



Department of State and  
Regional Development



# GREY-CROWNED BABBLER RETENTION PLAN



# **Grey-Crowned Babbler Retention Plan**

October 2005



Gloucester Shire Council

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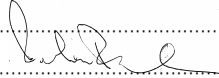
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- Peter Beard (Department of Environment and Conservation, Gloucester)
- Glenn Wilcox (Gloucester Shire Council)
- Doug Robinson (Trust for Nature, Victoria)
- Scott Hoy (Gloucester Shire Council, Public Works Department)

# 1. Introduction

Increasing population growth and demand for residential and industrial land has created pressure on the existing town boundaries and zonings in the township of Gloucester. The future expansion of lands for development in Gloucester has required the consideration of potential impacts on family groups and habitat of the Threatened Grey-crowned Babbler (*Pomastomus temporalis temporalis*). This species is listed as Vulnerable under the NSW *Threatened Species Conservation Act 1995*.

Parsons Brinckerhoff (PB) was commissioned by Gloucester Shire Council to prepare a retention plan for the Grey-crowned Babbler in light of potential expansion and rezoning of industrial and residential lands surrounding the township of Gloucester.

## 1.1 Gloucester Shire

Gloucester Shire local government area is located in the north-eastern corner of the Hunter region, approximately 120 kilometres north of Newcastle. It covers an area of 2952 square kilometres and lies on the eastern slopes of the Great Dividing Range. The shire is within the North Coast bioregion as defined in the Interim Biogeographic Regionalisation for Australia (Thackway & Cresswell 1995).

Land use within the Shire is dominated by a combination of forestry, agriculture and mining, as well as large conservation reserves that are used for wilderness based recreation. A significant proportion of the Shire (75 per cent) has a slope of more than eight degrees, much of which is too steep or rugged for agricultural use (Hunter Development Brokerage Pty Ltd 2005). Most of the agriculturally suitable lands on the alluvial floodplains surrounding the township of Gloucester has been cleared for grazing and cultivation. Remnant vegetation on the floodplains occur as patches and roadside areas of dry open sclerophyll woodland in various states of disturbance and fragmentation. The world-heritage listed Barrington Tops National Park and areas of State Forests are located in south and western parts of the Shire (*Figure 1.1*).

The shire contains a population of almost 5,000 people, much of which is centred in the townships of Gloucester, which is the largest town. The township of Gloucester is located at the foothills of the ranges and escarpments of the Bucketts mountain range, between the Barrington and Gloucester Rivers. The township is surrounded by an outer perimeter zoned Environmental Protection 7(d) Scenic (*Figure 1.2*), which extends to the Mograni mountain range in the east and the Bucketts mountain range to the west. The purpose of the environment protection zone surrounding the town is to restrict development.

The community of Gloucester has historically had a very slow rate of population growth, which has meant long term planning of infrastructure development for growth has not been necessary. However over the last two and a half years a 20 year plan for town expansion has been realised. In line with the accelerated growth of residential land has come a strong enquiry and growth in the small business sector. This growth has created pressure on the traditional town boundaries and industry zonings.

It has been suggested in the Gloucester Local Environment Study that the population of the shire should be capped at 12,000 and that Gloucester and the immediate surrounds could have a population of 6,700 with an additional 3,000 residences (Hunter Development Brokerage Pty Ltd 2005). Areas identified for rezoning include lands to the east of the existing town along the north coast railway for rural residential and residential properties, and to the south of the current industrial areas for future industrial expansion.

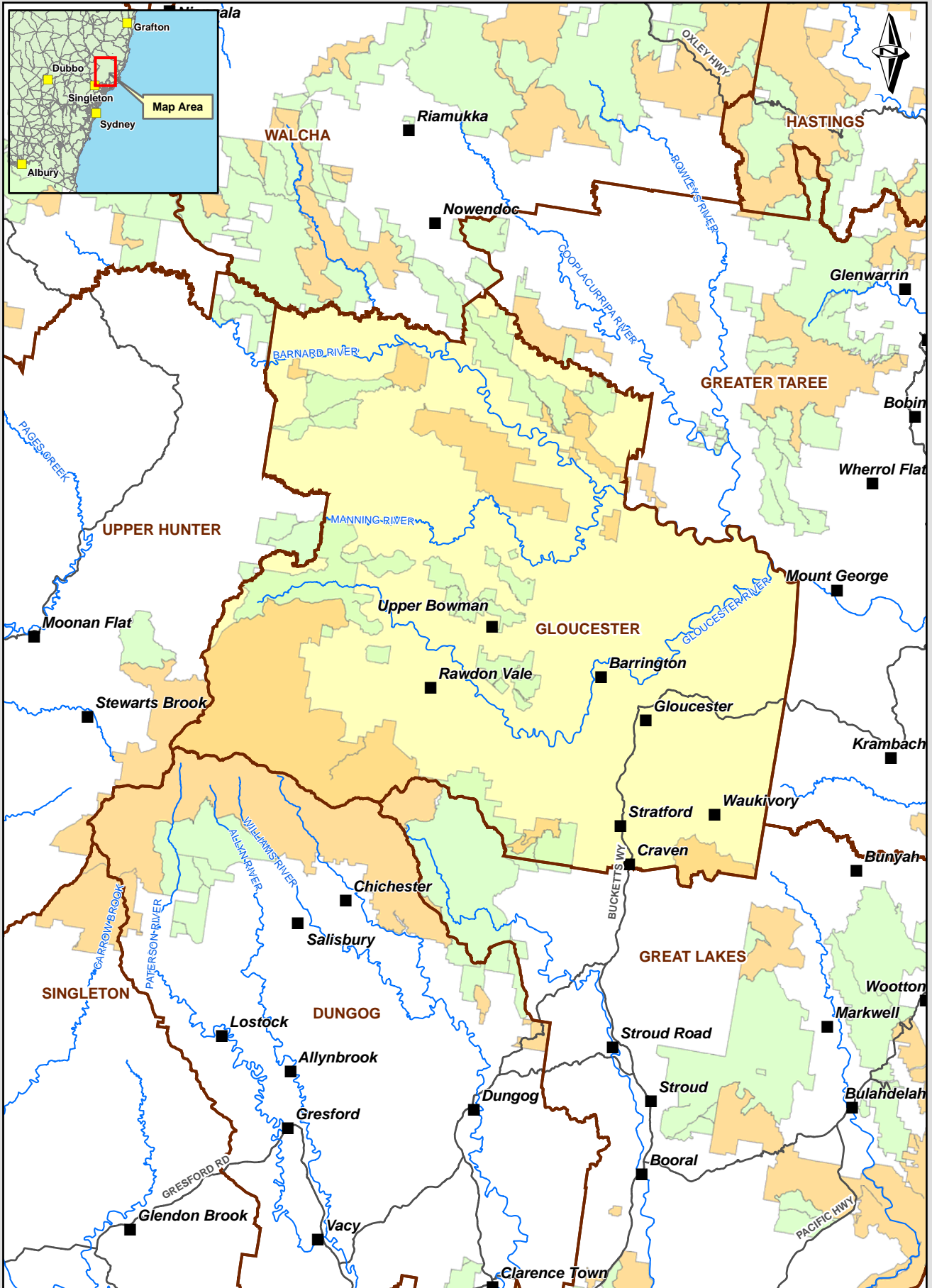
Within the township of Gloucester there currently exist two Grey-Crowned Babbler family groups that use habitat within and around the southern residential and industrial zones. The rezoning of the traditional boundaries of the township and the future development of earlier environmental protection lands has implications for the Grey-crowned Babbler within Gloucester and requires careful consideration of the ecology and potential threats to the species. Gloucester Shire Council has identified that the retention of Grey-crowned Babblers is a priority in the future expansion of the residential and industrial areas, which is the purpose of this retention plan.

## **1.2 Aims and objectives**

The objective of this retention plan is to address current and future land expansion issues in relation to the habitats of the Grey-crowned Babbler in the Gloucester township and the immediate surrounding areas.

