### 7.5.7 Environmental Impact and Protection

The Recreation Parks will be created within areas currently cleared of vegetation. The environmental impacts associated with creating these parks is therefore considered negligible.

### 7.5.8 Ownership

The Recreation Park will be maintained by the developer until the end of the establishment period (to be defined in the Open Space Management Plan). Ownership will be transferred to the City of Gold Coast at the end of the establishment period.

## 7.7 Open Space Category 3 – Conservation Estate (Environmental Reserve)

In addition to the environmental reserve in the south-western corner of the site, the natural drainage reserves will be managed for conservation and become part of the environmental open space upon completion of rehabilitation.

### 7.7.1 Size, Shape and Location

The total area of the open space linkage is 16,226 $m^2$. It is roughly triangular and protects areas of ecological significance, as identified in the Ecological Assessment. It is situated in the south-western corner of the proposed development (Figure 7.10).

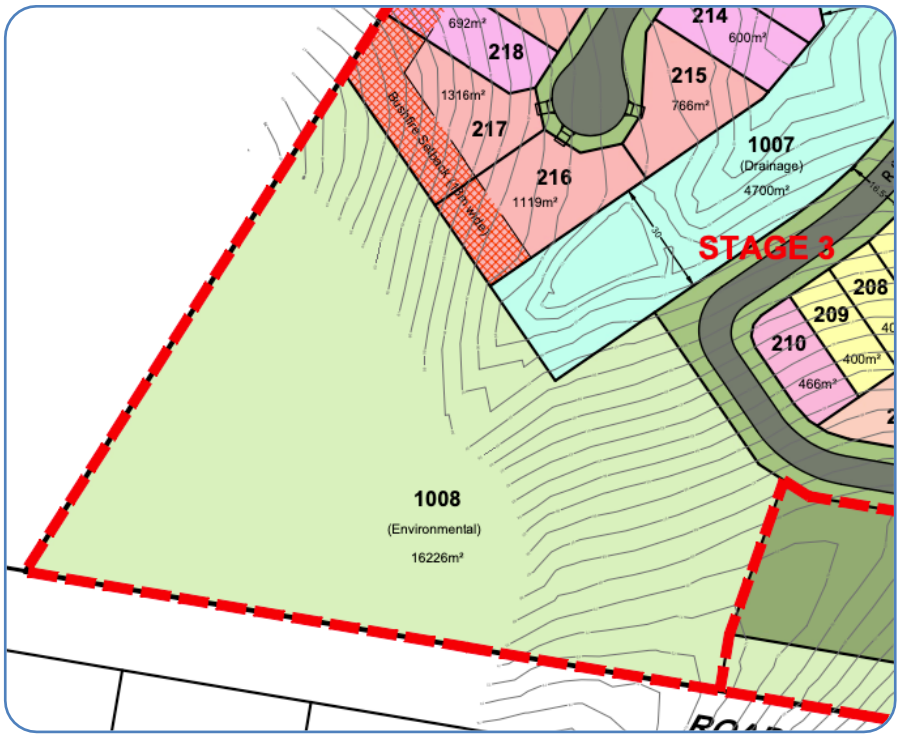



**Figure 7.10 Environmental Reserve**

### 7.7.2 Function and Connectivity

The primary function of the Environmental Reserve is to protect an area of ecological significance and associated fauna and flora habitat. This area is mapped as containing regulated vegetation and habitat of Koala. The Environmental Reserve will also provide passive recreational opportunities and nature observation, although no formal walking paths or facilities are planned.

The Environmental Reserve will enable connectivity with existing vegetation to the south to be maintained. Connectivity to bushland to the east from the environmental reserve is maintained through the drainage reserve 1, recreation area 1 and natural drainage reserve 3.

The ecological assessment identified some areas of degradation through weed incursion in this reserve. The rehabilitation of this area is detailed in the Statement of Rehabilitation Intent (Appendix A).

### 7.7.3 Access

Access to this area will not be encouraged by providing formal pathways, however, access will be via the internal road network or the road reserve located to the south.

Allotments 216 and 217 back onto this reserve.

### 7.7.4 Embellishments

No embellishments for this Environmental Reserve are planned.

### 7.7.5 Landscape Design

Landscaping will be minimal in this area and primarily consist of rehabilitation of degraded areas. A Rehabilitation Management Plan will be prepared to guide and inform the rehabilitation and restoration process. This Rehabilitation Management Plan will be informed by the Statement of Rehabilitation Intent (Appendix A). In areas where restoration is required, the planting palette will reflect the pre-clearing ecosystems.

### 7.7.6 Safety

To protect the natural features of the Environmental Reserve, no formal infrastructure will be created. The creation of this reserve provides an opportunity for promoting environmental awareness. Nonetheless, public safety and wellbeing is of paramount importance and where feasible, CPTED principles will be incorporated into the design of the Environmental Reserve.

### 7.7.7 Bushfire Hazard Management

Sections of the proposed development site have been identified as having a medium to high bushfire hazard rating. Bushfire hazard mitigation has been detailed in the Bushfire Management Plan.

### 7.7.8 Maintenance

On-going weed control will be necessary in the Environmental Reserve. Rehabilitation of the degraded areas will enhance the ecological values of this open space. A Rehabilitation Management Plan will be prepared to guide and inform the rehabilitation and restoration process during the operation phase of the development. Maintenance schedules and duration of establishment and maintenance periods will be defined in the Rehabilitation Management Plan.

### 7.7.9 Environmental Impact and Protection

The Environmental Reserve is in an area of ecological significance and is designed to conserve these features. The environmental impacts associated with creating this reserve is therefore considered negligible. The Environmental Reserve is designed so that its natural features will not be adversely impacted upon or damaged by visitors, thus destroying all or some of the fundamental features of the reserve.

The rehabilitation of this reserve to reflect pre-clearing ecosystems will serve to enhance its ecological values.

### 7.7.10 Ownership

The ownership of the conservation area will be transferred to the City of Gold Coast following the establishment period of the rehabilitated areas. During the establishment period, maintenance will be the responsibility of the developer. Once ownership has been transferred, the City will be responsible for on-going maintenance. The dedication of this area to the City will allow it to be conserved in perpetuity.

# 8 Open Space Design

The design elements of public open space areas have been depicted within the Landscape Intent Statement prepared by Zone Planning.

As described earlier, a Statement of Rehabilitation Intent has been prepared to define the areas that will fall within the rehabilitation areas of the development (Appendix A).

## 8.1 Breakdown of Open Space Areas

Table 8.1 summarises the areas of public open space planned in the proposed residential development.

Trunk infrastructure is defined by the Queensland Department of Infrastructure, Local Government and Planning as that shared between multiple developments. Non-trunk infrastructure is not shared between developments and is generally internal to a development site.

