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Fitzgibbon bushland management plan

Version 2 - October 2011

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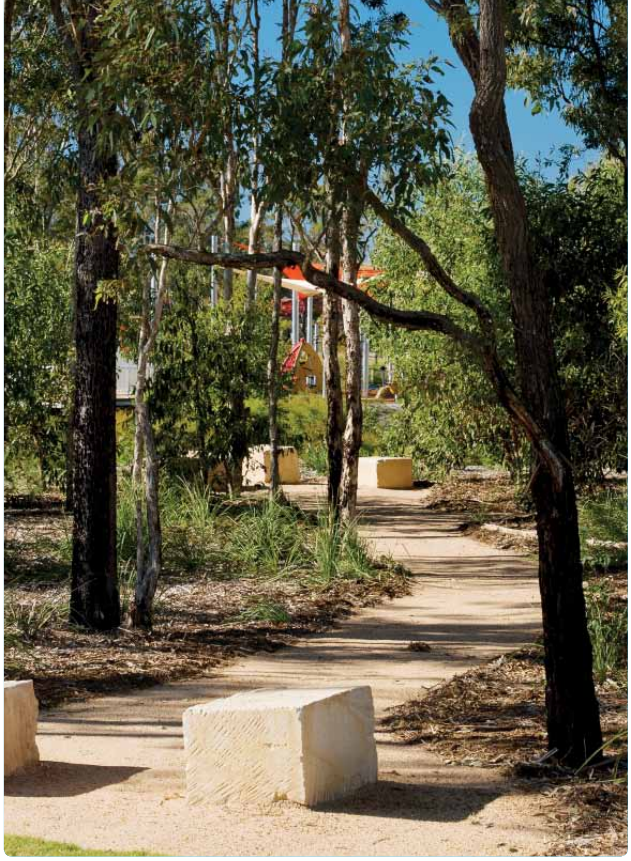
Introduction



The Fitzgibbon Bushland Management Plan (FBMP) is referenced by the Fitzgibbon Urban Development Area (UDA) Development Scheme directly and indirectly as a relevant consideration in development assessment within development Precincts 1 and 4 of the Fitzgibbon UDA.

The objectives of the FBMP are to:

- identify the environmental values within the Fitzgibbon UDA
- describe the process for the rehabilitation of the bushland and habitat areas as a result of disturbance of significant vegetation within development precincts
- describe the process for preserving and enhancing existing wildlife movement corridors
- provide criteria relating to managing the impact of roads on environmental values
- provide details of the track and trail system envisaged within the Bushland and open space zone
- provide details of fire management within the Bushland and open space zone
- provide criteria for development in the Boundary Interface Investigation Area
- provide criteria for the construction of stormwater management infrastructure within the Fitzgibbon UDA
- provide applicants with a common focus for development applications and compliance
- provide guidance on offset requirements where significant vegetation is proposed to be cleared.

The FBMP should be read in conjunction with the Fitzgibbon UDA Development Scheme, and, if applicable, the conditions of any development approval given under the *Urban Land Development Authority Act 2007*.

Development within the UDA may also be subject to other legislation, including, but not limited to:

- the *Nature Conservation Act 1992* and the (Commonwealth) *Environmental Protection and Biodiversity Conservation Act 1999* in relation to the threatened species and communities
- the *Environmental Protection Act 1994* in relation to exercising a general environmental duty and avoiding environmental harm, as defined under that legislation.

As such, applicants should contact the relevant administering authority for information about whether a permit is required before proceeding with works.

Development outcomes

The Fitzgibbon UDA Development Scheme delineates both development precincts and the Bushland and open space zone. Refer to Map 1. Reference should also be made to UDA-wide criteria 3.7 regarding Bushland/ open space planning and design and 3.11 Environment of the Fitzgibbon UDA Development Scheme.

UDA-wide development criteria outlined in section 3.7 of the Fitzgibbon UDA Development Scheme requires that bushland areas provide opportunities for habitat improvement arising from development in other parts of the Fitzgibbon UDA through the provision of vegetation and habitat offsets to improve the existing remnant vegetation and habitat areas within the bushland and open space areas.

The FBMP contributes to this by identifying the environmental values of the Fitzgibbon UDA and providing direction on how the rehabilitation opportunities should be pursued as a result of a development application. The development scheme also requires development to preserve and enhance existing fauna movement corridors and how to minimise impacts of the construction of stormwater management infrastructure and recreational activities upon environmental values.

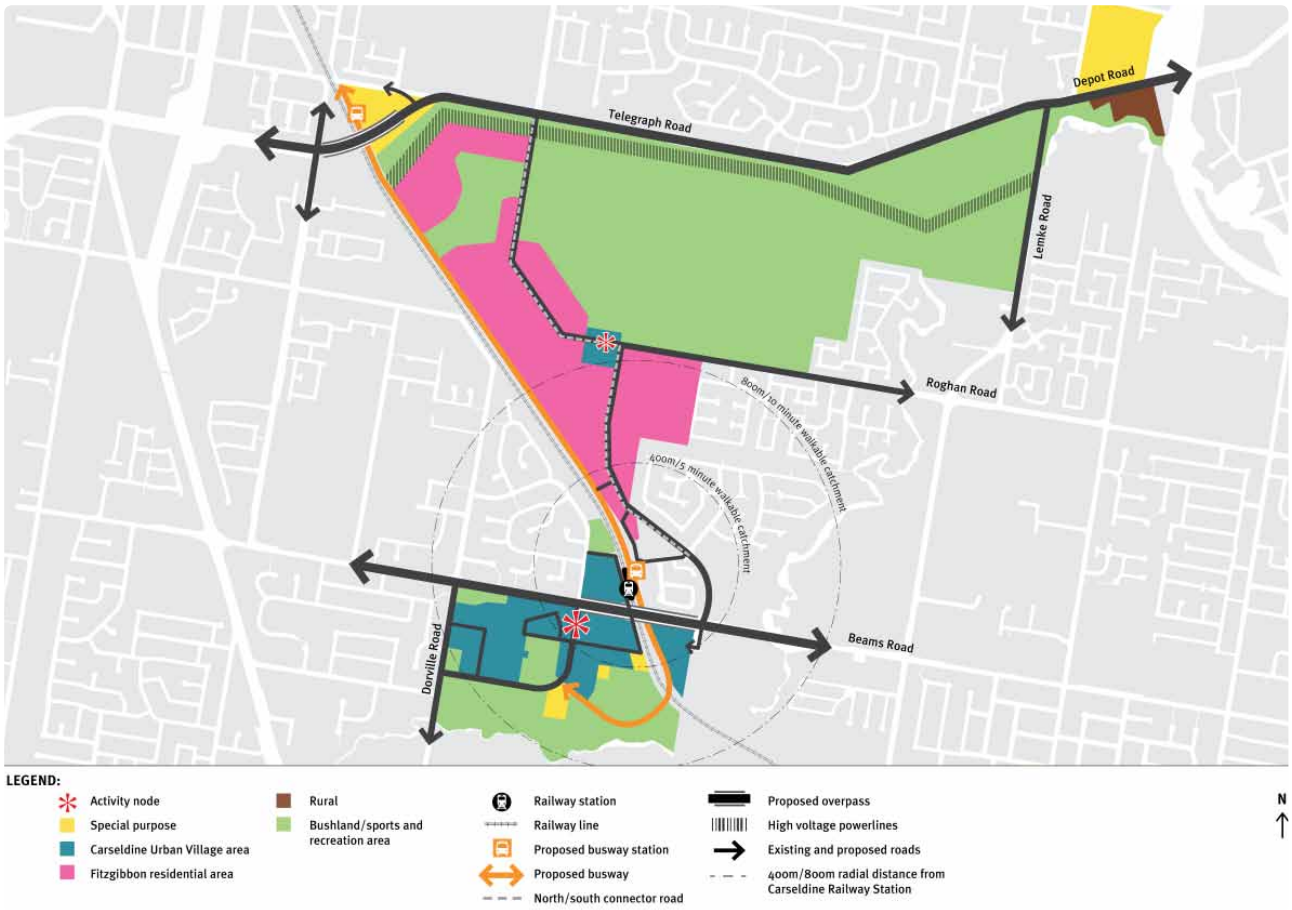
Section 3.7 also has requirements for the Bushland and open space zone to provide for community recreation, retain significant environmental values and contribute to stormwater management. With regard to community recreation, the requirements of section 3.7 of the Fitzgibbon UDA Development Scheme will be largely achieved by:

- the proposed track and trails system in the bushland and open space areas
- provision of a range of recreation settings, corridors for community paths, and attractive urban environment settings and focal points
- having a high regard to public safety and amenity
- landscaping that contributes to the bushland character and to flora and fauna habitat and fauna movement. In particular, street trees should be selected from species native and/or endemic to the Fitzgibbon UDA.