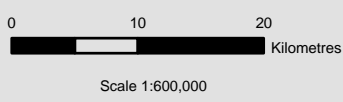
The aims of the retention plan are to create a working document that:

- Identifies historic and current locations, and habitat of the Grey-crowned Babbler within the township and immediate surrounding areas.
- Includes planning options for the development and expansion of residential and industrial areas, as well as management of current and proposed reserve locations.
- Aims to retain the existing family groups within Gloucester and increase their size.
- Aims to increase the number of family groups within Gloucester.
- Creates an information guide to the public on the continuing presence of Grey-crowned Babblers.



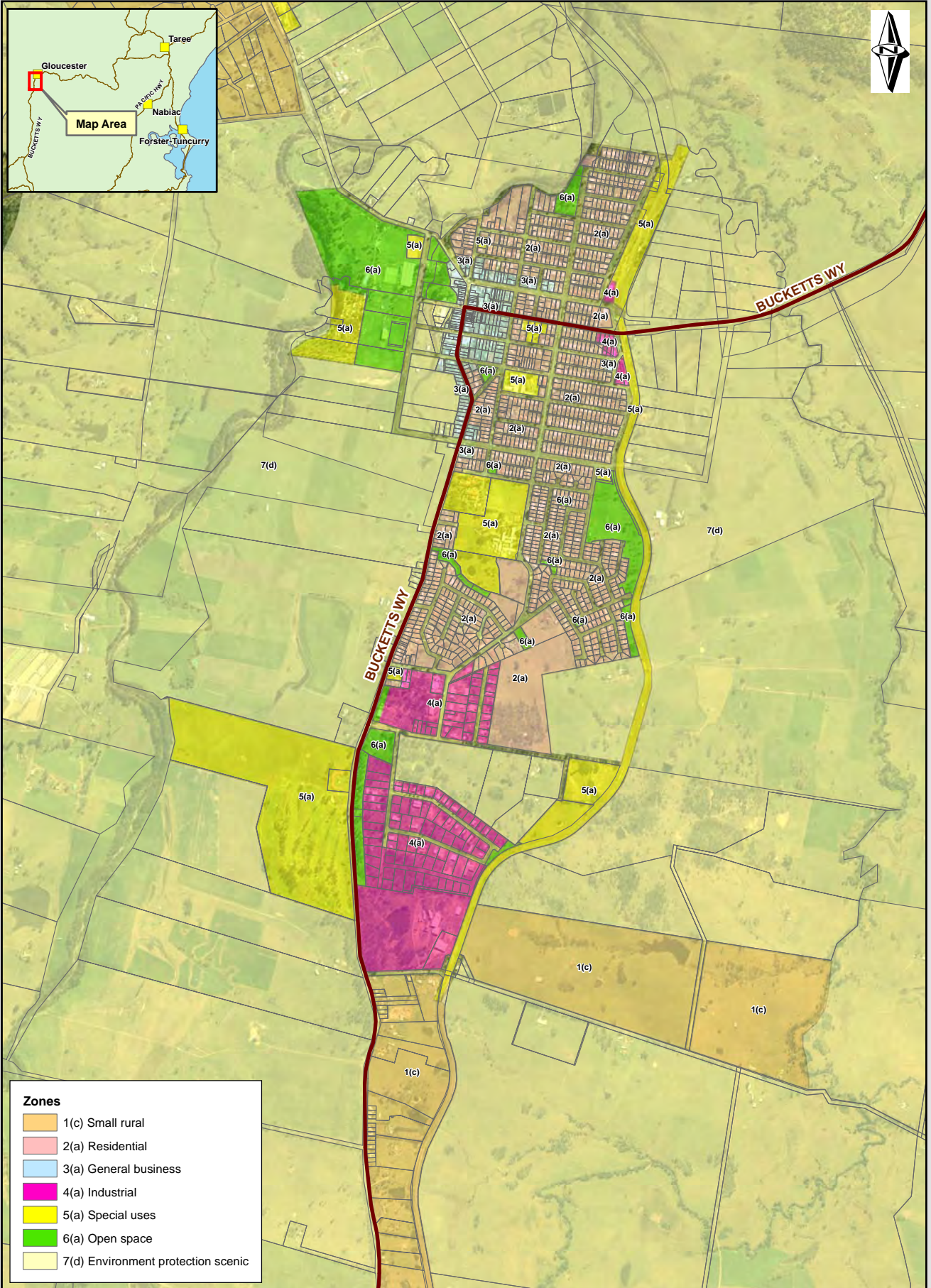
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- Towns
- Main Roads
- Rivers
- ▭ LGA Boundary
- ▭ State Forests
- ▭ National Parks



**Figure 1.1: Gloucester local government area**





2116585A\_2003\_Study\_Area.mxd

Zones	
	1(c) Small rural
	2(a) Residential
	3(a) General business
	4(a) Industrial
	5(a) Special uses
	6(a) Open space
	7(d) Environment protection scenic

Main Road  
 Cadastre

0 200 400 600 800 1,000  
  
 Metres  
 Scale 1:25,000

Figure 1.2: Location of Gloucester and township zoning boundaries

## 2. Relevant legislation and plans

Protection of biodiversity is a key element of ecologically sustainable development and is part of the core business of Council. Environmental legislation and policies create the framework in which Council makes planning and land use decisions and consideration of the effects of such on Threatened species and biodiversity (Hunter Councils 2002).

The Grey-crowned Babbler – Eastern Subspecies (*Pomastomus temporalis temporalis*) is listed as Vulnerable under the NSW *Threatened Species Conservation Act 1995*. In order to fulfil sustainable development planning objectives and environmental legislative requirements including the NSW *Environmental Planning and Assessment Act 1979* and NSW *Threatened Species Conservation Act 1995*, the potential impacts on the species must be addressed comprehensively and integrated early in the planning process. Currently, a recovery plan has not been prepared for the Grey-crowned Babbler in New South Wales.

State legislation, plans and policies relevant to the retention plan are detailed in *Table 2.1*.

**Table 2.1: Legislation, policies and plans relevant to the Grey-crowned Babbler retention plan for Gloucester**

Relevant legislation, policies and plans	Details
<i>Threatened Species Conservation Act 1995</i>	The <i>Threatened Species Conservation Act</i> is the Act under which Threatened species, population and communities are listed. Listing under the Act provides statutory protection for these species and communities and provides a mechanism by which impacts are assessed during the development application process. The Grey-crowned Babbler is listed as Vulnerable under the <i>Threatened Species Conservation Act 1995</i> .
<i>Environmental Planning and Assessment Act 1979</i>	Part 3 of the <i>Environmental Planning and Assessment Act 1979</i> relates to the preparation of environmental planning instruments including Local Environment Plans and Development Control Plans. Local Environment Plans divide the area they cover into 'zones' such as residential, industrial and commercial zones. Each zone usually has a list of 'objectives' and a list of the types of development that are permissible without consent, permissible with consent, and prohibited.  Council needs to be confident that the zoning is compatible with the existing environment and that there is unlikely to be a significant impact on Threatened species, populations and communities. Section 34A of the Environmental Planning and Assessment Act 1979 states that: "A Council must consult with the Director-General of National Parks and Wildlife before preparing a draft local environmental plan, if in the opinion of the council, critical habitats or threatened species, populations of ecological communities, or their habitats, will or may be affected by the draft plan."
Upper and Northern Hunter Environmental Management Strategy	The strategy is a joint initiative between the Upper and Northern Hunter local government areas of Gloucester, Singleton, Muswellbrook, Scone, Murrurundi, Merriwa, Dungog and Great Lakes. The Strategy aims to identify integrated environmental management actions that can be implemented by the member Councils so that the social, environmental and economic quality of the Upper and Northern Hunter is maintained and/or enhanced.