**Table 8.1 Breakdown of Open Space Areas**

| Open Space Type | Area ($m^2$) | Local Government Infrastructure Plan Use |
|---|---|---|
| Drainage Reserves (including detention areas and flood affected areas) | 22,970 | Non-trunk infrastructure |
| Natural Drainage Reserve (including buffer areas) | 10,685 | Non-trunk infrastructure |
| Recreation Parks | 4,626 | Non-trunk infrastructure |
| Environmental Reserve | 16,226 | Non-trunk infrastructure |

A total area of 54,507 $m^2$ of non-trunk infrastructure will be created within the proposed development.

# 9 Code and Development Compliance

This section references the relevant Development and Constraint Codes contained within the City Plan and how each has been addressed within the development design.

**Table 9.1 Compliance Table**

| Performance Outcomes | Acceptable Outcomes | Compliance with Code |
|---|---|---|
| **DEVELOPMENT CODES** | | |
| **9.4.6 Landscape Work Code** | | |
| **Public Open Space Areas** | | |
| **PO10**<br><br>Landscape works in public open space areas (including open space dedicated as an open space contribution) must be designed to be appropriate to their function and location by:<br><br>• utilising suitable land for its intended purpose;<br><br>• incorporating, complementing and enhancing existing vegetation and ecological systems;<br><br>• enhancing the visual amenity of local area and contributing to the amenity of the region;<br><br>• providing an inclusive and sustainable community resource; and<br><br>• reinforcing and enhancing hydraulic or drainage regimes on the site and within the adjacent surrounding areas. | **AO10**<br>No acceptable outcome provided. | Complies with PO10<br><br>A Statement of Landscape Intent has been prepared to support the development application. The Statement of Landscape Intent identifies the areas to the landscaped and includes a planting palette that will enhance existing vegetation communities and enhance visual amenity and drainage regimes. |
| **PO11**<br>Landscape works in public open space areas (including open space dedicated as an open space contribution) are appropriately managed during the construction and subsequent maintenance phases. | **AO11**<br>An Open Space Management Plan prepared in accordance with SC6.10 City Plan policy – Landscape work is submitted where the site includes one or more of the following:<br><br>1. threatened flora or habitat for threatened fauna under the *Nature Conservation Act 1992*; | Will comply with AO11 via conditions<br><br>An Open Space Management Plan will be prepared to support the construction phase of the development and accompany an operational works application.<br><br>It will be prepared in accordance with SC6.10. |

| Performance Outcomes | Acceptable Outcomes | Compliance with Code |
|---|---|---|
| | 2. assessable vegetation;<br>3. includes retention of matters of environmental significance;<br>4. includes extensive areas of replanting and large rehabilitation areas;<br>5. includes wetlands, watercourses and other drainage corridors;<br>6. requires storage of materials on-site during construction;<br>7. forms part of a wider open space system;<br>8. may be subject to sediment deposition or erosion;<br>9. includes fauna habitats that require protection or expansion, including habitat features;<br>10. includes areas of land subject to the Bushfire hazard overlay map;<br>11. incorporates significant public facilities or spaces likely to attract high visitation and use; or<br>12. incorporates treatment to the banks of wetlands, watercourses or edges of other water bodies and other drainage corridors.<br>**Note: Where an Open Space Management Statement has been endorsed through an earlier approval, the Open Space Management Plan should be in accordance with that approval.** | The site contains assessable vegetation, threatened fauna habitat and watercourse/drainage channels requiring rehabilitation. |
| **PO12**<br>Landscape work is designed and constructed to achieve a reasonable and practicable response to all public risk – duty of care issues. | **AO12**<br>The design and construction of Landscape work in public open space areas is consistent with all relevant Australian standards or other international landscape standards where a standard is not available in Australia or New Zealand for the specific work item or practice. | Will comply with AO12 via conditions<br><br>All landscape work in public open space areas will be consistent with all relevant Australian standards and industry best practice. |
| **9.4.8 Reconfiguring a Lot Code** | | |

| Performance Outcomes | Acceptable Outcomes | Compliance with Code |
|---|---|---|
| **Open Space Provision** | | |
| **PO20**<br>A public open space network is provided which:<br>1. has a range of recreation settings and adequate facilities to meet the needs of the community;<br>2. offers opportunities for residents to conveniently participate in passive recreational activities;<br>3. delivers well distributed public open space that contributes to the legibility, accessibility, safety, and character of the development;<br>4. creates safe and attractive settings and focal points;<br>5. facilitates casual surveillance from adjacent streets and land uses and provides for open space areas with public road frontages;<br>6. delivers for stormwater and flood management and care of valuable environmental resources; and<br>7. is cost effective to maintain. | **AO20.1**<br>Land intended for public open space is of a physical standard and condition in accordance with the SC6.9 City Plan policy – Land development guidelines.<br><br>**AO20.2**<br>**For trunk recreational open space**<br><br>Recreation and sporting parklands and land for community facilities are designed and provided in accordance with the Local government infrastructure plan and approved Council master plans.<br><br>**OR**<br>Public open space is provided in accordance with an already approved open space strategy, relevant approved material change of use, adopted concept plan, master plan or structure plan.<br><br>**AO20.3**<br>**For non-trunk recreational open space**<br><br>Residential subdivisions creating more than 100 lots provide a minimum of 20m$^2$ of land per dwelling, for open space that is:<br>1. within 400m walking distance of all residential lots; and<br>2. designed to adequately meet the recreational needs of users. | Will comply with AO20.1 via conditions<br><br>All land intended for public open space will be rehabilitated to standards and conditions in accordance with SC6.9.<br><br>Complies with AO20.2<br><br>Recreational open space is designed in accordance with the Local government infrastructure plan.<br><br>The designated recreation parks are within 400 m of all the residential community within the proposed development. The network of footpaths enables the recreation park to be accessed within a 5-minute walk by all residences. Public open spaces that provide passive recreational opportunities are easily accessible to all within this residential community.<br><br>Complies with AO20.3<br><br>The proposed development will create 196 residential blocks (one dwelling per block). A minimum of 3,920 m$^2$ of non-trunk recreational open space is therefore required.<br><br>The development will create a total of 4,626 m$^2$ of dedicated recreation park, which is supplemented by 26,910 m$^2$ of environmental reserve open space. All non-trunk open space is within 400 m walking distance of all residential lots. |