The FBMP provides criteria for developing a track and trail system within the bushland and open space areas in Precinct 1 and 4 that achieves these requirements.

Section 3.11 of the development scheme clearly states that where development results in the clearing of significant vegetation the development must rehabilitate land in the Bushland and open space zone in accordance with the FBMP.

Specific development requirements for Precincts 1 and 4 also call up the FBMP.



Map 1 - Fitzgibbon UDA Development Scheme structure plan (updated July 2011)

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Environmental values of the Fitzgibbon UDA

Introduction

The Fitzgibbon UDA has been subject to a variety of prior disturbances, including vegetation removal, recreational vehicles, weed invasion, inappropriate fire regimes, rubbish dumping and changed hydrology (flow regimes being formalised in some portions whilst other portions are subjected to increased levels of flooding). However, despite the detrimental impacts from the prior disturbances, the Fitzgibbon UDA retains some significant vegetation and landscape features that provide valuable habitat for a range of fauna species.

Details on the extent and condition of the significant flora and fauna of the Fitzgibbon UDA are contained within the Fitzgibbon Urban Development Area Flora and Fauna Habitat Assessment Report (2009) and Precinct 1: Flora and Fauna Assessment (2011) by Biodiversity Assessment and Management (BAAM) Pty Ltd. These reports can be obtained from the ULDA upon request.

Flora

The Fitzgibbon UDA contains two endangered regional ecosystems, two 'of concern' regional ecosystems and three 'least concern' regional ecosystems. The UDA also contains 'endangered' and 'of concern' high value regrowth. Details on the extent and condition of the vegetation communities in the Fitzgibbon UDA are mapped in the BAAM 2009 and 2011 reports. Refer to Map 2 which provides an overview of existing vegetation communities as at 2009.

The dominant vegetation communities within the Fitzgibbon UDA are characterised by tall open forest with canopies characterised by the presence of Forest Red Gum (*Eucalyptus tereticornis*), Broad Leaved Ironbark (*E. siderophloia*), Pink Bloodwood (*Corymbia intermedia*), Tindale's Stringybark (*E. tindaliae*) and Scribbly Gum (*E. racemosa*) with varying dominance. These communities occur on the sand plains and alluvial terraces of creek lines. Within remnant areas the canopies are generally in very good condition, providing the structural framework necessary for relatively rapid regeneration of many of the biodiversity values characteristic of equivalent pristine communities.

Narrow, linear, fringing riparian communities are dominated by emergent or canopy trees such as Forest Red Gum, Broad-leaved Ironbark and Brush Box (*Lophostemon confertus*), with associated riparian/rainforest obligates such as Foam Bark (*Jagera pseudorhus*), Murrogun (*Cryptocarya microneura*) and Jackwood (*Cryptocarya glaucescens*). The canopies of these communities are generally in good condition with only minor invasions of Camphor Laurel (*Cinnamomum camphora*).

The north west of the Fitzgibbon UDA is characterized by poorly drained and permanent wetland areas. The canopy vegetation within this area is dominated by Broad-leaved Paperbark and Forest Red Gum with sub-canopy species including Snow-in-Summer (*Melaleuca linariifolia*) and Swamp Box (*Lophostemon suaveolens*). These communities are in good condition with only minor invasions of canopy, sub-canopy and shrub weed species. The ground layers within these communities are often compromised by a proliferation of exotic grass species such as Swamp Foxtail (*Pennisetum alopecuroides*). These Melaleuca wetlands are classified as severely threatened in the Greater Brisbane area and are categorised as referable wetlands by the Department of Environment and Resource Management.

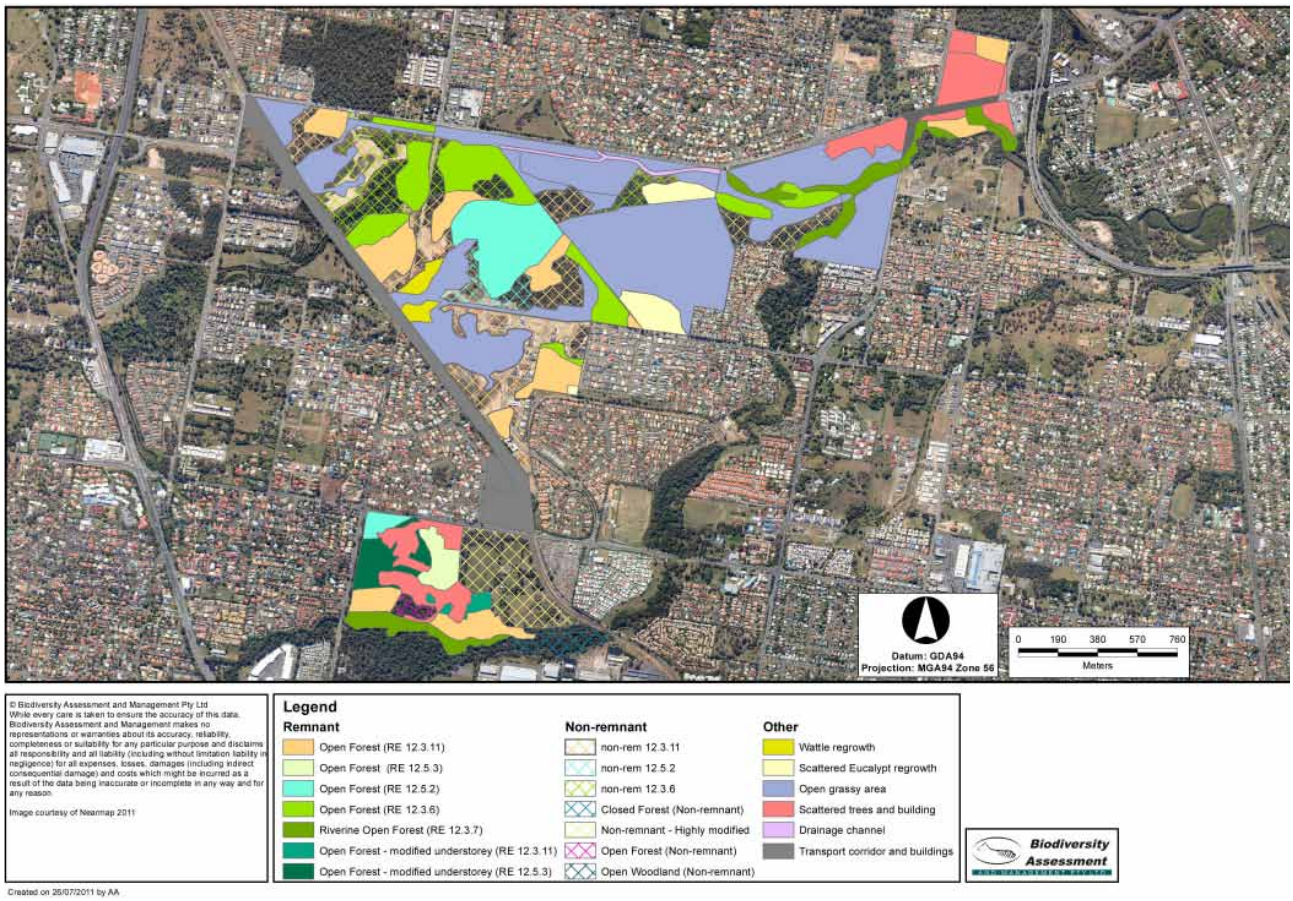
In addition, large tracts of land within the central northern portion of the Fitzgibbon UDA, which are included in the Bushland and open space zone, have been cleared or thinned by past land management practices. These areas are dominated by open grassy areas, wattle regrowth and scattered eucalypt regrowth with concomitant low native flora diversity and poor structure. These areas will benefit from revegetation and rehabilitation activities to strengthen the integrity of this core area within the UDA and ensure its long term viability.