Relevant legislation, policies and plans	Details
Hunter Regional Environmental Plan 1989	<p>The plan was established to promote the balanced development of the region, the improvement of its urban and rural environments and the orderly and economic development and optimum use of its land and other resources. The plan applies to all land within the Gloucester Shire local government area, and as such the rezoning of traditional land boundaries.</p>
Gloucester Local Environmental Plan (LEP) 2000	<p>The aims of the plan are to manage the resources of the Gloucester area, protect prime crop and pasture land and places of natural and cultural significance, manage development to benefit the community and to embrace and promote the principles of ecologically sustainable development.</p> <p>The zoning and development controls within the LEP govern the type of development that can occur and must also be considered when determining permissibility of an activity.</p> <p>The LEP states that development cannot be carried out on land that is critical habitat or the subject of a recovery plan that specifies measures to be taken in respect to the <i>Threatened Species Conservation Act</i>.</p>

### **3. Grey-crowned Babbler- *Pomastomus temporalis*- biology and ecology**

#### **3.1 Description**

The Grey-crowned Babbler is a distinctive medium sized bird measuring approximately 29 centimetres in length and weighing about 80 grams. The species has a curved bill, pale-grey head, a dark brown 'bandit's stripe' from the bill through the eye, orange tipped wings and white tipped tail. The general back colour is dark brown and the underparts are greyish-white to greyish-brown (King 1980). Grey-crowned Babblers are most often identified by their distinctive calls, including loud 'chuck' calls and a loud ringing 'peeoo, peeoo, peeoo' sound (Higgins & Peter 2002).

#### **3.2 Distribution**

The Grey-crowned Babbler (Eastern subspecies) has a wide distribution throughout Eastern Australia, occurring mostly in dry open forests and woodlands on fertile soil types of plains and undulating terrain (Robinson 1994). The Eastern subspecies has, however, declined in numbers and disappeared from large parts of its range. The species is now extinct in South Australia and from coastal regions of Victoria (NSW Scientific Committee 2001). Historically the species was recorded in NSW east of the Great Dividing Range from the Sydney Basin north to the mid-north Coast (NSW Scientific Committee 2001). The species is now extinct in the Orange area (Heron 1973) and possibly also from around Bathurst. Within the Hunter it is now considered uncommon (NSW Scientific Committee 2001).

#### **3.3 Habitat**

The Grey-crowned Babbler is found mainly in rural districts where it predominantly lives in roadsides and private land (Schulz 1991). In New South Wales, suitable habitats are usually abundant with leaf-litter and debris; often dominated by eucalypts including ironbark species, Spotted Gum (*Eucalyptus maculata*), open mixed woodland associations of Bimble Box (*Eucalyptus populnea*) with Cypress Pine (*Callitris columellaris*), partly-cleared woodland usually containing Forest Redgum (*E. tereticornis*), Pink Bloodwood (*Eucalyptus intermedia*) and Rough-barked Apple (*Angophora floribunda*), acacia shrubland and adjoining farmland (Higgins & Peter 2002). Grey-crowned Babblers are unlikely to occur in regrowth forest, large patches of forest or woodland and forest with dense understorey or grassland with few trees (Schulz 1991).

An understorey of young trees and shrubs, in the 10 to 25 centimetres diameter at breast height range, is used for nest sites and shelter, and a relatively sparse ground layer with more litter and less ground cover is preferred by the species (Adam &

Robinson 1996). Within that broad habitat category, they prefer sites with large trees, a scattered understorey of small trees or shrubs and a sparse ground layer of litter and short grass (Davidson & Robinson 1992). At the local scale, the species is common in edge habitats where there is access to both tree-cover and open ground. Historically this edge habitat would be found near larger trees in mature woodland habitat, but is now largely restricted to roadside vegetation and the edges of remnant patches (Robinson, Davidson & Tzaros 2001).

### **3.4 Feeding ecology**

Grey-crowned Babblers are insectivorous, feeding largely on the ground or on the branches and trunks of trees. The main food items taken from trees are beetle larvae, caterpillars and spiders. Occasionally birds consume flying insects, lizards and lerpis or break open termite galleries to extract their prey (Higgins & Peter 2002). When on the ground, they search for food by turning over leaf litter or by probing at the base of grass tussocks and into the soil. When feeding in trees, they use their beaks to prise beneath peeling bark, probe into crevices and demolish rotting bark (Robinson, Davidson & Tzaros 2001). They consequently prefer feeding on trees with rough bark and crevices (e.g. ironbarks) and larger trees (greater than 60 centimetres trunk diameter at breast height) containing diverse microhabitats for insects (Adam & Robinson 1996).

### **3.5 Social and breeding ecology**

The Grey-crowned Babbler is a communal-breeding species noted for its gregarious social behaviour. It is sedentary and territorial, with co-operatively breeding social groups (known as family groups) and is rarely seen singly or in unattended pairs (Brown et al. 1983a, 1983b; Counsilman 1980). Grey-crowned Babblers have a 'flock' behaviour, with individuals usually within 15 metres of each other, and groups usually occupying an area of less than 30 metre in diameter (Higgins & Peter 2002). The activity ranges of Grey-crowned Babbler groups vary from 2 to 53 hectares (Blakers et al. 1984) and increases with increasing group size and habitat connectivity (Counsilman 1977; King 1980).

A healthy Grey-crowned Babbler group (breeding unit) consists of a dominant breeding pair and a number of usually related helpers that contribute to nest-building, feeding of the incubating female and feeding of the young. Group size ranges between 4 and 12 individuals, although larger groups have been recorded. Group size appears to be related to habitat elements such as the amount of wooded cover and the type of ground layer (Brown et al. 1983). In declining populations in fragmented habitat, groups are often much smaller, often with only two or three birds (King 1980). Based on population viability analysis in Victoria, a viable population is likely to contain more than 10 family groups, while populations with less than 10 groups are likely to have a high rate of extinction (Doug Robinson *personal communication* 2005).

Adult birds have an average life expectancy of approximately four years. Young birds stay with the family group for at least one year after fledging and may remain for two or more years acting as non-breeding helpers, even though they are physiologically

capable of breeding (Brown et al. 1983a). Occasionally groups contain two breeding pairs or two breeding females (Counsilman 1977). As breeding spaces become available in the population, some helpers may disperse to establish their own breeding group (Dow & King 1984).

The breeding season is from June to February with clutches laid either once or twice per breeding season. Clutch size varies from two to six eggs in NSW, and is negatively influenced by drought and greater temperature ranges. Incubation takes between 18 and 25 days and nestlings fledge after 17 to 23 days (Higgins & Peter 2002). Nesting success ranges from 40 to 70 per cent and breeding success of family groups is significantly related to the number of helpers in the group (Dow & King 1984; Higgins & Peter 2002). Nest failure has been related to predation, bad weather and starvation (Robinson, Davidson & Tzaros 2001).

### **3.6 Nesting ecology**

The Grey-crowned Babbler is a prolific nest builder, building nests throughout the year for both breeding and roosting (Counsilman 1979). Active Grey-crowned Babbler territories can be located readily by finding clusters of their distinctive and bulky nests, domed with a short tunnel beneath and an overhanging projection leading to an enclosed and roughly spherical nest-chamber (Dow & King 1984). The nests are found close together, often with more than 12 nests within 90 square metres (Dow & King 1984). Nests are located in shrubs or the lower canopy of trees, usually less than six metres above the ground (Brown et al. 1983a). Materials used to construct the external parts of the nest include sticks, grass, bark and fine roots, with a lining of soft grass including tufts with roots attached. Plants used for nests include a variety of eucalypts, paperbark trees, wattles, Callitris Pine, She-Oak, tea-tree and hoop pines (Higgins & Peter 2002; Robinson, Davidson & Tzaros 2001).

### **3.7 Threats**

#### **3.7.1 Habitat clearing and fragmentation**

The Grey-crowned Babbler is one of a suite of species that has declined in woodland and open forest in south-eastern Australia as a result of clearance or other modification of habitat, especially in the last 30 to 40 years (Davidson & Robinson 1992). The primary cause of the Grey-crowned Babbler's decline has been widespread clearing of its preferred box woodland habitat, which has been disproportionately cleared for agriculture (Prober & Thiele 2005; Schulz 1991; Trail & Duncan 2000). Much of the remaining woodland habitat is unsuitable, either because it does not contain the preferred overstorey tree species or because it is too dense (Robinson, Davidson & Tzaros 2001). Most of the remaining habitat in New South Wales now occurs mostly in remnant patches along roadside verges, remnant woodland with an open understorey, fringes of woodland on farmland with dense shrub layer, and in parks or residential areas (Reid 1999).

Like other Threatened species of woodland bird, the fragmentation of habitat through clearing and modification has isolated populations into scattered remnants, with family groups becoming isolated (Reid 1999; Trail & Duncan 2000; Watson, Whittaker & Freudenberger 2005).