| Performance Outcomes | Acceptable Outcomes | Compliance with Code |
|---|---|---|
| | | The variety of public open space areas and the network of pedestrian footpaths will meet the recreational needs of all users within the residential community. |
| **PO21**<br>The design and location of open space results in high-quality parkland which:<br>1. enables the retention and protection of matters of environmental significance, their associated buffers, assessable vegetation, habitat features and natural cultural features;<br>2. contributes to the visual amenity of the area and facilitates casual surveillance;<br>3. can be easily accessed along road frontages;<br>4. directly adjoins existing or proposed open space areas; and<br>5. creates opportunities for linkages between open space areas. | **AO21.1**<br>Open space is provided adjacent to waterway buffers with roads servicing linear parkland and lots located on the opposite side of the road.<br><br>**AO21.2**<br>Open space for conservation purposes is consolidated with other conservation areas to allow for a connected movement corridor.<br><br>**AO21.3**<br>Recreational open space areas less than 5000m$^2$ directly adjoin existing or proposed recreational open space areas to provide:<br>1. a consolidated useable area; and<br>2. connectivity between open spaces. | Complies with PO21<br><br>High quality parkland has been created that protects areas of environmental significance, provides a buffer to waterways, contributes to visual amenity and creates open space linkages.<br><br>Complies with AO21.1<br><br>All public open space has been designed to accommodate the waterway buffers. These areas will be rehabilitated to enhance the ecological values of the waterways and provide increased bank stability, reduce erosion and provide for wildlife movement corridors.<br><br>Complies with AO21.2<br><br>The Environmental Reserves will conserve ecologically significant areas of the site and adjoin conservation estate located externally. This will allow for fauna movement to and from the site.<br><br>Alternative solution to AO21.3<br><br>Site constraints such as steep slopes limit the amount of suitable recreational local park space. The dedicated recreation parks directly adjoin other open space areas within the development, providing consolidated, connected areas. |

| Performance Outcomes | Acceptable Outcomes | Compliance with Code |
|---|---|---|
| **Open Space Safety and Design** | | |
| **PO22**<br>Open space areas are designed and managed to promote user safety. | **AO22.1**<br>Areas intended for use during times of darkness are lit in accordance with SC6.9 City Plan policy – Land development guidelines.<br><br>**AO22.2**<br>Casual surveillance is achieved by parks and open space being overlooked by housing, commercial or other development, as well as passing pedestrian and vehicle traffic.<br><br>**AO22.3**<br>Fencing greater than 1.2m in height adjoining a park is to be at least 50% transparent (i.e. swimming pool style or timber picket fencing) and any landscaping adjacent to the fence is to be designed to maximise the opportunity for casual surveillance. | AO22.1 Not applicable<br><br>No areas are intended for use during the evening.<br><br>Complies with AO22.2<br><br>Residential housing overlooks all public open space areas. The positioning of the roadways and footpaths also allows for casual surveillance from passing vehicle and pedestrian traffic.<br><br>Will comply with AO22.3 via conditions<br><br>Fencing and landscaping adjoin public open space areas will comply with that stipulated in AO22.3. |
| **9.4.15 Works for Infrastructure Code** | | |
| **Open space and recreational facilities design** | | |
| **PO6**<br>Open-space areas and recreational facilities are designed and constructed to an appropriate standard, having regard to their intended recreational use and environmental values. | **AO6**<br>Open-space areas and recreation facilities are designed and constructed in accordance with the requirements of the relevant sections of SC6.9 City Plan policy – Land development guidelines | Complies with AO6<br><br>All public open space areas are designed in accordance with SC6.9.<br><br>Will comply with AO6 via conditions<br><br>All public open space areas will be constructed in accordance with the requirements of SC6.9. |
| **OVERLAY CODES** | | |
| **8.2.3 Bushfire Hazard Overlay Code** | | |

| Performance Outcomes | Acceptable Outcomes | Compliance with Code |
|---|---|---|
| **Open space management plan** | | |
| **PO8**<br>For areas to be dedicated to Council as open space, management strategies to mitigate bushfire risk must be identified. | **AO8**<br>The Bushfire management plan contains a separate section detailing management strategies for areas to be dedicated to Council that can be included within the Open space management plan. | Will comply with AO8 via conditions<br><br>A Bushfire Management Plan will be prepared for the site. Strategies to mitigate bushfire risk to public open space areas will be identified in this plan. |
| **8.2.6 Environmental Significance Overlay Code** | | |
| **Tenure, ownership and management arrangements** | | |
| **PO23**<br>Matters of environmental significance and associated buffers, mapped areas as identified on the Environmental significance – vegetation management overlay map proposed for retention and areas requiring rehabilitation are suitably protected in perpetuity and will:<br>1. enable necessary fire management in accordance with an approved fire management plan and any adopted bushfire management plan;<br>2. allow unimpeded movement of native fauna through matters of environmental significance and associated buffers;<br>3. enable maintenance access and regular management;<br>4. enable auditing and reporting of maintenance and management activities;<br>5. provide for public access along major watercourses, where such access is consistent with the ecological functions;<br>6. allow for linkages and buffers to adjacent areas of ecological significance; and | **AO23**<br>Matters of environmental significance and associated buffers, mapped areas as identified on the Environmental significance – vegetation management overlay map proposed for retention and areas requiring rehabilitation are transferred to Council ownership as Public Open Space.<br><br>**OR**<br><br>Where not required for public access, matters of environmental significance and associated buffers, and mapped areas as identified on the Environmental significance – vegetation management overlay map proposed for retention and areas requiring rehabilitation are retained in private ownership and protected under a statutory covenant (under the *Land Title Act 1994*).<br><br>Note: Where the area is adjacent to existing public open space, or is a buffer to a major waterway, Council's preference is for the land to be dedicated as Public Open Space. | Complies with AO23 via suggested conditions<br><br>It is the intent of the developers to transfer ownership of all public open space areas to the City upon completion of rehabilitation projects. |

| Performance Outcomes | Acceptable Outcomes | Compliance with Code |
|---|---|---|
| 7. allow for a coordinated approach to the management of adjacent areas of conservation estate. | | |
| **PO24**<br>An Open Space Management Plan prepared in accordance with SC6.10 City Plan policy – Landscape work is prepared for areas to be dedicated to Council as Public Open Space. | **AO24**<br>No acceptable outcome provided. | Will comply with PO24 via suggested conditions<br><br>An Open Space Management Plan will be prepared in accordance with SC6.10 and accompany an operational works application. This plan will incorporate all open space areas that are to be dedicated to the City upon completion of rehabilitation of these areas. |

# 10 Conclusion

This report has been prepared in accordance with the Open Space Management Guideline for the preparation of reports and plan associated with the dedication of public open space (GCCC, 2007). The open space meets the requirements of the City of Gold Coast Park Design Guidelines by providing an open space design in harmony with the development, the surrounding environs and the environmental constraints.

The open space areas planned for the development will maintain connectivity to existing bushland, provide community meeting points, passive recreational opportunities and allow for pedestrian connectivity to community facilities in the local region. The open space network also includes drainage reserves, including natural drainage reserves that will be rehabilitated to provide riparian linkages along Yaun Creek and a waterway in the south-eastern corner of the site.

The open space network seeks to improve the environmental values of the site through retaining and rehabilitating an area of existing native vegetation of conservation significance.

Relevant development and constraint code responses to applicable Planning Scheme requirements have been provided.

# 11 References

Biome Consulting 2018. Environmental Assessment 79-99 Courtney Drive, Upper Coomera. Report to Gallery Homes.

Gold Coast City Council (GCCC) (2007). Open Space Management Guideline. Guideline for the Preparation of Reports and Plans Associated with the Dedication of Public Open Space. Version 1 November 2007

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GHD (2017). Investigation Areas Program – Courtney Drive, Upper Coomera. Draft Concept Plan May 2017 Version 1.