In addition the following four species are considered to be of significance under the Brisbane City Council Natural Assets Planning Scheme Policy Schedule 3:

- *Abrus precatorius*
- *Cryptocarya microneura*
- *Eucalyptus baileyana*
- *Keraudrenia sp.* (Chermside S.T. Blake).

All known occurrences of these species are located within the Bushland and open space zone however further detailed investigations may be required. No endangered, vulnerable or rare flora species as listed under the provisions of the *Nature Conservation Act 1992* and/or the *Environment Protection and Biodiversity Conservation Act 1999* were observed within Precinct 4 of the Fitzgibbon UDA. One endangered flora species has been identified in Precinct 1 within the Cabbage Tree Creek waterway corridor.

A total of thirteen flora species declared under the provisions of Queensland's *Land Protection (Stock and Pest Route Management) Act 2002*, were found to be present within the Fitzgibbon UDA. Of these weed species Groundsel (*Baccharis halimifolia*), Singapore Daisy (*Wedelia trilobata*), Morning Glory (*Ipomea cairica*) and Lantana (*Lantana camara*) are of immediate concern within the creek lines in the northern and southern extremes of the Fitzgibbon UDA. Control of Guinea grass (*Megthyrsus maximus*) within regenerating eucalypt communities will enhance potential regeneration. Refer to Appendix 1 for a list of the weed species within the Fitzgibbon UDA that require management.



Map 2 - Significant vegetation communities

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Fauna

Three fauna species considered to be Endangered, Vulnerable or Rare under legislation were recorded within the Fitzgibbon UDA. These species were:

- Grey-headed Flying-fox (*Pteropus poliocephalus*) (*Environment Protection and Biodiversity Conservation Act 1999*)
- Tusked Frog (*Adelotus brevis*) (*Nature Conservation Act 1992*)
- Grey Goshawk (*Accipiter novaehollandiae*) (*Nature Conservation Act 1992*).

In addition, a population of the locally significant Squirrel Glider (*Petaurus norfolciensis*) was observed within the Fitzgibbon UDA. This species is well known within habitats where there are abundant hollow-bearing trees and food resources for the species both within the Fitzgibbon UDA and within surrounding bushland habitats.

The significant vegetation is also classified as koala habitat though the area is not identified as such under the South East Queensland Regional Plan. Investigations concluded that no koalas are living within the area although they may occasionally traverse the Fitzgibbon UDA.

Of the significant species known from within the Fitzgibbon UDA, only the Grey-headed Flying Fox, listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Vulnerable) was observed in a small area along Cabbage Tree Creek. Any activities that are predicted to impact on this species should be avoided. If any major works are to be undertaken in close proximity to the Flying-fox camp, referral of the proposed actions to the Commonwealth Department of Environment and Heritage under the *Environment Protection and Biodiversity Conservation Act 1999* may be warranted.

The majority of the core habitat for the Grey Goshawk and Squirrel Glider is retained within the Bushland and open space zone.

The feral terrestrial vertebrate species noted in the Fitzgibbon UDA and from database searches are:

- *Bufo marinus* - Cane Toad
- *Rattus rattus* - Black Rat
- *Mus musculus* - House Mouse
- *Lepus capensis* - European Hare.

All of these species are considered as non-declared animals under the *Lands Protection (Pest and Stock Route Management) Act 2002*. Under that Act, non-declared animal's are 'non-native mammals, reptiles or amphibians that are widespread but have minimal negative commercial, environmental or social impacts; and/or there are no cost effective, broad-scale control measures available'. None of these species is unexpected and all are commonly found in south-east Queensland.

Fitzgibbon Core Biodiversity Network

The Fitzgibbon Core Biodiversity Network (FCBN) spatially defines the priority ecological values of the Fitzgibbon UDA and includes core habitat areas and linkages that maximise conservation of priority areas and the maintenance of populations of extant species considered significant. The FCBN contains between 80 and 100 per cent of the area's endangered and 'of concern' regional ecosystems with nearly 100 per cent of wetland communities being incorporated. There are also approximately 30ha within the FCBN that require some form of revegetation or rehabilitation in order to perform their desired ecological functions.

More than 70ha is retained by the development scheme in the Bushland and open space zone. Refer to Map 1 for the extent of the Bushland and open space zone. The development scheme also requires development to retain significant vegetation, where possible, within development areas.

Waterway and wetland values

Cabbage Tree Creek forms the southern boundary of the Fitzgibbon UDA with two tributaries of this creek traversing the northern and southern portion of the UDA. Although showing varying levels of human disturbance, this creek and its tributaries provide important habitats for riparian vegetation and aquatic and terrestrial fauna.

The northern tributary is known as the Carseldine Drain which for most of its journey though the Fitzgibbon UDA is constricted to a man made channel just south of Telegraph Road. It enters the UDA through a culvert under the North Coast Rail line on the western edge of the UDA. Water quickly spreads out across the north west of the UDA occupying a wide flood plain before being channelled between and around two old land-fill sites. Towards the eastern portion of the site the channel regains a more natural condition before it joins Cabbage Tree Creek.

Another tributary is known as Fitzgibbon Drain and flows under the North Coast Rail line on the western edge of the Fitzgibbon UDA near Carseldine Station. This flow path is a man made drain with limited environmental values, but it forms a vital role in site drainage and stormwater management for the central portion of the site.

The northern portion of the Fitzgibbon UDA serviced by Carseldine Drain contains regional ecosystems 12.3.6 and 12.3.7 which are representative of wetland communities. The dominant wetland community within the Fitzgibbon UDA is Broad-leaved Paperbark (*Melaleuca quinquenervia*) Open Forest (analogous with regional ecosystem 12.3.6). This community is in good condition with no signs of die-back from too frequent or deep flooding events.

Smaller areas of in-frequently flooded Forest Red Gum (*Eucalyptus tereticornis*), Weeping Bottlebrush (*Callistemon viminalis*) and River She-oak (*Casuarina cunninghamiana*) Open Forest fringe the Cabbage Tree Creek tributary along the southern margins of the Fitzgibbon UDA. As a wetland community this vegetation type acts as a buffer to water quality within the Cabbage Tree Creek system. Its floristic make-up is driven by increased access to water and nutrients from flooding events and access to groundwater. The distribution of wetland areas as represented by regional ecosystems 12.3.6 and 12.3.7 within the Fitzgibbon UDA are displayed in Map 2.

Water quality and quantity

The majority of the water flowing through and across the site is stormwater from urbanised areas upstream. Despite this a 2000 report from the Environmental Protection Agency (EPA) (A city-wide assessment of water quality in Brisbane's creeks October 1999-April 2000, EPA) found that water quality in the Cabbage Tree Creek was very good. No measurements were taken of water quality within Carseldine Drain but it can be assumed that owing to the stormwater control mechanism within Boxwood Place Park and filtration through the wetland areas of the Fitzgibbon UDA, water quality would also be good to very good prior to the water reaching the landfill area. No water quality measurements have been taken from Fitzgibbon Drain.

The quantity of water flowing through the Fitzgibbon UDA has significantly contributed to the environmental values of the area. However the land has to cope with stormwater from a number of urbanised catchments up stream of the site. Opportunities to undertake stormwater harvesting and thereby minimise external water impacts have been investigated are currently being implemented with development in the UDA.

Development and significant vegetation

Fitzgibbon UDA Development Scheme requirement - section 3.11

Where significant vegetation exists in precincts identified for development, vegetation should be retained where possible along streets and within parks.

Where significant vegetation is cleared, development will be required to rehabilitate land in the Bushland and open space zone in accordance with the Fitzgibbon Bushland Management Plan (FBMP) prepared by the ULDA.

Significant vegetation is defined by the Development Scheme but is expanded upon in this section. This section also describes the requirements for rehabilitation activities as part of a development application.

Significant vegetation

The Fitzgibbon UDA Development Scheme defines significant vegetation as vegetation whether living or dead including their root zone as:

- all plants within the bed and banks of Cabbage Tree Creek
- vegetation included in regional ecosystem 12.5.2 remnant and non remnant
- vegetation included in regional ecosystem 12.5.3 remnant and non remnant
- vegetation included in regional ecosystem 12.3.11 remnant and non remnant
- vegetation included in regional ecosystem 12.3.6 remnant and non remnant
- vegetation included in regional ecosystem 12.3.7 remnant and non remnant
- all other trees with a diameter of equal to or greater than 60cm measured at 1 metre above the ground level.