Grey-crowned Babblers show relatively small levels of dispersal from their parents' territories and most sites occupied by babbler groups are within one kilometre of other groups (Higgins & Peter 2002). The species is reluctant to traverse large tracts of cleared land (Robinson 1994; Watson, Whittaker & Freudenberger 2005), and therefore, habitat fragmentation prevents the opportunity for new groups to become established and genetic exchange to occur between groups. As a collection of reduced groups, isolated small populations are vulnerable to extinction via stochastic events and from the loss of genetic viability in the long term (Robinson 1994).

### **3.7.2 Modification of understorey habitat**

An open woodland character with a grassy understorey is an important habitat element for the Grey-crowned Babbler and a number of factors can modify this.

The removal of dead timber for firewood for domestic use severely modifies habitat of the species, reducing a major source of feed insects derived from microhabitats created by fallen dead wood, bark, and leaf litter (Davidson & Robinson 1992).

Studies by Adam and Robinson (1996) have shown that fuel reduction burning has a considerable, detrimental impact on the habitat of the Grey-crowned Babbler due to the reduction of understorey habitat in which the birds can nest or shelter. As a result, controlled burning can also fragment Grey-crowned Babbler groups.

Grazing by stock affects the structural architecture of the environment by removing fallen logs, or by changing the proportion of bare ground and grass cover (James 2003). Overgrazing can remove grass and low shrub cover needed by the Grey-crowned Babbler for feeding, breeding or shelter, and open habitats to weed invasion (such as introduced perennial grasses) and predators (Robinson, Davidson & Tzaros 2001). Grazing also causes a significant decline in the abundance of litter and topsoil invertebrates, an effect that increases with increasing grazing pressure (Cardillo et al. 1999), resulting in a reduction in the availability Grey-crowned Babbler food resources.

### **3.7.3 Increased competition and predation**

Increased abundance of competitors, such as the Noisy Miner (*Manorina melanocephala*), and nest predators, including the Pied Butcherbird (*Craticus nigrogularis*), Pied Currawong (*Strepera graculina*), Australian Magpie (*Gymnorhina tibicen*) and Australian Raven (*Corvus coronoides*), threaten Grey-crowned Babbler foraging efficiency and breeding (Major, Gowing & Kendal 1996; Woinarski 1984). Observational studies have provided correlated evidence that where Noisy Miners (*Manorina melanocephala*) are present in small, degraded woodland remnants, other insectivorous species and small woodland birds are absent due the aggressive exclusionary behaviour of the Noisy Miners (Grey, Clarke & Loyn 1998).

Feral predators have a major impact on bird populations that are restricted to isolated patches of remnant woodland. Cats and the European Red Fox have been known to predate on Grey-crowned Babblers, particularly fledglings (Robinson 1994; Schulz 1991).

### **3.8 Status**

As result of the ongoing threats to the species, the New South Wales Scientific Advisory Committee (1992) determined that the Grey-crowned Babbler is:

- rare in terms of abundance and distribution
- significantly prone to future threats likely to result in extinction.

Consequently, the Grey-crowned Babbler is listed as Vulnerable under the New South Wales *Threatened Species Conservation Act 1995*.

The species is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, but has been listed as Near Threatened in the Commonwealth Department of the Environment and Heritage Action Plan for Australian Birds (Garnett & Crowley 2000). The species is also listed as Endangered under the Victorian *Flora and Fauna Guarantee Act 1988*.



## 4. Grey-crowned Babblers in Gloucester Shire

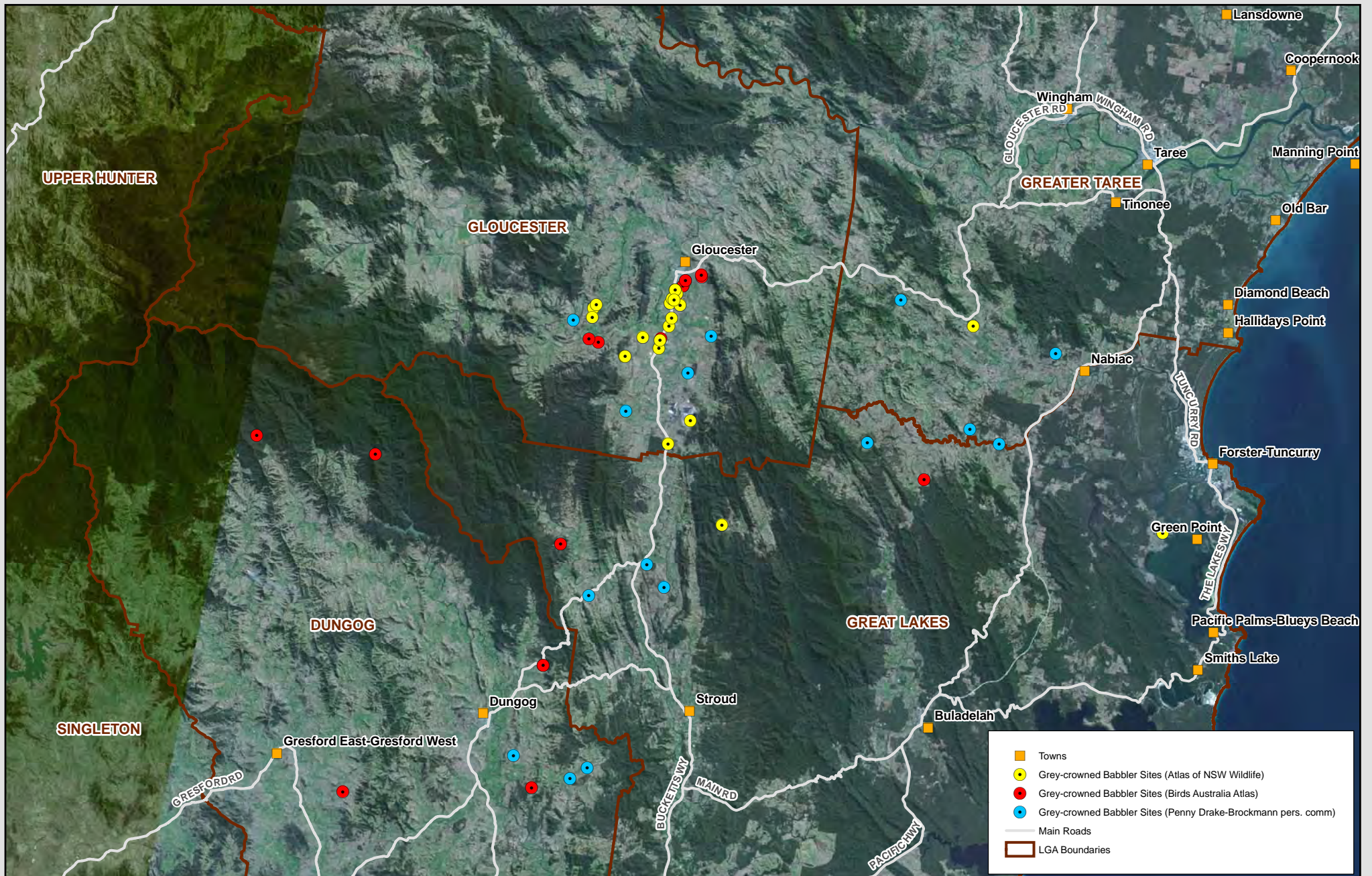
### 4.1 Known current distribution in Gloucester Shire

Sightings of Grey-crowned Babbler within the Hunter region have declined considerably with most now centred around the Lower Hunter Valley and Gloucester areas. Within the Gloucester local government area the Barrington population of Grey-crowned Babbler died out in the 1980s (G. Germon *personal communication* 2005\_ and the Gloucester population is reported by long term residents to be in decline (P. Drake-Brockman *personal communication* 2005).

Approximately 20 family groups are known to be distributed throughout Gloucester Shire Council boundaries from Gloucester township to Monkerai in the south both sides of the Bucketts Way (*Figure 4.1*). Forty kilometres south of Gloucester there appears to be a separate population south of Dungog, to Clarencetown and the Lower Hunter Valley, and another population west of the Pacific Highway in the Dyers Crossing area. However there have been no studies that have identified genetic interchange between these populations and those around Gloucester (P. Drake-Brockman *personal communication* 2005).