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# Appendix A

# Statement of Rehabilitation Intent

BIOME
WATER AND ENVIRONMENTAL CONSULTING

DATE: 09.11.20
PROJECT No.: BC-16090
DRAWING No.: SRI-00
REVISION No.: B

# STATEMENT OF REHABILITATION INTENT

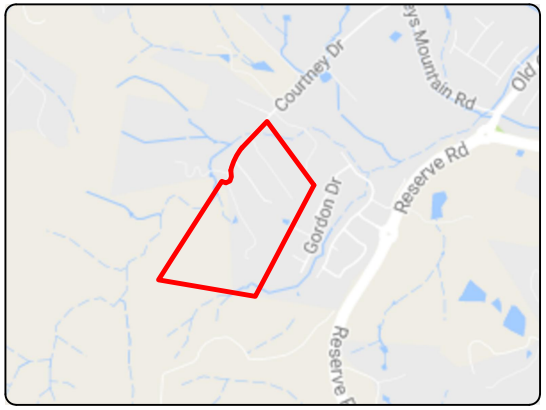
## Lots 188-192 on RP173728, 79-99 Courtney Drive, Upper Coomera

for

## Gallery Homes

Project No: BC-16090

November 2020



Site Location

BIOME Consulting Pty Ltd
Unit 30201, Southport Central Tower 3,
9 Lawson St, Southport QLD 4215
PO Box 3469, Australia Fair, Southport
**O 07 5532 7779**
**M** 0415 935 222
**E** brad@BIOMEconsulting.com.au
**W** www.BIOMEconsulting.com.au
ABN 86 166 087 476

SCHEDULE OF DRAWINGS

| Drawing No. | Drawing Title |
|---|---|
| SRI-00 | LOCALITY AND DRAWING INDEX PLAN |
| SRI-01 | EXISTING ECOLOGICAL FEATURES |
| SRI-02 | REHABILITATION STRATEGY & REHABILITATION ZONES |
| SRI-03 | PLANTING SPECIFICATIONS |
| SRI-04 | REHABILITATION PROCEDURES & WEED CONTROL |
| SRI-05 | REHABILITATION AREA MANAGEMENT |

# EXISTING ECOLOGICAL FEATURES

**Vegetation**

The vegetation on site has been broadly classified into four (4) vegetation communities:

- V1 - Acacia low open forest
- V2 - Spotted Gum / Grey Ironbark Open Forest (RE 12.11.5);
- V3 - Acacia low open woodland/mosaic +/- landscaping around dwellings
- V4 - Pasturelands +/- copses of native/exotic trees

**Vegetation Community V1**

V1 is a regrowth extension of Regional Ecosystem vegetation at the site's southwestern boundary corner. It comprises mature Acacia disparrima regrowth with occasional emergent Corymbia citriodora, Eucalyptus siderophloia, E. propinqua, and E. tereticornis. Other common species in the mid stratum include Lophostemon suaveolens and Allocasuarina littoralis. The notable disturbance within this vegetation community is the incursion of weeds with Lantana dominating the shrub layer.

**Vegetation Community V2**

V2 comprises a small area of the total subject site in the south-west corner and is an extension of a larger area of the same vegetation type beyond the site boundary. The composition of the canopy is generally representative of RE 12.11.5, primarily Corymbia citriodora and Eucalyptus siderophloia. The understorey is a mixture of juvenile canopy species, endemic shrubs and endemic ground species with negligible weed incursion.

**Vegetation Community V3**

V3 primarily mature acacia regrowth proximate to dwellings and outbuildings on the subject site. There are occasional larger eucalypts and small isolated thickets of lantana and vine weeds are common. Low level grazing is presently active throughout most of this community. Prevalent endemic flora species for this community include Acacia disparrima, Eucalytpus siderophloia, E. tereticornis, Lophostemon confertus, Cynodon dactylon var. dactylon. Prevalent weed species include Lantana camara, Setaria sphacelata, and Panicum megathyrsus.

**Vegetation Community V4**

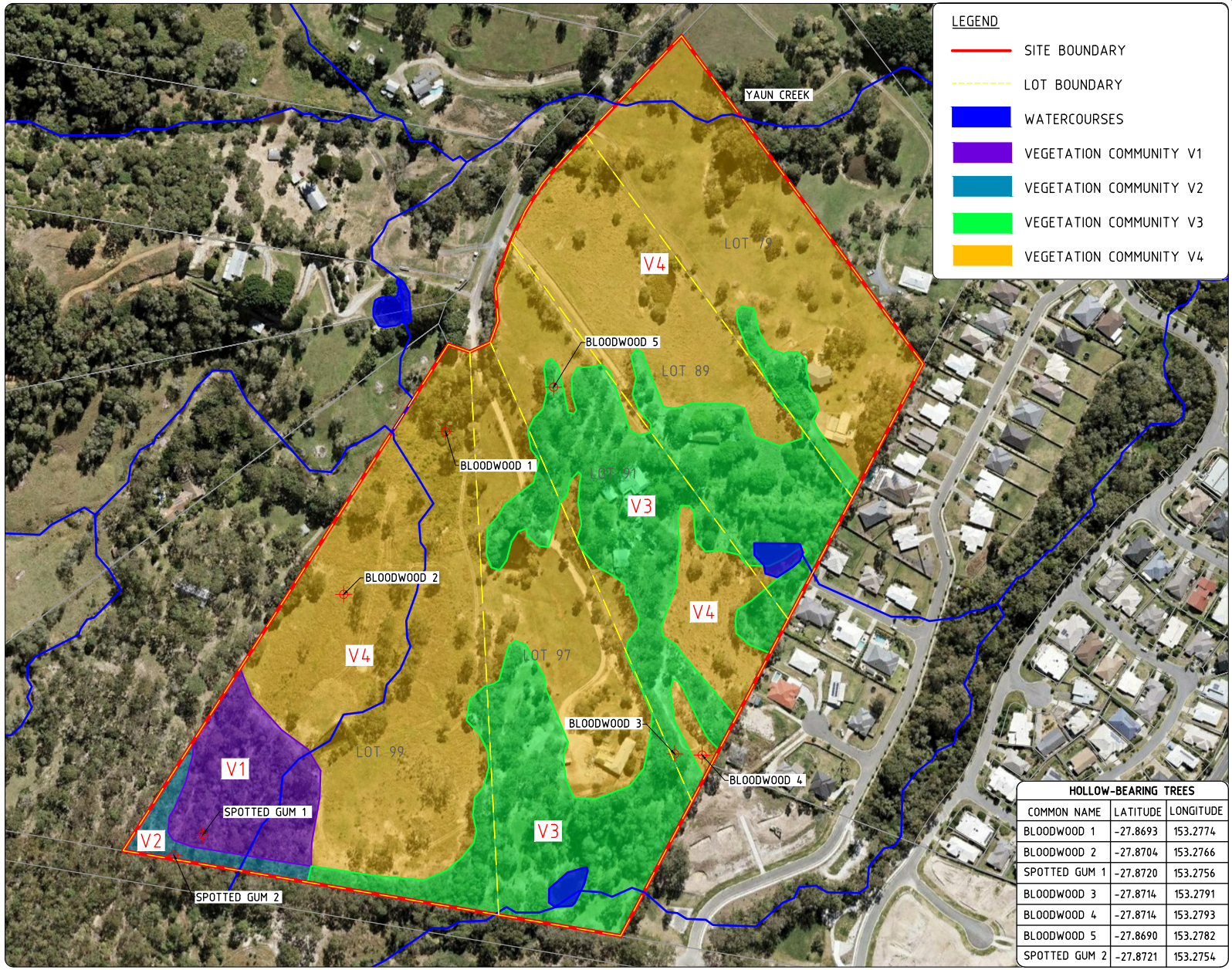
V4 covers the majority of the site and comprises introduced pasture species, copses of endemic tree species and trees associated with landscaping. Some of the largest eucalypt trees on site occur as isolated trees or within the copses.