The root zone of the soil and roots is described in area by the vertical projection of the foliage limit of the tree, to the depth of 1 metre and including buttress roots on and above the soil surface. Significant vegetation does not include species listed by the ULDA as pest vegetation.

Rehabilitation requirements

Rehabilitation activities within the Bushland and open space zone will consist of the following where relevant:

- removal of weed species in a way that avoids disturbance to significant vegetation
- planting of areas of established high flora values with under-storey vegetation suitable for that community with a particular emphasis on food species for Squirrel Gliders
- planting of areas that have low habitat values, e.g. grassy areas or areas with scattered trees, with vegetation necessary to re-establish the relevant regional ecosystem more quickly than would occur naturally
- identification and enhancement of habitats for all affected species but primarily for selected significant species being the Tusked Frog and Squirrel Glider
- placement of mature native timber logs felled from the proposed development areas within the retained bushland areas to provide microhabitat for small terrestrial species
- use of coarse debris throughout the bushland areas to assist in habitat creation and weed species control
- be consistent with the ongoing role of fire in maintaining ecosystem health. Refer also to section titled: Fire management for further detail
- maintaining and enhancing movement corridors through rehabilitation of vegetation and provision of infrastructure such as fauna under passes, glider poles and nest boxes. Refer also to section titled: Wildlife movement corridors

- minimisation of light impacts from development and roads upon habitat and movement corridors. Refer to Boundary Interface Investigation Area (BIIA)
- planting of fire buffer areas with low fire risk native species to restrict entrance and control weeds
- mechanisms to exclude motor vehicles except for maintenance and emergency purposes
- the alteration of ground and surface water dynamics due to filling within the floodplain should not adversely affect the existing wetland communities. Flood and groundwater modelling should be used establish the appropriate hydrological regimes needed to maintain and enhance wetlands and associated vegetation communities. Controlled release of waters into regenerating wetland systems is required for seedling establishment as is protection of seedlings from grazing by fauna, especially waterfowl. Information on wetland management can be found at http://www.epa.qld.gov.au/wetlandinfo/site/ManagementTools.html
- wet areas that are not classified as wetland areas should be drained or filled to prevent ponding to minimise biting insect breeding areas. Activities are to be conducted with minimal impact on other environmental values.

Rehabilitation ratios

Development that results in the loss of significant vegetation Map 2 required to rehabilitate existing vegetation and habitat values in accordance with the ratios set out in Table 1.

Developers may not be required to undertake extensive flora and fauna surveys of their sites where sufficient information is available but will be expected to provide sufficient detail to map at an appropriate scale the presence of significant vegetation as per Map 2. Also note that the area to be rehabilitated is to be calculated based upon the area occupied by the root zone of the significant vegetation as defined above.

Developers are encouraged to liase early in the formulation of proposals particularly where remnant regional ecosystems or individual significant trees are present.

Table 1 - Rehabilitation ratios

Significiant vegetation	Ratio of area to be rehabilitated to that lost
Remnant regional ecosystems 12.3.6, 12.3.7, 12.3.11, 12.5.2 and 12.5.3	2 for 1 by area*
Non-remnant regional ecosystems 12.3.6, 12.3.7, 12.3.11, 12.5.2 and 12.5.3	1 for 1 by area
All plants within the bed and banks of Cabbage Tree Creek	1 for 1 by area
All trees with a diameter of equal to or greater than 60cm measured at 1metre above the ground level	3 for 1 by number

* Within Precinct 1 a minimum of 50 per cent of the offset area is to include revegetation and rehabilitation of non-remnant vegetation.

Development requirements

To demonstrate compliance with the rehabilitation requirements of the Fitzgibbon UDA Development Scheme and the FBMP, applicants should develop a Flora and Fauna Management Plan (FFMP) where the broad scale mapping indicates the presence of significant vegetation in development areas.

The FFMP is to be provided as part of a development application and is to integrate responsible management of the site's remaining environmental values with the enhancement and rehabilitation actions in specified bushland areas of the Bushland and open space zone. The FFMP is to be written and certified by a suitably qualified professional and should include but not be limited to:

- identification of project management responsibilities
- location and description of all vegetation to be retained and that is to be removed including appropriate maps and area calculations
- provide a tree retention plan identifying the trees to be retained, i.e. the extent of works
- measures used to protect retained vegetation including individual trees and specific habitat trees
- measures to manage habitat loss and fauna within areas to be disturbed, i.e. sequential clearing practices and use of Department of Environment and Resource Management (DERM) certified fauna spotter/ catchers
- specify the detailed requirements to achieve the rehabilitation outcomes in the Bushland and open space zone in accordance with this FBMP.

Applicants will discuss with the ULDA what area in the Bushland and open space zone for their enhancement and rehabilitation activities as part of the pre-lodgement discussions through the development approval process.

Rehabilitation activities are to be undertaken prior to commencement of development activities. Where this is not possible developers will be required to undertake habitat enhancement in the existing bushland areas by:

- providing nest boxes for variety of species half of which to be for squirrel gliders at the ratio of one box for every hectare of vegetation cleared
- nest boxes to be placed in across the retained Bushland and open space zone in appropriate areas and
- a monitoring program initiated with inspections occurring at 6 months, 1 year and 2 years after installation.

Additional requirements in Precinct 1

As indicated in Table 1, within Precinct 1, a maximum of 50 per cent of the offset ratio, can involve rehabilitation of existing remnant areas.

In addition, where mapped remnant vegetation is proposed to be cleared for development or infrastructure within Precinct 1, rehabilitation and revegetation activities will focus on following in order of priority:

- non-remnant vegetation within the Cabbage Tree Creek corridor and its habitat and wildlife movement corridor values within Precinct 1
- remnant vegetation within the Cabbage Tree Creek corridor and its habitat and wildlife movement corridor values within Precinct 1
- the Cabbage Tree Creek corridor and its habitat and wildlife movement corridor values adjacent/ to the south of Precinct 1 in consultation with land owners and by agreement
- non-remnant vegetation in other Bushland and open space zoned areas or civic and open space areas within the UDA (i.e. within Precinct 4 or 6)

Wildlife movement corridors

Introduction

Currently, connectivity of fauna movement is constrained by the presence of a railway, roadways and urban development in areas bracketing the Fitzgibbon UDA. However, volant species such as bats and birds are able to freely traverse most of the habitats within the Fitzgibbon UDA. The presence of Beams Road through the UDA also forms a significant barrier to safe movement for the species from the vegetation to the south of Beams Road to the remainder of the UDA.

Nevertheless several functional movement corridors exist within the Fitzgibbon UDA leading to external areas. Refer to Map 3.

Wildlife movement options could be improved for non-volant species within the Fitzgibbon UDA (e.g. Squirrel Gliders) by:

- revegetating crossing areas as close as feasible to existing infrastructure
- installing 'fauna-friendly' crossing infrastructure to encourage dispersal at crossings (e.g. glider poles, rope bridges)
- installing nest-boxes and glider poles along corridors that currently lack tree hollows.

Fitzgibbon UDA Development Scheme requirements - Precincts 1 and 4

Bushland and open space corridors and habitat have a strong connection with existing corridors and habitat beyond the UDA, and are maintained across streets and roads within the precinct.