There have been numerous records of the birds in Gloucester (*Figure 4.2*) including those of a local environment group (Friends of the Grey-crowned Babbler) that maintains database records of observations and nest sites. The Department of Environment and Conservation Atlas of New South Wildlife and Birds Australia (New Atlas) databases have records of the species around Gloucester. Recent records within this report have been supplemented by field surveys and personal communication with Penny Drake-Brockmann (Friends of the Grey-crowned Babbler), Gary Germon (formerly Gloucester Department of Environment and Conservation), and Trish Waters and Peter Beard (Gloucester Department of Environment and Conservation).

There are no records of the species within local National Parks and conservation reserves (Department of Environment and Conservation 2005); areas that generally include heavily timbered higher ridges. The species range appears to be restricted to the Gloucester valley where the fertile soils are derived from Permian Coal Measures geological formations (Germon and Drake-Brockman personal communications 2005, Henderson 2000) and to one or two groups within the Barrington valley.



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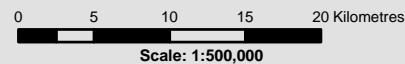
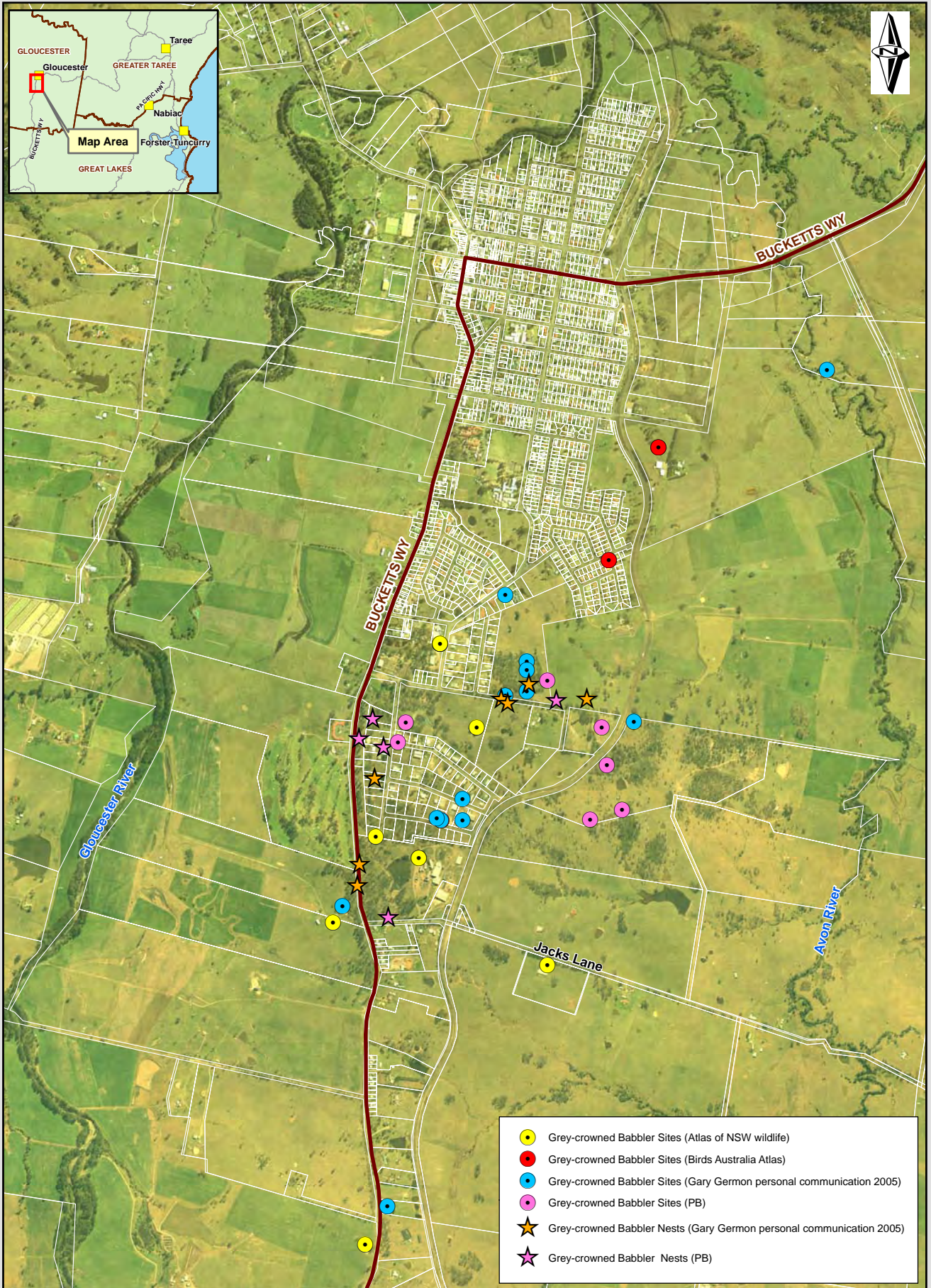


Figure 4.1: Distribution of Grey-crowned Babbler records in the wider area



2116585A\_2004\_GBC\_Records.mxd

— Main Road  
 □ Cadastre

0 200 400 600 800 Metres  
 Scale 1:25,000

Figure 4.2: Grey-crowned Babbler records at Gloucester township

## 4.2 Grey-crowned Babbler family groups at Gloucester Township

Two family groups of Grey-crowned Babbler are known to currently occur in the southern half of Gloucester township (*Figure 4.2*). The two groups form the northerly extent of known family groups within the Gloucester Shire council boundaries (G. Germon *personal communications*, 2005). For reference purposes of this plan the groups have been referred to as the Cemetery Road group and Avon Valley group. These family groups interact where their foraging territories overlap at the Gloucester cemetery (P. Drake-Brockman *personal communication*.). The activity range for both groups is shown in *Figure 4.3*.

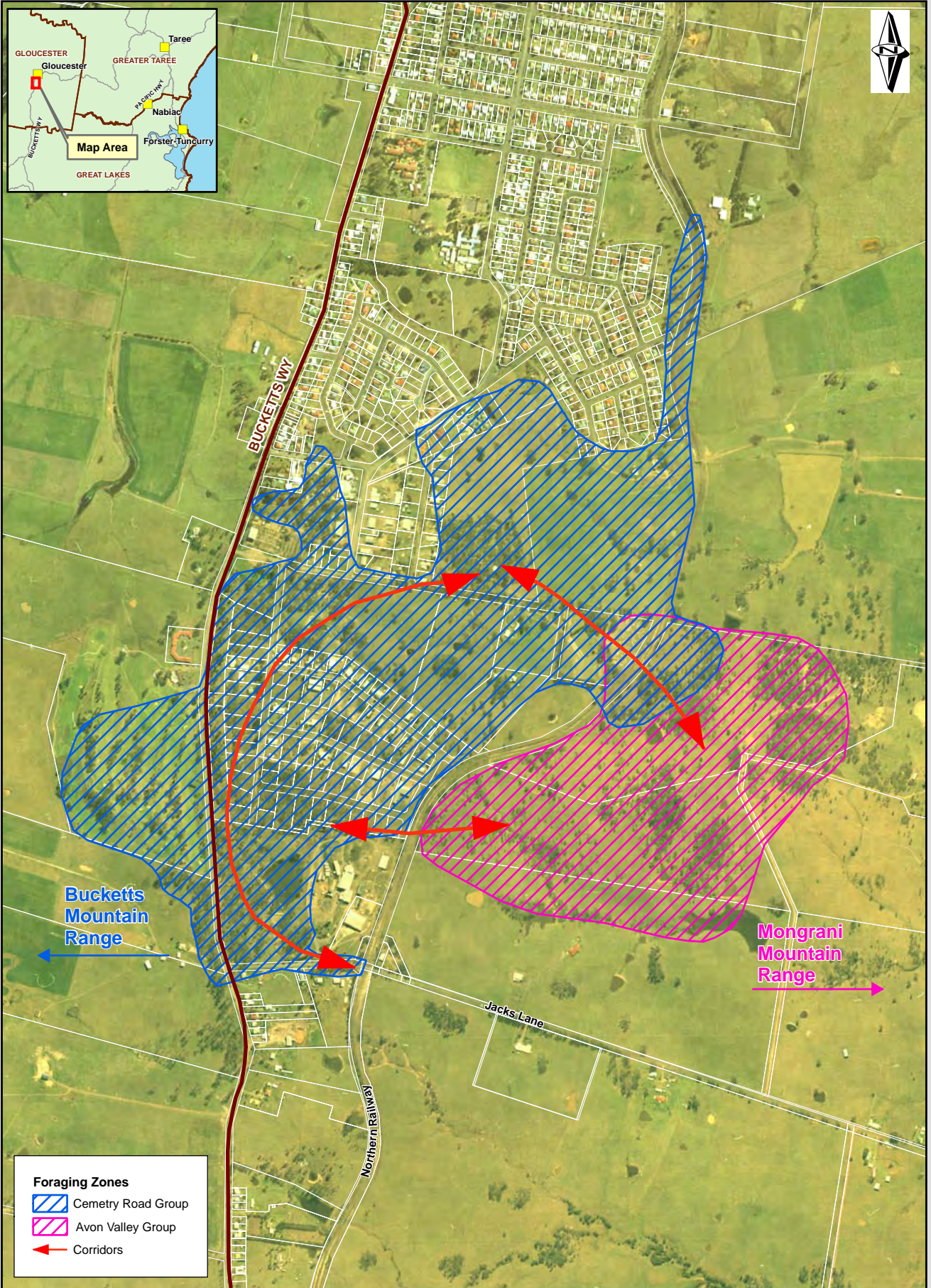
The Cemetery Road group consists of up to 14 individuals that use habitats including:

- A reserved bush lot zoned as Residential 2 (a) on the northern side of Cemetery Road.
- Cemetery Road and the cemetery itself.
- Woodlands to the east of the north coast railway near the cemetery.
- Small areas of woodland along Tate Street in areas zoned for industrial development and environment protection.
- Woodlands at the corner of Bucketts Way Road and Jacks Lane.
- The road side of Jacks Lane.
- Vegetation south east of Ravenshaw Road 500 metres north of Cemetery Road.

The Avon Valley group of approximately 11 individuals uses areas of habitat including:

- a large “cattle camp” opposite 58 Avon Valley Road
- woodland patches between the railway line and the Avon River
- vegetation at the base of the Mograni Mountain range (east of the township).

Another family group occurs at Gloucester Tops Road in private property near Buggs Creek, which connects to Gloucester River. While it is unlikely that this group forages as far as Gloucester or within the territory of the Cemetery Group, interaction could occur, such as young females travelling to join other breeding groups. The location of recorded birds and the likely activity range for each group is shown in *Figures 4.2 and 4.3*.



2116585A\_2006\_Foraging\_Zones.mxd

Figure 4.3: Activity areas of Grey-crowned Babbler groups at Gloucester

### 4.3 Habitat in Gloucester Shire

Fragments of woodland habitat suitable for the species exist amongst residential, industrial and rural land in south-east Gloucester. The quality of habitat for Grey-crowned Babbler varies according to size, shape and connectivity to other areas, and the presence of endemic vegetation. Most of the habitat used by the birds occurs as linear roadside woodland remnants or the edges of remnant woodland on private rural property. The species appears to be relatively disturbance tolerant, being observed foraging in gardens, parks and small remnants with cleared understorey, fence boundaries, and man made structures near roads - providing there is nearby connectivity to suitable habitats. In general the birds prefer to forage in open woodland habitats with fallen dead wood, bark and leaf litter on the ground (for foraging), native tussock grasses and shrubs (foraging and refuge) and canopy trees (breeding and foraging), particularly *Eucalyptus carnea* (Broad-leaved White Mahogany), *E. moluccana* (Grey Box), *E. globoidea* (White Stringybark) and *E. eugenoides* (Narrow-leaved Stringybark).

Habitats that have the highest value for both family groups occur north and along the roadside of Cemetery Road (*Photograph 4.1* and *4.2*), in woodlands east of the Railway Line (*Photograph 4.3*), and at the corner of Jacks Lane and Bucketts Way Road (*Figure 4.3*). Other roadside trees (*Photograph 4.5*) and vegetation patches (*Photograph 4.4*) provide nesting sites and important habitat corridors especially for the family group at Cemetery Road whose activity range is largely within areas zoned Industrial (4a) and Residential (2a) (*Figure 4.3*).

Grey-crowned Babbler nests have been recorded in a variety of sites, mostly clustered around the group's main breeding area, which may consist of linear rows of varied sized trees along roadsides, groups of trees in paddocks, the outer fringes of denser woodlands and smaller patches scattered through grazing land. Nests have been recorded from 2.5 to 20 metres high, on terminal branches and centrally within large eucalypts, in regrowth along roadsides and, during summer (when in leaf), in exotic deciduous trees close to housing. The known distribution of nests occurring along Cemetery Road, the water tower on the northern side of the road and at the Cemetery itself is shown in *Figure 4.2*. Nests also occur along Jacks Road near Bucketts Way, McKinleys Lane, Waukivory Road, Fairbairns Road and Tiedmans Lane in the southern half of Gloucester township (Gary Germon 2005 and Birds Australia 2005).



**Photograph 4-1: Grey-crowned Babbler habitat near the water tower along Cemetery Road**



**Photograph 4-2: Grey-crowned Babbler habitat near the water tower along Cemetery Road**



**Photograph 4-3: Across the eastern side of the railway line the Avon Valley group forages on the outer margins of denser regrowth woodland**



**Photograph 4-4: Woodland remnant on the corner of Tate Street and Cemetery Road in the industrial area provides foraging habitat for the species**





**Photograph 4-5: Roadside remnant vegetation and plantings along Cemetery Road used by the species for nesting**

#### **4.3.1 Species of plant**

The remnant dry open sclerophyll woodland in various states of disturbance comprises of a variety *Eucalyptus* canopy species including:

- *E. carnea* (Broad-leaved White Mahogany)
- *E. tereticornis* (Forest Red Gum)
- *E. globoidea* (White Stringybark)
- *E. eugenioides* (Narrow-leaved Stringybark)
- *E. crebra* (Narrow-leaved Ironbark)
- *E. maculata* (Spotted Gum)
- *E. moluccana* (Grey Box)
- *E. amplifolia* (Cabbage Gum).

Other tree species include *Melaleuca styphelioides* (Prickly-leaved Paperbark) which occurs in the damper areas of the industrial area near the Forestry depot and *Allocasuarina torulosa* (Forest Oak) which suppresses the growth of invasive groundcover species (S. Hoy personal *communications* 2005). Mixture plantings of non-native species including pine trees and non-indigenous eucalypts also occur as plantings in roadside reserves or areas of public open space.

Prior to disturbance, the open woodlands would have been characterised by a limited diversity and density of shrub species, and groundcover dominated by *Themeda* tussock grasses (Binns 1995; Henderson 2000; Prober & Thiele 1995). However, grazing within the woodlands has resulted in a general absence of groundcover vegetation, or a dominance of introduced perennial grasses. Native understorey species occurring throughout the south-eastern Gloucester include *Melaleuca stypheloides* (Prickly-leaved Paperbark), *Acacia ulicifolia* (Prickly Moses), *Bursaria spinosa* (Blackthorn), *Acacia irrorata* (Green Wattle), *Leptospermum* spp., *Dillwynia* spp. (Eggs and Bacon) and *Xanthorrhoea* spp. Native pasture species of grass include *Themeda australis* (Kangaroo Grass), *Cymbopogon refractus* (Barbwire grass) and *Poa labillardierei* (Tussock Grass) (Binns 1995; Henderson 2000).

While open and disturbed areas within the industrial area have moderate levels of weed invasion, grazing has controlled the invasion of weeds in most paddock areas east of the railway line. However, there is often a shortage of ground litter and understorey and improved pasture grows too densely for successful Grey-crowned Babbler foraging.