**Hollow-bearing Trees**

Seven (7) Hollow-bearing Trees have been identified across the site as shown in the adjacent image.

**Watercourses and Drainage Features**

The site contains two main drainage lines. Yaun Creek is the primary drainage line which traverses the site's northern corner for approximately 100 m. An ephemeral drainage line, originating at the site's southern boundary, converges with Yaun Creek on the site's central western boundary.




**HOLLOW-BEARING TREES**

| COMMON NAME | LATITUDE | LONGITUDE |
|---|---|---|
| BLOODWOOD 1 | -27.8693 | 153.2774 |
| BLOODWOOD 2 | -27.8704 | 153.2766 |
| SPOTTED GUM 1 | -27.8720 | 153.2756 |
| BLOODWOOD 3 | -27.8714 | 153.2791 |
| BLOODWOOD 4 | -27.8714 | 153.2793 |
| BLOODWOOD 5 | -27.8690 | 153.2782 |
| SPOTTED GUM 2 | -27.8721 | 153.2754 |

DATE: 09.11.20
PROJECT No.: BC-16090
DRAWING No.: SRI-01
REVISION No.: B

PROJECT: STATEMENT OF REHABILITATION INTENT
DRAWING TITLE: EXISTING ECOLOGICAL FEATURES
CLIENT: GALLERY HOMES
ADDRESS: LOTS 188-192 ON RP173728
79-99 COURTNEY DRIVE, UPPER COOMERA

| DRAFTED BY: | DESIGNED BY: | CHECKED BY: | PAPER SIZE: | SCALE: |
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| TP / LD | NL | BC | A3 | 1:3000 |

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ORIGINAL SCALE BEFORE REDUCTION
30 0 30 60 90 120 150
1 : 3000 (FULL SIZE) (metres)
CERTIFIED BY
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# REHABILITATION STRATEGY

This Statement of Rehabilitation Intent (SRI) has been prepared to set out the rehabilitation approach for the open space network. It will be used as a basis upon which the detailed Rehabilitation Management Plan will be prepared.
The proposed development includes several open space areas, three of which will require rehabilitation. The rehabilitation strategy has been designed to protect and enhance ecological values.

## REHABILITATION OBJECTIVES

The fundamental rehabilitation objective is to construct an ecosystem that will be self-sustaining and resilient to environmental stress (e.g. flooding and drought).
Specific objectives of this SRI are to:

- Provide fauna habitat and movement opportunities;
- Recreate a waterway; and
- Re-establish vegetation reflective of pre-clearing regional ecosystems.

## REHABILITATION APPROACHES

Three approaches are required to achieve the rehabilitation objectives:

- Fabrication;
- Reconstruction; and
- Assisted natural regeneration.

### Fabrication

Where significant reprofiling of the land's relief is undertaken, subsequent planting is prescribed to achieve the purposes of the modified area.

### Reconstruction

Reconstruction of vegetation communities is necessary where the site is highly degraded or altered and has poor regeneration capacity (resilience). Suitable species will be planted at a density of one plant per square meter which, when established, will provide the necessary structure and seed bank to enable successful ongoing rehabilitation.

### Assisted Natural Regeneration

Assisted natural regeneration is appropriate where the native plant community is largely healthy and functioning and there is evidence of high ecosystem resilience (e.g. native seedling recruitment). The primary objective for this zone is targeted weed control, although some supplementary planting will be undertaken in disturbed areas. These areas are expected to recover with limited intervention. The control of weeds is intended to facilitate the re-establishment of endemic species via the seed bank or by other natural seed dispersal vectors. Disturbed areas greater than five square meters will be planted with suitable species at a density of one plant per square meter.

## REHABILITATION ZONES

Three rehabilitation zones have been proposed according to the approach required.

### Zone R1

Regional ecosystem 12.11.5 occurs along the fringes of the southern and western boundary with negligible weed incursion. The balance of the area comprises advanced regrowth dominated by Acacia disparrima and other species consistent with RE12.11.5 with moderate weed incursion.
Areas under canopy will require assisted natural regeneration.
Weed control will include:

- Woody and vine weeds either manually removed or treated via cut/paint or drill/inject; and
- Ground layer weeds sprayed with herbicide.

Where gaps in the canopy exceed 5 square meters, infill planting with species selected from planting schedule PS1 will occur.

### Zone R2

This restoration zone occurs along waterways. The majority of these areas are cleared of vegetation and highly disturbed.
Areas under canopy will require assisted natural regeneration. Cleared areas will require reconstruction as per planting schedule PS2 and planting module PM2.
The waterway in the south-eastern corner of the site will be piped under the roadway. A fauna underpass will be provided to enable movement corridors to be maintained.
Figure 1 shows detail of the wildlife ledge to be fitted in the fauna underpass.