Precinct 1

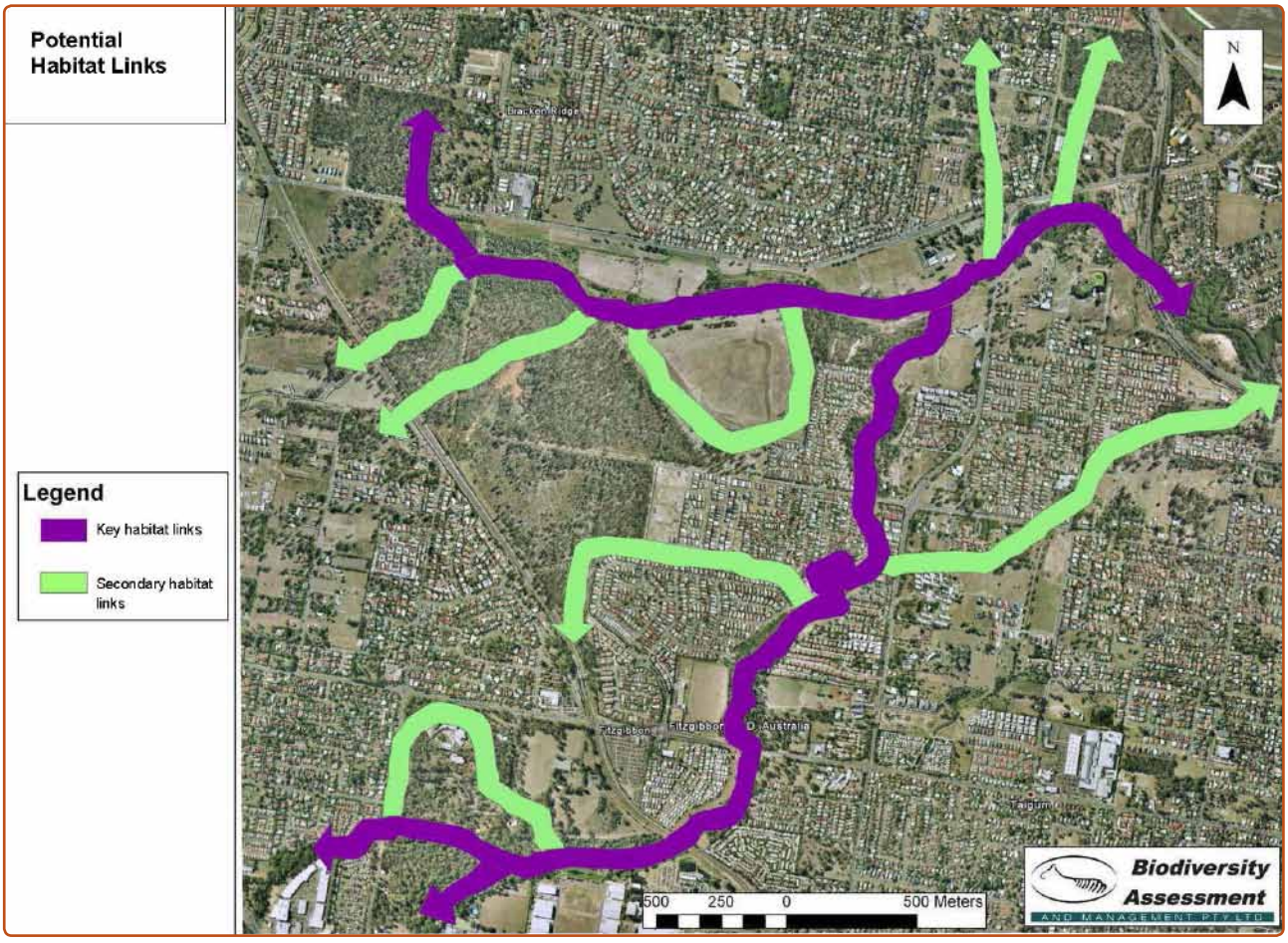
Development will contribute to the provision of fauna movement infrastructure, e.g. across Dorville Road and the new internal road/proposed busway.

Precinct 4

A north/south squirrel glider and other fauna movement corridor is provided in the north of the precinct. The fauna movement corridor is a minimum of 30m wide and contains infrastructure to assist fauna movements to link to future fauna movement infrastructure. The corridor is replanted with squirrel glider habitat species.

An east/west squirrel glider and other fauna movement corridor is provided across the north/south connector road. The corridor is a minimum of 50m wide and links the two bushland areas either side of the north/south connector road.

This section describes these corridors and the requirements for provision and enhancement of the corridors to enable them to fulfil their function.



Map 3 - Wildlife movement corridors

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Development requirements

Development will be required to contribute to the improvement of fauna movement corridors within, across and out of the Fitzgibbon UDA. Applicants will be informed of the works required or areas for enhancement as part of the pre-lodgement discussions through the development approval process. Fauna movement corridors are to be undertaken prior to commencement of development activities and this will be a condition of development approval.

Table 2 provides the links between development precincts and the required corridor enhancement activities.

Table 2 - Wildlife movement corridors

Development precinct	Corridor	Corridor requirements
Precinct 1	North south movement over the proposed east west road/busway	» Retain suitable trees on either side as launching platforms. » If suitable trees are not present, install glider poles or a rope ladder. » Nest boxes to be installed in the trees or poles close to the desired launch points. » Corridor is to be a minimum of 50m wide. » Lighting impacts to be minimised.
	Movement along Cabbage Tree Creek at Dorville Road	» Retain suitable trees on either side as launching platforms. » If suitable trees are not present, install glider poles or a rope ladder or move the power lines under ground at or near the bridge. » Nest boxes to be installed in the trees or poles close to the desired launch points. » Corridor is to be a minimum of 50m wide. » Lighting impacts to be minimised.
	Movement along Cabbage Tree Creek under rail line culverts	» Revegetation of cleared area with low growing tree species. » Install nest boxes either side of the bridge. » Removing weed infestation and install short glider poles under the bridge. » Lighting impacts to be minimised.
Precinct 4	Linking the north south drainage corridor to the bushland and open space area to the north of the Roghan Road extension	» Retain suitable trees on either side as launching platforms. » If suitable trees are not present, install glider poles or a rope ladder. » Nest boxes to be installed in the trees or poles close to the desired launch points. » Corridor is to be a minimum of 50m wide. » Lighting impacts to be minimised.

Development precinct	Corridor	Corridor requirements
Precinct 4	Over and under the north south connector road	» Retain suitable trees on either side as launching platforms. » If suitable trees are not present, install glider poles or a rope ladder. » Nest boxes to be installed in the trees or poles close to the desired launch points. » Corridor is to be a minimum of 50m wide. » Road to be designed to facilitate other fauna movement under the road consistent with current best practice (see section titled: Management of impacts upon environmental values arising from road construction). » Lighting impacts to be minimised.
	North south corridor linking the Bushland and open space zone with the power line corridor to the north	» Corridor width to be a minimum of 30m. » Existing trees should be retained where possible. If trees can not be retained install glider poles. » Corridor to be replanted with feed trees for gliders to increase habitat and improve movement security. » Nest boxes to be installed within the bushland area to the south and along the corridor. » The corridor is to lead to another to be built across the power line corridor to the north. » Nest boxes to also be placed along Telegraph Road until such time as the road is upgraded by Brisbane City Council (BCC). » Lighting impacts to be minimised.
	Retaining the potential for movement east west to and from Boxwood Place Park	» Retain existing vegetation where possible close to the transport corridor. » Movement should not be encouraged until further work has been undertaken in conjunction with BCC. » Lighting impacts to be minimised.

Nest boxes

Nest boxes to be provided and tailored for a variety of species. Squirrel Gliders prefer rear-entry nest boxes (i.e. entrance directed towards the trunk of the tree). Their nest boxes should be positioned at least 4m high and in various aspects from north through to south depending on habitat characteristics (e.g. slope, aspect and vegetation), so boxes are not in direct sunlight for long periods during the hottest months of the year. Medium sized boxes (0.008 m3) should be used - 40 x 14.5 x 14cm with a 45cm diameter entrance hole. Nest boxes should be constructed of plywood and painted on the outside to improve longevity. Either rubber tubing or crimped wire should be used to attach the box to allow growth of the tree.

Tree or pole height requirements

For a 2 lane road (equivalent to a 20m gap) requires trees on both sides to be at least 13m high. A 4 lane road (43m gap) requires trees at least 25m high. Where trees are absent, 12m high wooden poles could be installed, requiring some in the median strip of four-lane roads.

Lighting impacts

Development near bushland and open space areas is designed to avoid the use of extensive bright lighting. Where high levels of lighting are required the use of directional lighting or shade barriers are to be used. Refer to *AS-4282: 1997 Control of the obtrusive effects of outdoor lighting for further guidance*.

Management of road construction impacts

Introduction

There are two points at which major roads will have an impact upon environmental values within the Bushland and open space zone. They are:

- north/south connector road in Precinct 4
- the new road off Dorville Road that will be part of the busway network in Precinct 1.

The environmental values that may be impacted by road design and construction are:

- significant vegetation and other significant individual habitat trees
- habitat for significant species
- management of water flows and erosion and sediment control.