#### **4.4 Current viability**

It is not known if groups within the township of Gloucester and the immediate surrounding areas are part of a viable population. Approximately 20 groups are known to be distributed throughout Gloucester Shire, the number of which is low compared to studies in Victoria by Robinson et al (2001). Preliminary population viability analysis in Victoria has suggested that at least 10 groups, and preferably closer to 50, are necessary to maintain a viable population (D. Robinson, *personal communication* 2005). Further studies are required to determine the viability of the Gloucester/Monkerai Grey-crowned Babbler population.

The size of the family groups of Grey-crowned Babblers in Gloucester township are relatively large and healthy, containing between 11 and 14 individuals with known breeding activity. It is important to note, however, that the family groups at Gloucester may still be part of a declining population even though group sizes appear healthy. The population may be in the process of an 'extinction debt', which occurs when previous actions (such as habitat clearing and fragmentation) result in local or total species extinctions, with the species still extant only due to the time lag in the extinction process (Possingham & Field 2001). Thus, although the groups at Gloucester appear to be healthy with large numbers of individuals, there may be a substantial time lag between the loss of habitat and the consequent decline of groups and the wider Gloucester population.

For the purpose of this retention plan, and in the absence of further information, it is assumed that the population within Gloucester is viable.

## **5. Grey-crowned Babbler issues and management at Gloucester**

### **5.1 Grey-crowned Babbler issues at Gloucester**

The threats outlined in Section 4 have resulted in the current distribution and abundance of Grey-crowned Babblers seen in Gloucester today. Wide-scale clearing of woodland vegetation for agriculture and urban expansion has resulted in the reduction and fragmentation of habitat, resulting in the loss of many family groups from the wider region. Some of the remaining groups would have become isolated, and through local impacts such as increased competition and habitat degradation suffered a reduction in group size and fledgling success, until they became unviable.

The pattern of past land clearing has nevertheless resulted in the creation of the edge habitats that are used by the groups within the Gloucester township and immediate surrounding area.

The threatening processes that are likely to currently be working in Gloucester include

- habitat loss and fragmentation
- habitat degradation
- mortality from predation and collision

These main threatening processes have the potential to increase and impact the family groups at Gloucester as the town's population increases resulting in growing pressure on traditional land uses and boundaries. Habitat management is therefore an essential part of any conservation strategy (Bennett, Kimber & Ryan 2000), and forms the basis of this retention plan.

#### **5.1.1 Habitat loss and fragmentation**

The major pressures on the habitat of the Grey-crowned Babbler are the expansion of urban and industrial lands to the south and east of the township and the development of lands already zoned for these uses. The area to the east of the north coast rail line has been suggested as a possible site of future rural residential expansion, but also includes foraging and nesting habitat for Grey-crowned Babblers. This site borders a recent rezoning to the north of Jacks Lane. Similarly, the property south of the current industrial estate is zoned industrial 4(a), and contains suitable habitat for this species. The future expansion of the township into these areas has the potential to reduce and fragment habitat and isolate the existing groups.

Two groups of Grey-crowned Babblers are active within areas that have been already rezoned for either industrial or residential uses. For example, Grey-crowned Babblers have been recorded throughout the current industrial area, but it is likely that the suitability of this habitat will be reduced following the development of all the current lots.

It is the patchwork of development within the industrial area that has made the site suitable as habitat. Similarly, the birds use open habitat north of the water tower, an area that has been zoned residential. It is likely that with the future development of lots in this zone that the birds will contract their activity range towards Cemetery Road.

Trees within many remaining woodland remnants within the Gloucester valley suffer from severe dieback that may be the result of phosphate being added to the pastures. The progressive loss of tree cover in these remnants will gradually make them unsuitable for Grey-crowned Babblers, thereby reducing the extent of available habitat and further fragmenting the landscape.

### **5.1.2 Habitat degradation**

The habitat requirements of the Grey-crowned Babbler are linked to their tree-foraging needs, nesting needs and ground-feeding needs. Wherever one or more of these habitat elements is missing or removed, Grey-crowned Babblers are usually absent, or soon disappear (Adam & Robinson 1996). Furthermore, because degraded and smaller remnants tend to have an open understorey and high edge-to-area ratio, their dependent fauna is more vulnerable to predation by foxes, cats and other birds than the fauna of larger, more intact remnants of native vegetation (Robinson 1994).

Babbler habitat degradation also occurs from the removal of coarse, woody debris within woodland remnants for firewood and fire protection works. Such simplification of the ground layer decreases the amount of foraging habitat available for Grey-crowned Babblers (Martin & Possingham 2005). Timber removal is a problem near large towns, where firewood collection significantly reduces the amount of potential foraging habitat.

Remnant woodland habitats within private properties in Gloucester may be degraded as a result of overgrazing of understorey vegetation, leading to the invasion of introduced weed species such as perennial grasses which dominate the understorey layer and affect the long term regeneration of the woodland remnants.

The preferred open woodland habitat of the Grey-crowned Babbler is a fine balance between over grazing which reduces the habitat complexity of the remnants and the cessation of grazing which sees an increase in ground cover. This can be seen clearly in the bushland remnant near the water tower where weeds have rapidly increased following cessation of grazing.

The maintenance of road reserves can also reduce the suitability of this habitat for Grey-crowned Babblers (Adam & Robinson 1996). Generally the management actions reduce the number of smaller trees and shrubs.

### **5.1.3 Mortality from predation and collision**

Mortality can be influenced by habitat degradation. A reduced shrub layer within foraging habitats and narrow rows of roadside trees make Grey-crowned Babblers vulnerable to predation by feral animals including foxes and cats, and nest predation by native species including Pied Butcherbirds (*Craticus nigrogularis*), Laughing Kookaburras (*Dacelo novaeguineae*), Australian Magpies (*Gymnorhina tibicen*) and Australian Ravens (*Corvus coronoides*).

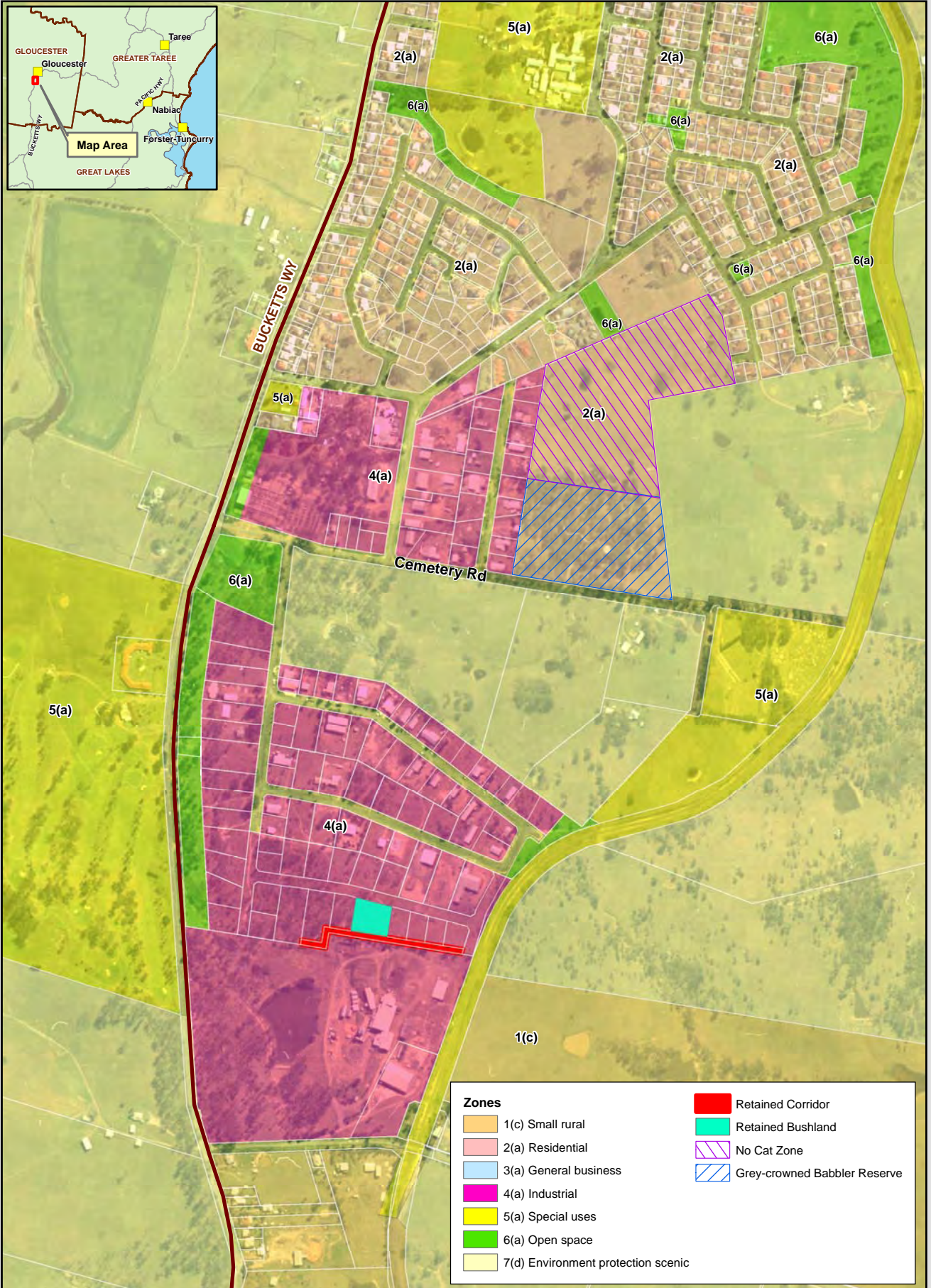
The typically slow and low flight of the species from one side of the road to the other makes the species susceptible to being killed on roads. This susceptibility is compounded by the fact that most of the nesting and foraging habitats occur on either side of roads with moderate traffic volume including Tate Street, Jacks Lane, Waukivory Road and Cemetery Road. An example of such an incident occurred in January 2005 when a motor vehicle resulted in the death of three Grey-crowned Babbler birds on Bucketts Way Road which is a busy regional road (P. Drake-Brockman *personal communications* 2005).