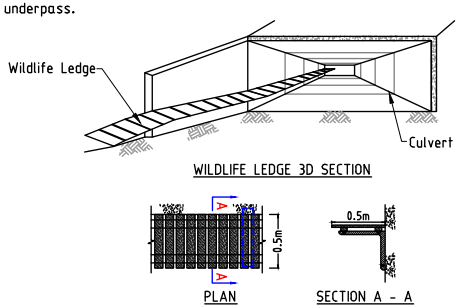



FIGURE 1: WILDLIFE LEDGE DETAIL
SCALE 1:25

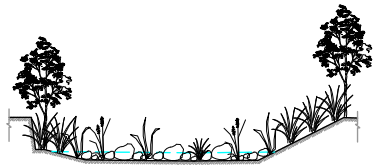


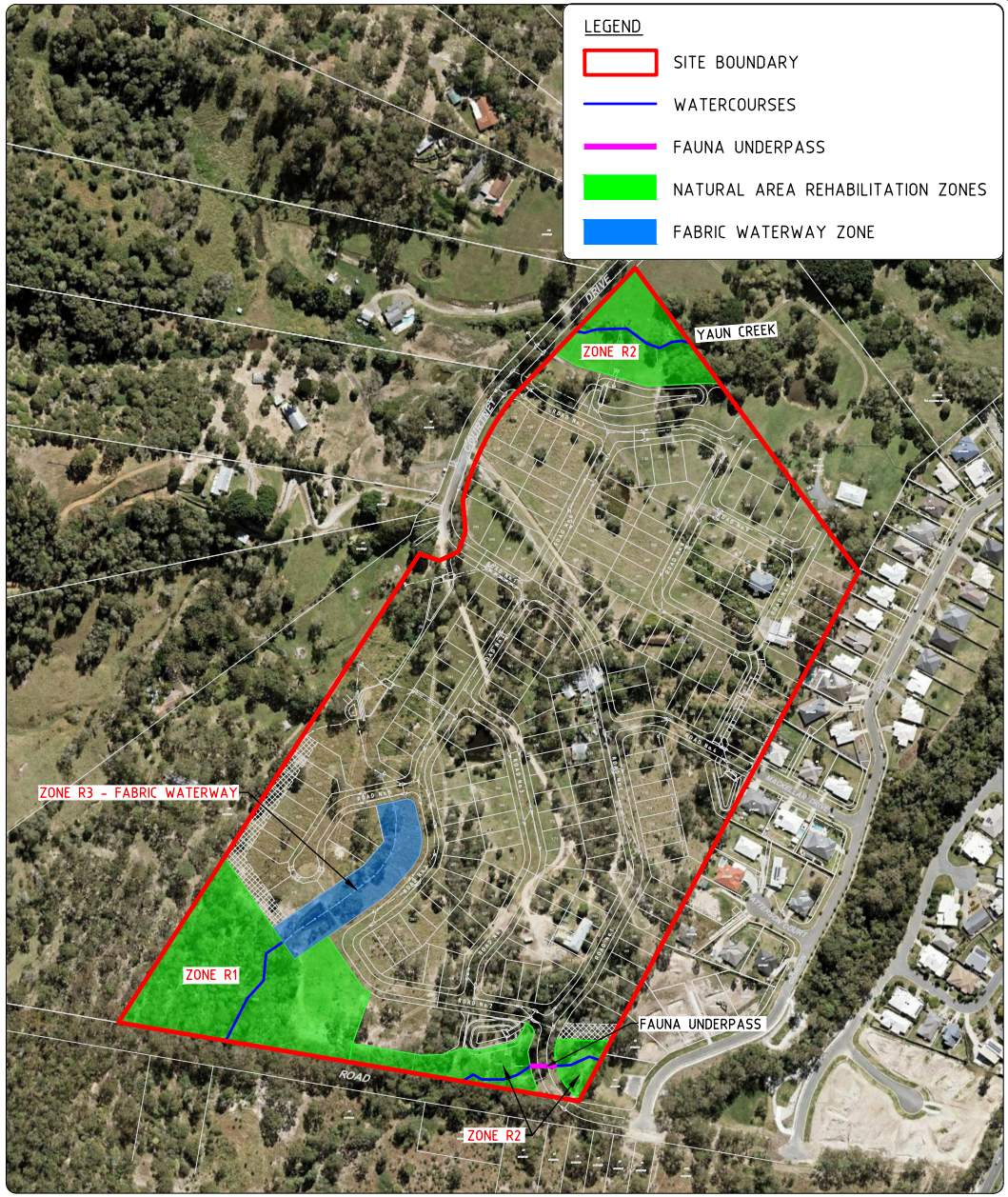
FIGURE 2: WATERWAY CROSS SECTION
SCALE 1:250

### Zone R3

This zone is a reconstructed waterway. The aim of the waterway reconstruction is to:

- Emulate a natural waterway to provide linkages from the environmental reserve to Yaun Creek; and
- Provide the required hydraulic conveyance while providing for environmental values in the channel design where possible.

Yaun Creek can be described as a depositional chain-of-ponds; relatively deep, permanent ponds are separated by bars of sediment stabilised with vegetation. These permanent ponds provide water and habitat for a range of wildlife.
The restoration objective within the realigned waterway is to recreate a depositional style chain-of-pools in a channelized stream. The restoration strategy involves creating stable pools and bars.
Bars can be created from low earthen or rock weirs that are well vegetated with appropriate species to prevent erosion. The lower embankment of the weirs should be planted with reeds or semi-aquatic vegetation. Stream verges should be revegetated for stabilising and shading. To recreate the pools, a bed of gullies can be stabilised with rock-chutes, with the crest of the chute set higher than normal. The upstream end of the pool needs to be densely vegetated.




| | |
|---|---|
| DATE | 09.11.20 |
| PROJECT No. : | BC-16090 |
| DRAWING No. : | SRI-02 |
| REVISION No. : | B |

PROJECT: STATEMENT OF REHABILITATION INTENT
DRAWING TITLE: REHABILITATION STRATEGY & REHABILITATION ZONES
CLIENT: GALLERY HOMES
ADDRESS: LOTS 188-192 ON RP173728
79-99 COURTNEY DRIVE, UPPER COOMERA

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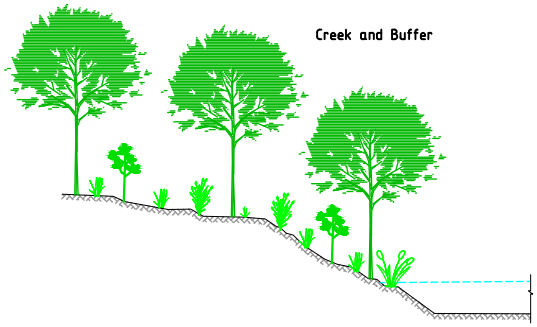
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1 : 4000 (FULL SIZE) (metres)
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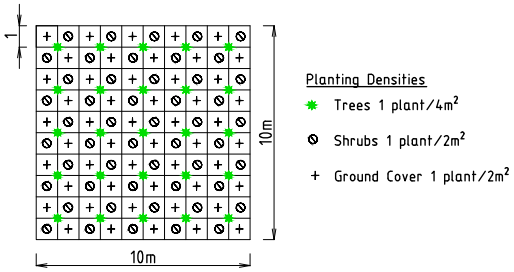
## PLANTING SCHEDULE - PS1

| Scientific Name | Common Name | Planting Density | Container Size |
|---|---|---|---|
| **Trees** | | | |
| Corymbia intermedia | Pink Bloodwood | 1 plant / 4m² | Tube |
| Eucalyptus grandis | Flooded Gum | | |
| Eucalyptus tereticornis | Queensland Blue Gum | | |
| Ficus watkinsiana | Strangler Fig | | |
| Grevillea robusta | Silky Oak | | |
| Lophostemon confertus | Brushbox | | |
| Melaleuca bracteata | River Tea Tree | | |
| Tristaniopsis laurina | Water Gum | | |
| **Small Trees/Shrubs** | | | |
| Acacia disparrima | Hickory Wattle | 1 plant / 2m² | Tube |
| Alphitonia excelsa | Red Ash | | |
| Allocasuarina littoralis | Black Sheoak | | |
| Babingtonia similis | Twiggy Myrytle | | |
| Ficus coronata | Creek Sandpaper Fig | | |
| Glochidion ferdinandi | Cheese Tree | | |
| Glochidion sumatranum | Umbrella Cheese Tree | | |
| Lophostemon suaveolens | Swamp Box | | |
| Melaleuca quinquenervia | Broad-leaved Paperbark | | |
| **Groundcovers** | | | |
| Lomandra hystrix | Creek Mat Rush | 1 plant / 2m² (along creek) | Tube |
| Lomandra longifolia | Spiny-headed Mat Rush | 1 plant / 2m² (beyond creek) | |