Significant vegetation and habitat

The north/south connector road comes off the Norris and Telegraph Road intersection and runs south across the low lying area associated with Carseldine Drain before reaching the higher ground to the south. This low-lying area contains significant vegetation, i.e. upon regional ecosystems 12.3.6, 12.3.11, and other significant individual habitat trees.

The new road off Dorville Road runs east to west to the south of the existing buildings associated with the Queensland University of Technology. This area has significant vegetation, i.e. regional ecosystem 12.5.3, 12.3.11 and other significant individual habitat trees.

Development requirements

Construction and design of roads are to:

- minimise impacts upon significant vegetation
- avoid destruction of specific habitat for the Squirrel Glider and Grey Goshawk and wetland habitat suitable for the Tusk Frog
- permit fauna movement over and under the road in accordance with recommended practice. Refer also to section titled: Wildlife movement corridors for further detail.

Recommended practice - the Department of Transport and Main Roads has guidelines for fauna mitigation measures for all projects, according to the level of risk to species and populations. Fauna mitigation can be achieved, in most cases, by:

- reducing clearing
- revegetating or restoring habitat of fauna corridors
- preserving hollow trees, translocating fauna hollows or installing manufactured tree hollows and nest boxes within the road reserve
- incorporating fauna-sensitive road design principles
- installing fauna exclusion fencing
- installing significant environmental area signage and other fauna signage.

Fitzgibbon UDA Development Scheme requirements - Precincts 1 and 4
The north/south connector road is designed to minimise impacts upon significant vegetation including habitat trees, hydrology and wetlands. While the above development requirement is specific to Precinct 4, section 3.11 of the Fitzgibbon UDA Development Scheme also covers development impacting upon significant vegetation. Therefore this section describes how to achieve all the environmental related development requirements for roads constructed in or adjacent to bushland and open space areas.

The Department of Transport and Main Roads guideline Fauna Sensitive Road Design (Vol 1 and Vol 2), can be used to manage the impact of roads upon fauna habitat and movement.

Construction and design of the road is to:

- maintain flow regimes so that significant vegetation and the overall ecosystem on both sides of the proposed road are maintained or enhanced
- develop and implement an erosion and sediment control plan in accordance with recommended practice.

Recommended practice - the Department of Transport and Main Roads has developed a Road Drainage Design Manual which can be consulted when addressing erosion and sediment control.

Water values

These major roads are to be built above the 100 year Annual Recurrence Interval flood level (flood level information is available from the ULDA upon request) allowing normal and flood flows under the roads where required. Bridge and culvert design is to facilitate water flows to minimise flooding impacts and contribute to retention of flora communities through management of water flows and levels. Additionally, the loss of soil from a construction site can result in sediment deposition and suspension in water bodies which results in impacts on water quality and aquatic life.

Tracks and trails

Introduction

While the primary purpose of the Bushland and open space zone is to retain environmental values it is recognised that surrounding and new residents see this land as having significant open space amenity for the area. Current uses include horse and motor bike riding, off road driving, mountain biking and walking. As there are no official trails within the area, these activities are resulting in soil degradation and weed infestation which adversely impact upon the area's environmental values.

The development of areas within the Fitzgibbon UDA provides an opportunity to formalise access and low impact recreation uses within the bushland and open space areas. The preferred uses will be walking, running and bike riding on specific formalised tracks. Motor vehicles, except for fire management, maintenance and emergency purposes, will be excluded from the bushland areas. Horse access will be prohibited within Precincts 1 and 4.

Tracks and trails network

The ULDA has developed a preferred tracks and trails design in conjunction with BCC to seamlessly integrate the new trail system into the larger Brisbane based trail network.

The desired track network is depicted in Map 4 and has been designed in accordance with the following:

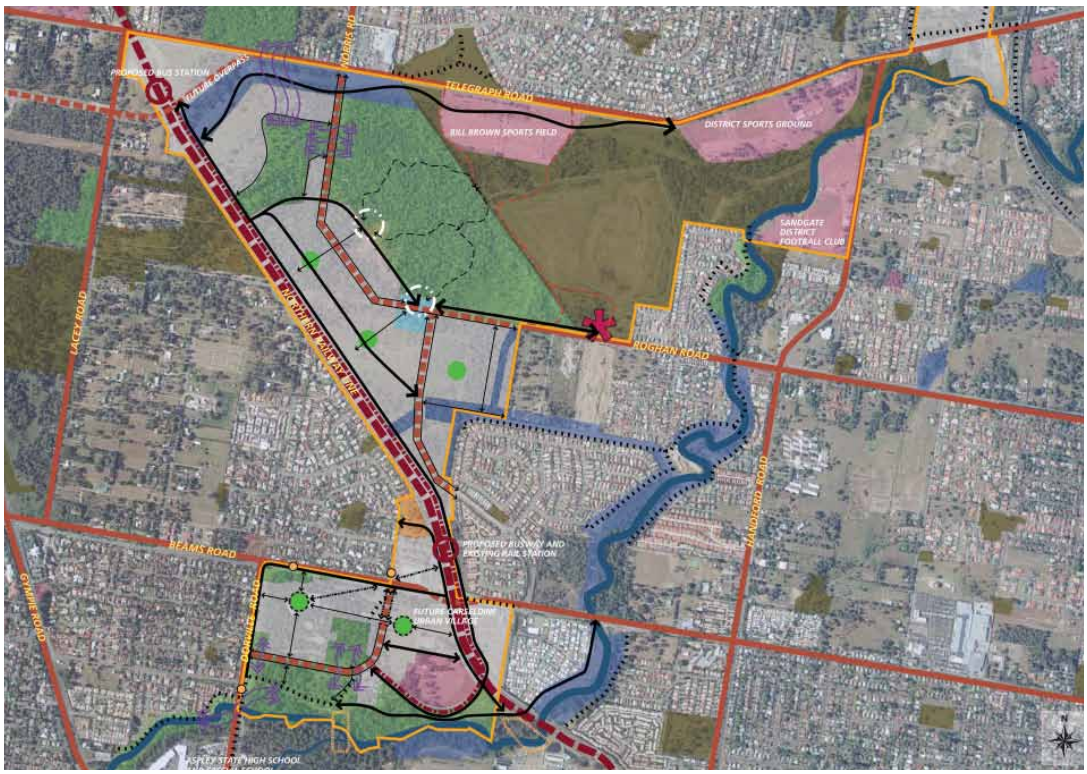
- achieving the bushland and open space outcomes as expressed by section 3.7 and Precincts 1 and 4 of the Fitzgibbon UDA Development Scheme
- linking with the existing and proposed cycling and walking network to be delivered by BCC in the surrounding area
- providing some component of wheel chair accessible experience
- preserving the environmental values in the Bushland and open space zone (including but not limited to habitat for squirrel gliders)
- including suitable interpretation/educational measures to enhance the proposed network.

The network includes a landscape and open space plan for the area associated with the proposed neighbourhood centre in the Fitzgibbon UDA. This area will include a community facility building, car parking, open space area and a focal point for the proposed walking track network. Details of the preferred tracks and trails network can be found in the Fitzgibbon Urban Development Area - Open Space and Trails Network by Place Design Group PTY LTD, 2009 and the updated plan (2011).

Development requirements

The ULDA will fund construction of the tracks and trails network and development will be expected to contribute to the cost of construction through an infrastructure charge/ credit.

The area of disturbance associated with tracks and trails including the path and shoulder clearances should be minimised and should not be greater than 10m. Where possible and practicable tracks and trails should follow or utilise existing informal pathways, shared paths or firebreaks.



Map 4 - Track and trail network (updated 2011)

This map is produced for illustration purposes only and unless stated is not to scale

Fire management

Fitzgibbon UDA Development Scheme requirements - Precincts 1 and 4
A publicly accessible edge is to be provided at the interface between bushland and open spaces and other urban uses. Where required for bushfire or other emergency vehicle access, 100 per cent of the bushland/open space interface should be roads or streets. In all other instances, at least 50 per cent of the length of the open space interface shall be roads or streets, with the remaining public edge comprising pedestrian/cyclist ways. This section provides details on how to achieve this requirement.

Introduction

A significant amount of development in the Fitzgibbon UDA abuts the Bushland and open space zone. While the risk of a significant bushfire is low the existing fire hazard needs to be managed. The main area of concern for bushfire is on the sloping areas associated with vegetation of the regional ecosystem 12.5.2 and 12.5.3. In recognition of this risk the ULDA commissioned a Fire Management Strategy (FMS) for the Bushland and open space zone and will undertake actions to mange this risk.