## PLANTING SCHEDULE - PS2

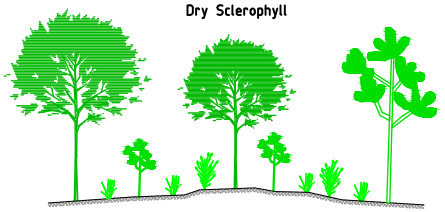
| Scientific Name | Common Name | Planting Density | Container Size |
|---|---|---|---|
| **Trees** | | | |
| Corymbia citriodora | Spotted Gum | 1 plant / 4m² | Tube |
| Corymbia intermedia | Pink Bloodwood | | |
| Eucalyptus carnea | Broad-leaved White Mahogany | | |
| Eucalyptus propinqua | Small-fruited Grey Gum | | |
| Eucalyptus siderophloia | Grey Ironbark | | |
| Eucalyptus tereticornis | Queensland Blue Gum | | |
| Lophostemon confertus | Brushbox | | |
| **Small Trees/Shrubs** | | | |
| Acacia disparrima | Hickory Wattle | 1 plant / 2m² | Tube |
| Allocasuarina littoralis | Black Sheoak | | |
| Lophostemon suaveolens | Swamp Box | | |
| Melaleuca salignus | White Bottlebrush | | |
| **Groundcovers** | | | |
| Cymbopogon refractus | Creek Mat Rush | 1 plant / 1m² | Tube |
| Imperata cylindrica | Blady Grass | | |
| Lomandra longifolia | Spiny-headed Mat Rush | | |
| Themeda triandra | Kangaroo Grass | | |

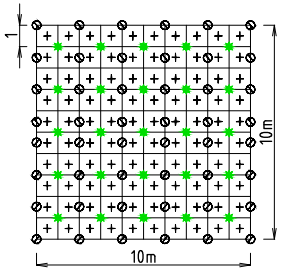



Planting Densities
- Trees 1 plant/4m²
- Shrubs 1 plant/2m²
- \+ Ground Cover 1 plant/2m²

PLANTING MODULE - PM1




Planting Densities
- Trees 1 plant/4m²
- Shrubs 1 plant/2m²
- \+ Ground Cover 1 plant/2m²

PLANTING MODULE - PM2

DATE
09.11.20

PROJECT No. :
BC-16090

DRAWING No. :
SRI-03

REVISION No. :
B

PROJECT
STATEMENT OF REHABILITATION INTENT

DRAWING TITLE
PLANTING SPECIFICATIONS

CLIENT
GALLERY HOMES

ADDRESS:
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79-99 COURTNEY DRIVE, UPPER COOMERA

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ABN 86 166 087 476

ORIGINAL SCALE BEFORE REDUCTION

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# REHABILITATION PROCEDURES

## PLANT PROCUREMENT

Local provenance tube stock is to be utilised for all restoration works involving planting. Where this is not possible due to circumstances out of the control of the applicant, Council approval must be sought.

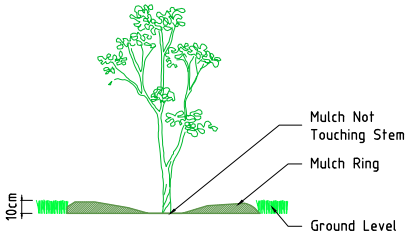
## PLANT INSTALLATION PRACTICE NOTES:

- Plants are to be vigorous, well established, hardened off, consistent with species or variety, free from disease and insect pests, with large root systems and no evidence of having been restricted or damaged;
- Plants are to be planted immediately after delivery to the planting site. If not possible, they are to be stored in the shade and watered sufficiently during the day;
- Excavate planting medium to a depth suitable for the installation of tube or pot specimens. In areas where the planting substrate is deemed to be very poor (compacted, nutrient depauperate, hydrophobic etc.) and above areas of potential frequent inundation and water flow, soil shall be suitably prepared (e.g. through use of fertilizer, and mechanical ripping where required) and enough topsoil to sustain long term plant growth shall be used;
- Pre-water plant hole if soil is dry, to decrease root stress upon planting and assess the infiltration of water through the soil;
- Incorporate into the planting substrate the appropriate quantity of prepared water crystals or other suitable hydrating product;
- Place plant into hole and backfill ensuring that the plant is upright, and the stem is not covered in any less than 10 mm or any more than 20 mm of planting medium;
- Plants are to be watered thoroughly immediately after planting (ensure deep irrigation) and thereafter as required during the construction phase of the development depending on climatic conditions. Creation of a concave hollow around the base of each plant will aid water infiltration to the plant roots;
- A complete, slow release fertiliser is recommended, and is to be administered appropriately during planting. Top dressing with slow release fertiliser is preferred to avoid toxic levels of fertiliser accumulating in the plant hole around the plant roots;
- To ensure successful establishment, all planting surfaces must be covered in either:
  - a 10 cm layer of high quality, debris and weed-free composted chip mulch (Note: to avoid possible stem rot in some 'drier' species ensure mulch is 'dished' and not covering plant stem by more than 2 cm); or
  - suitable individual anchored natural fibre weed mat (e.g. jute mat) in areas subject to high velocity flows;
- Mulched material is to be sourced from cleared vegetation if suitably seasoned;
- A long-term slow release fertiliser will be used for all plantings after initial plant establishment;
- Seedling and saplings are to be encouraged and maintained throughout the Establishment period;
- Monitoring and evaluation for site maintenance (watering, weed control, stock replacement, fertilising, managing inappropriate site access etc.) is to occur monthly for the period from October to May and bi-monthly for June to September;
- Where specimens show signs of very poor health, do not replace unless the plant is determined to be dead below ground. Many species are capable of strongly recovering from transplant stress or adjustment to site conditions. If a particular species is consistently doing poorly in certain site conditions, it is recommended to replace with an alternate species; and
- A minimum 90% survival rate must be achieved.

## SUPPLEMENTARY PLANTING

Supplementary planting should be undertaken in areas where plants have failed to thrive or where weed removal activities have resulted in site disturbance.

Supplementary planting should consider the existing species composition, for example, in areas with good canopy cover but degraded lower strata, ground cover and understory species are to form the predominant part of the revegetation planting.




MULCHING TECHNIQUE

# WEED CONTROL

The control of weeds is essential to the restoration process. The removal of invasive species reduces competition and therefore assists the germination and establishment of native species.

In areas where assisted regeneration is undertaken, weed control should be designed to reduce impacts to existing native vegetation, maintain juvenile species and retain the existing seed bank in the soil profile.

The control of weeds is to be undertaken generally in accordance with the following phases:

- Primary weed control
- Involves selective and strategic removal of weeds rather than the removal of all weed species at once to reduce erosion risks.
- Secondary weed control
- Follows the completion of primary work. This is necessary to manage the growth of weeds and regenerating natives.
- Maintenance and follow-up weed control
- On-going maintenance and follow-up weed control is essential for successful restoration works. The frequency and duration of this process shall vary according to the resilience of native vegetation, viability of weed seed in the seed bank, the proximity of weed sources and the skill level of workers.

All weed control works are to be either actively supervised or undertaken by personnel suitably qualified in botany or bush regeneration disciplines. Weed removal should be undertaken in accordance with the methodologies outlined within the South East Queensland Ecological Restoration Framework: Manual (Chenoweth EPLA and Bushland Restoration Services, 2012). Methods for removing weeds include hand, chemical or mechanical control, or a combination of these.

Specific control techniques for weeds identified on site have been provided in the Covenant Management Plan. General weed control techniques are presented as follows.

## WEED CONTROL TECHNIQUES

The following describes the current best practice methods for weed control.

### Cut-scrape-paint

This weed control method applies to all woody shrubs, trees and some vines.

- Cut plant low to the ground at an angle.
- Apply Glyphosate immediately at the rate of 1 part Glyphosate to 1.5 parts water, with a paintbrush.
- Scrape sides lightly to reveal green tissue and apply the herbicide to the scraped area.
- Take care that the brush is not contaminated with soil.
- Note - all seed that has high viability and longevity, or plants with a high invasive potential must be removed from the parent and either composted on site or removed from the site.

### Stem Injection

This weed control method applies to all woody trees and shrubs with a diameter of about six to ten centimetres or greater.

- With a tomahawk, make a cut the width of the blade, at a slight angle, into the trunk. Note - it is important not to make cuts too deep.
- Apply herbicide immediately into the cut using a tree-injecting device (if using Glyphosate, apply at the rate of 1 part Glyphosate to 1.5 parts water).
- Repeat this procedure in a brickwork pattern around the circumference of the tree, as close to the ground as possible. Where the presence of a crotch angle makes this difficult, make a cut above it. Note - two rows of cuts will be enough for trees with trunks of six to ten centimetres; larger trunk diameters will need correspondingly more.
- Treat all visible lateral roots as per dot point 1.

### Spraying

This weed control method is carried out using a backpack spray unit with a modified spray nozzle that gives a solid spray pattern. Glyphosate is the main herbicide used with the addition of a marker dye. For plants that show some resistance or where growing conditions are not optimal, an acidifying agent is added. Metsulfuron methyl can also be used for resistant species and grasses. It should be used with a surfactant.

Dilution rates for Glyphosate and Metsulfuron methyl are in accordance with the manufacturer's recommendations and any variation requires a permit from the National Registration Authority.

### Overspray

This weed control method is applicable to large, dense infestations and where it is desirable to leave the dead plants intact to prevent erosion and over-exposure of large areas, protect native seedlings from foragers such as wallabies, and avoid trampling by humans.

- Spray over the top of the infestation, using a weak solution of Glyphosate
- Any native plants that may be under the weed will be protected by the foliage cover of the weed.
- Leave the sprayed plants intact so that native seedlings can establish under the shelter provided.

Alternatively, weeds can be cut and flattened with bush-hooks or loppers and the subsequent regrowth sprayed with Glyphosate. In many cases it is preferable to overspray wherever practicable as this will cause less erosion and trampling of suppressed native plants, such as ferns and seedlings. However, handwork will be necessary to cut-scrape-paint any unsprayed weeds that surround native plants.

### Crowning

This weed control method is applicable to weeds which have their growing points below the surface of the ground (corms, bulbs, rhizomes, clumped or fibrous root systems, etc.).

- Grasp the leaves or stems and hold them tightly so that the base of the plant is visible. Plants with sharp leaves or stems should be cut back first.
- Insert the knife close to the base of the plant at a slight angle, with the tip well under the root system.
- Cut through the roots close to the base. Depending on the size of the plant, two or more cuts may be needed to sever all the roots.
- Remove the plant. Make sure that the base of the plant where the roots begin is completely removed.

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# REHABILITATION AREA MANAGEMENT

## Monitoring

Routine monitoring must be undertaken monthly. During monitoring, the rehabilitation areas are assessed for:

- New weed infestations;
- Poor health or mortality of plantings;
- Adequate mulch coverage; and
- Presence of rubbish.

## Establishment Period

Following primary weed control and plant installation, a 12-month establishment period will be undertaken. During this period, the developer is responsible for the following:

- Control of weeds
- Monthly inspections;
- Supplementary or replacement plantings as required to achieve prescribed densities;
- Monthly litter collection; and
- Irrigation as needed.

## On-Maintenance

Upon completion of the establishment period, works shall then undergo a further 12 month on-maintenance period. During this period, the developer is responsible for the following:

- Monthly progress inspections;
- Management of weeds to achieve prescribed outcomes;
- Replacement planting as required to achieve required densities; and
- Irrigation as needed.

## Performance Criteria

The following key performance criteria shall be met:

- No invasive plant species as identified under the Biosecurity Act 2014;
- Removal of a minimum of 95% of weeds;
- Achieve a minimum success rate of 90% survival rate of all installed plants
- Achieve a minimum cover of 95% in the reconstruction zone (Zone R1); and
- Removal of all temporary construction structures (if installed).

## Compliance

The developer is responsible for undertaking the rehabilitation works. The developer must provide to Council certification from a qualified professional that all works have been implemented on site and plants are established following a minimum establishment period of 12 months and on-maintenance period of 12 months. Certification is to demonstrate that all site works have been completed in accordance with applicable conditions of approval and relevant management plans.

## Rehabilitation Schedule

A summary of the rehabilitation schedule has been included in the table below.

| Rehabilitation Stage | Actions Required | Timing |
|---|---|---|
| Initial site works | Undertake primary weed control | At the commencement of rehabilitation works |
| | Revegetation in accordance with plans. This will include:<br>• soil preparation;<br>• planting;<br>• fertilising (slow release for native plants);<br>• mulching; and<br>• installation of stakes and seedling protection covers where deemed appropriate. | After primary weed control |
| Establishment period | Irrigation | Irrigation requirements will depend on rainfall.<br>Irrigation will be undertaken at a minimum every three to five days for first eight weeks depending on weather. |
| | Routine weed control | Monthly |
| | Routine management:<br>• reinstate mulch;<br>• application of fertiliser to tube stock;<br>• replacement of staked and tree guards;<br>• replace dead or dying plants; and<br>• remove rubbish. | Following inspection as required |
| | Monitoring | Monthly |
| On Maintenance period | Routine weed control | Monthly |
| | Routine management | Following inspection as required |
| | Monitoring | Monthly |

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PROJECT
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# Appendix B

# Statement of Landscape Intent