The FMS has identified the bushland adjacent to the identified development areas has a fire hazard rating of 7 which constitutes a medium hazard, refer Map 5. This rating requires specific requirements in order to minimize the bushfire risk on development, see Appendix 2.

Development requirements

Development abutting the Bushland and open space zone is designed to address the fire management requirements of the development scheme section 3.7. There are three areas where development precincts are adjacent to hazardous vegetation that require management. These areas are:

- Precinct 4 - BIIA, see Map 6
- Precinct 4 - Northwest bushland area
- Precinct 1 - Boundary between bushland and development.

Precinct 4 BIIA: the development scheme requires a public street to occur on the development side of the Precinct 4 - BIIA. The road is to form part of a 30m buffer area between building/structures and hazardous vegetation. The interface area must contain adequate and accessible water supply for fire fighting purposes.

Precinct 4 - Northwest bushland area: this area is surrounded by development to the north and south. As a result of the hazard rating of the FBMP this area must also address the fire fighting requirements of section 3.7. This implies that that the length of the interface shall be roads or streets to achieve adequate access for fire fighting and emergency vehicle access. However, roads or streets may not be required around the entire bushland area provided that adequate access can be incorporated into the design. The interface can constitute at least 50 per cent of its length as roads or streets, with the remaining public edge comprising pedestrian/cyclist ways. The interface area must contain adequate and accessible water supply for fire fighting purposes.

Precinct 1 - Boundary: the majority of the interface between building/structures and hazardous vegetation will be delineated by a major road and/or busway in the longer term. Interim bushfire management strategies should be considered as development is staged. The interface between buildings/structures and hazardous vegetation can be managed by incorporating into the development areas a buffer element comprising a least 50 per cent of the length shall be roads or streets, with the remaining public edge comprising pedestrian/cyclist ways. The interface area must contain adequate and accessible water supply for fire fighting purposes.

Refer to Appendix 2 for specific requirements for water supply and access for fire fighting purposes, landscaping for fire management and bushland maintenance. Refer also to *State Planning Policy 1/03: Mitigating the adverse impacts of Flood, Bushfire and Landslide* for guidance.

Map 5 - Overall fire hazard

This map is produced for illustration purposes only and unless stated is not to scale

Boundary interface investigation area

Fitxgibbon UDA Development Scheme requirement - Precincts 1 and 4

This section provides further details on the requirements of the Boundary interface investigation areas (BIIA) mapped in the UDA Development Scheme.

Development considers boundary investigation areas and develops appropriate interfaces considering fauna, bushfire and CPTED principles.

Introduction

The Fitzgibbon UDA Development Scheme Maps 7 and 10 identify Boundary Interface Investigation Areas (BIIA) within Precinct 1 and 4 of the UDA. The development scheme states that development in the BIIA will determine the precise extent of developable area in accordance with the criteria of the FBMP. Since the adoption of the Fitzgibbon UDA Development Scheme the approximate location of the boundary between the the Bushland and open space zones and development area in Precinct 4 has been determined by the FBMP.

In Precinct 1 the appropriate development extent is to be determined with reference to the UDA scheme and through site survey. The precise details of the impacts of development, e.g. development footprints, roads, interface treatments and landscaping, upon the environmental values of the Bushland and open space zone will be determined through detailed design.

In Precinct 4 the appropriate development extent is determined by the coordinates set out in Table 3 and shown in Map 6.

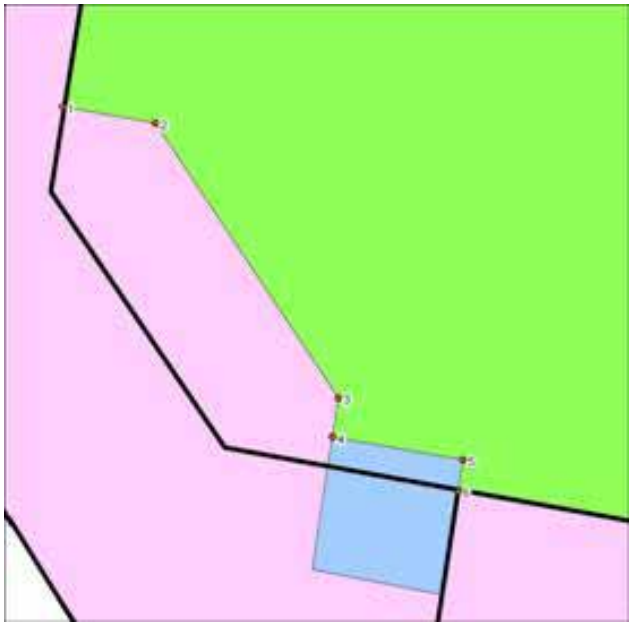
Development requirements

For Precincts 1 and 4 development should not occur in the Bushland and open space zone as identified by the FBMP unless such development does not compromise the environmental values of the area. Development occurring within 10m of the boundary will take the following into consideration:

- development is to minimise impacts on significant vegetation
- development is to avoid adverse impacts e.g. impacts on the root zone, lighting and building heights affecting branches, on habitat trees
- development is to consider bushfire management principles and appropriate edge treatments.

Table 3 - Boundary of the Precinct 4 bushland investigation area

Points	Map grid of Australian (MGA 56) coordinates	
1	502422	6976413
2	502519	6976397
3	502708	6976112
4	502702	6976071
5	502838	6976048
6	502833	6976015



Map 6 - Precise location of the BIIA in Precinct 4

This map is produced for illustration purposes only and unless stated is not to scale

Stormwater infrastructure management

Fitzgibbon UDA Development Scheme requirement - Precincts 1 and 4

Development within the Bushland and open space zone will be limited to enhancement and rehabilitation of environmental values and construction of water sensitive urban design features, stormwater management features, maintenance of drainage lines and for pedestrian/cycleways and other park facilities where such development minimises impacts upon the area's environmental values in accordance with the Fitzgibbon Bushland Management Plan.

This section details the requirements associated with construction of stormwater infrastructure in the Bushland and open space zone.

Introduction

Large areas in the Bushland and open space zone within Precincts 1 and 4 will be used to retain and manage flooding and stormwater. While the majority of this water will be en-route water, i.e. water travelling through the system, a significant proportion of the water will be generated from new impervious areas.

An essential part of the flood and stormwater management strategy requires the construction of stormwater infrastructure within the Bushland and open space zone. Special areas of consideration include:

- the bushland area in the north west channel requires the construction of a detention basin
- excavation south of the Fitzgibbon UDA near Pineapple Street
- construction of several levees for the detention areas in south of Beams Road and north of Roghan Road
- works within Cabbage Tree Creek.

Works within wetland areas or outside the UDA may be subject to other approval or permit requirements and applicants must consider other relevant Queensland and Commonwealth legislation. Applicants are encouraged to consultant with the ULDA and other relevant authorities during the preparation of plans to determine approval requirements.

Development requirements

Construction of stormwater infrastructure is to minimise impacts upon environmental values in accordance with current best practice natural channel design principles and water sensitive urban design standards and guidelines to protect and enhance water quality. The desired outcomes are to:

- protect existing natural features and ecological process
- maintain the natural hydrologic behaviour of catchments
- protect water quality of surface and groundwater
- integrate water into the landscape to enhance visual, social, cultural and ecological values.

Recommended practice - water sensitive urban design measures should be consistent with the Healthy Waterway's Water by Design guidelines. Refer also to the Queensland Wetland Buffer Planning Guideline.

References

- BAAM (2011), 'Fitzgibbon Urban Development Area: Precinct 1 Flora and Fauna Assessment'. Report prepared for the Urban Land Development Authority by Biodiversity Assessment and Management P/L.
- BAAM (2008). 'Fitzgibbon Urban Development Area Flora and Fauna Habitat Assessment'. Report prepared for the Urban Land Development Authority by Biodiversity Assessment and Management P/L.
- BAAM (2008). 'Fitzgibbon Squirrel Glider Management and Action Plan'. Report prepared for the Urban Land Development Authority by Biodiversity Assessment and Management P/L.
- PLACE DESIGN GROUP (2009). 'Fitzgibbon Urban Development Area - Open Space and Trails Network'. Report prepared for the Urban Land Development Authority by Place Design Group PTY LTD.
- PLACE DESIGN GROUP (2009). 'Fitzgibbon Urban Development Area - Bushfire Management Plan'. Report prepared for the Urban Land Development Authority by Place Design Group PTY LTD.
- WRM (2009). 'Flood and Stormwater Management Studies for the Fitzgibbon UDA Development Scheme'. Report prepared for the Urban Land Development Authority by WRM Water and Environment P/L.

Appendix 1
Identified weed species

A total of 13 flora species declared under the provisions of Queensland's *Lands Protection (Stock and Pest Route Management) Act 2002*, as listed below, are present within the proposed UDA:

- Mother of Millions (*Bryophyllum delagoense*) - Class 2
- Groundsel (*Baccharis halimifolia*) - Class 2
- Broad Leaf Pepper (*Schinus terebinthifolius*) - Class 3
- Lantana (*Lantana camara*) - Class 3
- Creeping Lantana (*Lantana montevidensis*) - Class 3
- Basket Asparagus (*Asparagus africanus*) - Class 3
- Climbing Asparagus (*Asparagus aethiopicus*) - Class 3
- Chinese Elm (*Celtis sinensis*) - Class 3
- Singapore Daisy (Wedelia trilobata) - Class 3
- Camphor Laurel (*Cinnamomum camphora*) - Class 3
- Madiera vine (*Anredera cordinfolia*) - Class 3
- Prickly Pear (*Opuntis stricta*) - Class 2
- Ginger Hedychium sp (possibly *H favescens*) Possibly Class 1

Further investigation of the specimen of observed ginger within Precinct 1, when in flower, is required to confirm identification and if found to be Hedychium flavescens treatment by the landholder is required. Refer also to the Precinct 1: Flora and Fauna Assessment (2011) by BAAM Pty Ltd for the location of particular problem weed areas.

In addition, there were occurrences of 13 environmental weeds listed under BCC's *Natural Assets Local Law, 2003*:

- Easter Cassia (*Senna pendula*)
- Mickey Mouse Plant (*Ochna serrulata*)
- Guinea grass (*Megthyrsus maximus*)
- Wild Tobacco (*Solanum mauritianum*)
- Devil's Fig (*Solanum hispidum*)
- Brazilian Nightshade (*Solanum seaforthianum*)
- Balloon Cotton (*Gomphocarpus physocarpus*)
- Swamp Foxtail (*Pennisetum alopecuroides*)
- Slash Pine (*Pinus elliottii*)
- Morning Glory (*Ipomoea indica*)
- Mist Weed (*Ageratina riparia*)
- Elephant Grass (*Pennisetum purpureum*)
- Pampas Grass (*Cortaderia selloana*).

Of the weed species identified as being present within the UDA, Groundsel, Singapore Daisy, Morning Glory and Lantana are of immediate concern within the creek lines in the northern and southern extremes of the UDA. Control of Guinea grass within regenerating eucalypt communities may well enhance regeneration.

These species can be regarded as 'ecosystem altering' - suppressing natural regeneration processes and causing the gradual degradation of natural vegetation communities. Spread of these species within the UDA should be avoided and management plans to control and eradicate these species are important at the operational works stage.

The decrease in condition of vegetation communities due to the presence of weed infestations has been taken into account when assessing the ecological values across the site. The presence of weed infestations has also been taken into account when assessing areas for rehabilitation to offset losses elsewhere in the UDA.

Appendix 2 Bushfire management guidelines

Reference should be made to *State Planning Policy 1/03: Mitigating the adverse impacts of Flood, Bushfire and Landslide* along with the following key points.

Water hydrants and fire fighting access

Access to areas of fire threat is critical for the safety of the residents and assets within the site. It is important that:

- fire breaks are regularly maintained to enable emergency vehicle and personal safe access for a fire fighting purposes
- fire breaks should not be accessible by public vehicles and locked with a universal key that only is distributed to authorities requiring access and where possible fire fighting hydrants are located in close proximity to any areas of urban-bush interface and at the entrance to fire trails.

Landscaping techniques

Landscaping features and rehabilitation areas can increase fire threat and intensity if not carefully planned. Increased levels of dense vegetation and flammable structures can convey fire from adjoining bushland into residential areas. To minimize this risk:

- fire retardant species such as dry rainforest (non myrtaceous) and low density planting should be used in the bushland-urban interface areas
- all landscaping along the proposed public major pathways and constructed pathways should be planted with fire retardant species or grassed areas (note low density and low growing grasses)
- these areas are to be regularly maintained to reduce the threat of fire ignition.

Bushfire risk management

The bushfire threat to the development areas across the site have been assigned a low - medium hazard rating, however prescribed ecological burns and regular maintenance of landscaped features are required to retain the low hazard rating. The site retains areas of bushland and open space that require ongoing management and maintenance to avoid the risk of bushfire. The bushfire maintenance program will, if effectively implemented, maintain a relatively low risk of bushfire. This maintenance program considers the following;

- assessing risk to life, assets and land
- maintenance of landscaped features (pathways/activity areas)
- proposed parkland where pedestrian access occurs
- proposed rehabilitation areas and the need to allow them to establish
- weed control
- controlled burning (where and when required)
- habitat protection.

Table 4 indicates the proposed actions, environmental conditions sought and calendar timeframes for the proposed controlled burns which are may be required within the ULDA lands. An annual assessment of fuel loads should be the determinate for future burning regimes. Any future regimes should utilize micro-mosaic burning patterns which benefit the biodiversity within the site.

Table 4 - Controlled burn timing and actions

Prescribed burn	Timing	Actions
Micro-mosaic burns	An assessment of fuel loading should occur on an annual basis to document the level of accumulated fuel loading within the VPA areas. This vegetation type should have burns conducted between 7 and 25 years. It is recommended that only small strategic areas be burnt and a mosaic pattern occurring between this 7 - 25 year period.	Prescribed burns should occur in a mosaic pattern and not on a broad scale. This will allow a variety of vegetation species to persist within the VPA's, as well as encouraging native vegetation to dominate. These burns should initially target the areas with the greatest fuel loads. Bi-annually - every 5 years (post initial 7 years regeneration) burning of different areas should occur to maintain a safe fuel load and encourage native regeneration. These burns should be of low intensity.

The Fire Consortium of Queensland recommends that this vegetation type be burnt in a mosaic pattern between 7 and 25 years if the vegetation has a shrubby understorey. For those areas zoned as Bushland and Open space with a grassy understorey a mosaic burn pattern of 3 - 6 years is recommended. The majority of the BOS's fall under the dry schlerophyll forest with a shrubby understorey post rehabilitation, thus a mosaic burn program of 7 - 25 years should be adopted. This should be based on the assessment of the fuel loading accumulated within the BOS's.

An annual vegetation management works schedule should be carried out by a suitably qualified contractor engaged by the ULDA. This contractor should respond to pre and during-bushfire season. These tasks must continue until such time that the land is handed back into BCC custodianship. The main tasks would be to:

- prune or remove any dead or overhanging tree branches and sucker growth, wherever possible in preference to removing healthy non-hazardous trees within pathways and road verges
- reduce fuel loads along the edges of any infrastructure, pathway, road verge and activity node area that is free from tall grass and shrubby regrowth
- remove all hazardous trees and reuse the logs as fauna habitat wherever possible in the VPA
- to monitor debris build up points and target these locations for priority removal of materials during the bushfire season and
- to review the choice of any new or replacement native plants used for landscaping, against a bushfire guideline.

Regular slashing of the proposed fire access trails, along the pathway edges and road verges to reduce the fuel loads in narrow strips and provide easy access to BOS. These actions should continue, but specific vegetation management and monitoring actions should be planned within the urban-bush interface.

An annual vegetation management works schedule should respond to the pre, during and post- bushfire season. The main tasks would be to:

- maintain good vehicle access to all fire access trails and the majority of the perimeter fencing, that is free from tall grass and shrubby regrowth
- to reduce fuel loads along the edges of the outer ring road, that is free from tall grass and shrubby regrowth
- to remove all hazardous trees and reuse the logs as fauna habitat and
- to plan for the use of micro-mosaic burns within the bushland areas to reduce fuel loads (which cannot be managed by other means) on a 7 to 25 year cycle based on the assessment of fuel loads accumulated annually.

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