## **5.2 Current Grey-crowned Babbler management at Gloucester**

To date, Gloucester Shire Council has taken some actions to protect Grey-crowned Babblers. These include:

- Retention of remnant woodland habitat used by Grey-crowned Babbler on Cemetery Road and another smaller lot with a thin connective corridor in the industrial area at Lowe Street (*Figure 5.1*). The Cemetery Road remnant is approximately four hectares, although there is considerable growth of weeds and a dense shrub layer thereby reducing the suitability of this area as habitat for Grey-crowned Babblers. The industrial estate remnant is approximately 0.25 hectares and borders a narrow strip running along the south of the existing estate. The industrial estate remnants are in poor condition.
- Creation of open space areas to the west of the industrial area adjacent to Bucketts Way.
- Introduction of a 'no cat zone' in the area proposed for residential development (north-east of the industrial area).
- Planting a mixture of native trees in roadside reserves.
- Producing an environmental newsletter, the 'Environmental Educator', creating public awareness on environmental issues including biodiversity protection. The newsletter is produced by Council for local schools, interested community groups and individuals. The newsletter outlines environmental issues and events relevant to the local community.
- Implementing a Schools Environment Program, co-ordinated by Council. The program aims to combine with school curriculum and promote sustainable activities in relation to waste management, energy efficiency, water conservation, biodiversity and ecosystem management.

Gloucester Shire Council is in the process of creating a roadside vegetation management plan that will identify significant roadside areas including Grey-crowned Babbler habitat (Scott Hoy personal communications 2005).



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— Main Road  
 □ Cadastre

0 200 400  
 Metres  
 Scale 1:10,000

Figure 5.1: Existing protection measures

## 6. Management actions and Recommendations

Local extinction can be partly avoided by habitat management in the short term and large-scale habitat reconstruction in the long term (Possingham & Field 2001). The maintenance of both family groups and their numbers of helpers is important for the population of Grey-crowned Babblers long-term survival in the Gloucester area. It is especially important that viability of the two family groups be maintained because they represent the northern extent of the Gloucester population. Once a family group declines to less than four, the group is unlikely to successfully breed. Furthermore, natural colonisation cannot occur if there is an absence of suitable habitat with good connectivity.

The survival of the two family groups depends on the appropriate protection and management of remnant habitat on roadsides and both public and private land. As a precautionary measure, it is important that more than just adequate amounts of habitats are maintained. Rehabilitation should be considered as a measure to enhance habitats, bearing in mind that rehabilitated habitats take many years to develop to a fully functional stage.

The management actions outlined are in most cases not prescriptive, since the restoration and rehabilitation of habitats is by its very nature a dynamic process. Management of the habitat and species must be adaptive, recognising that the management of natural resources is always experimental, that we can learn from implemented activities, and that management can be improved on the basis of what has been learned. Input into the monitoring and review of previous actions is needed and this role should be provided by Council.

The management actions detailed below are also based on the precautionary principle, namely that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

### 6.1 Habitat protection and maintenance

Grey-crowned Babblers are dependent on habitat and habitat corridors that cannot be created easily. Consequently, protection of significant habitats should be the priority for Grey-crowned Babbler conservation in Gloucester.

#### **Objectives**

- To maintain and protect woodland remnants that form part of a corridor network and other habitats that have potential for regeneration for the longer term benefit of the species.

- To protect habitat of existing groups to promote increases in group size and breeding success.

### **Criteria**

The net extent of suitable habitat remains the same or increases.

### **Actions**

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#### **Action**

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- Protect remnant vegetation north of Cemetery Road, adjacent to the water tower, through rezoning as Environmental Protection (Wildlife Habitat) 7(l).
  - Negotiate statutory environment protection for vegetation remnants on private property east of the northern rail line. This can be achieved through a variety of mechanisms including property vegetation plans or voluntary conservation agreements, but should be included in any future rezoning/subdivision plans.
  - Maintain vegetation within existing remnants so as to protect and enhance the woodland characteristics. This may include small light control burns to reduce weeds and dense vegetation cover. It will be important to maintain edge habitats within the remnants.
  - Provide buffers comprising of at least 20 metres around all remnant patches. This will not only protect the remnant vegetation but will also provide suitable edge habitats.
  - Consider controlled grazing within remnants instead of controlled burning to keep the open nature of the vegetation. Grazing should only be used in mature remnants in which grazing will not stop the natural pattern of regeneration.
  - Retain large trees (approximately 60 centimetres diameter at breast height) due to the significantly larger surface area that provides foraging resources for insects as well as the safety of nesting sites (Robinson 1994).
  - Prohibit firewood collection within public controlled remnants and within roadside reserves.
  - Implement a program of weed control within remnant vegetation that opens up the ground cover and promotes natural regeneration.
  - Maintain roadside vegetation in a way that minimises disturbance to the shrub and ground layer and allows for a diversity of plant species. This may include using small, light control burns in consultation with the Rural Fire Service. An important element of all roadside vegetation management should be the maintenance of suitable vegetation structure. This may include only using control measures such as slashing and burning in areas that have high fuel loads and pose a risk to public safety. A mosaic pattern could be produced along longer lengths of road maintaining some suitable habitat at any one time.
  - Create a roadside vegetation management plan that identifies significant Grey-crowned Babbler habitats in roadside areas, which is regularly updated with information from population monitoring (see Section 6.7).
  - Implement protocols for vegetation management by Council employees including frequency of slashing and maintenance activities in weed infested areas.
  - Support the 'no cat zone' with regular trapping of cats and other feral predators within the Council managed lands.
- 

## **6.2 Habitat restoration and corridor creation**

Revegetation is a longer term management action and plays an important role in securing the family groups, especially within the precinct of increasing surrounding development. *Figure 6.1* shows the areas proposed for rehabilitation mentioned.



For the rehabilitation works to be effective, sites must be regularly managed to be prevent weed invasion, with occasional light and small burns (Adam & Robinson 1996; Cole & Lunt 2005).

### **Objective**

- Enhance the habitat of existing groups to promote increases in group size and breeding success.
- Restore degraded habitats and create habitat corridors for tree-less areas within the foraging range of Gloucester township and the wider valley.

### **Criteria**

The net extent of suitable habitat and connectivity increases.

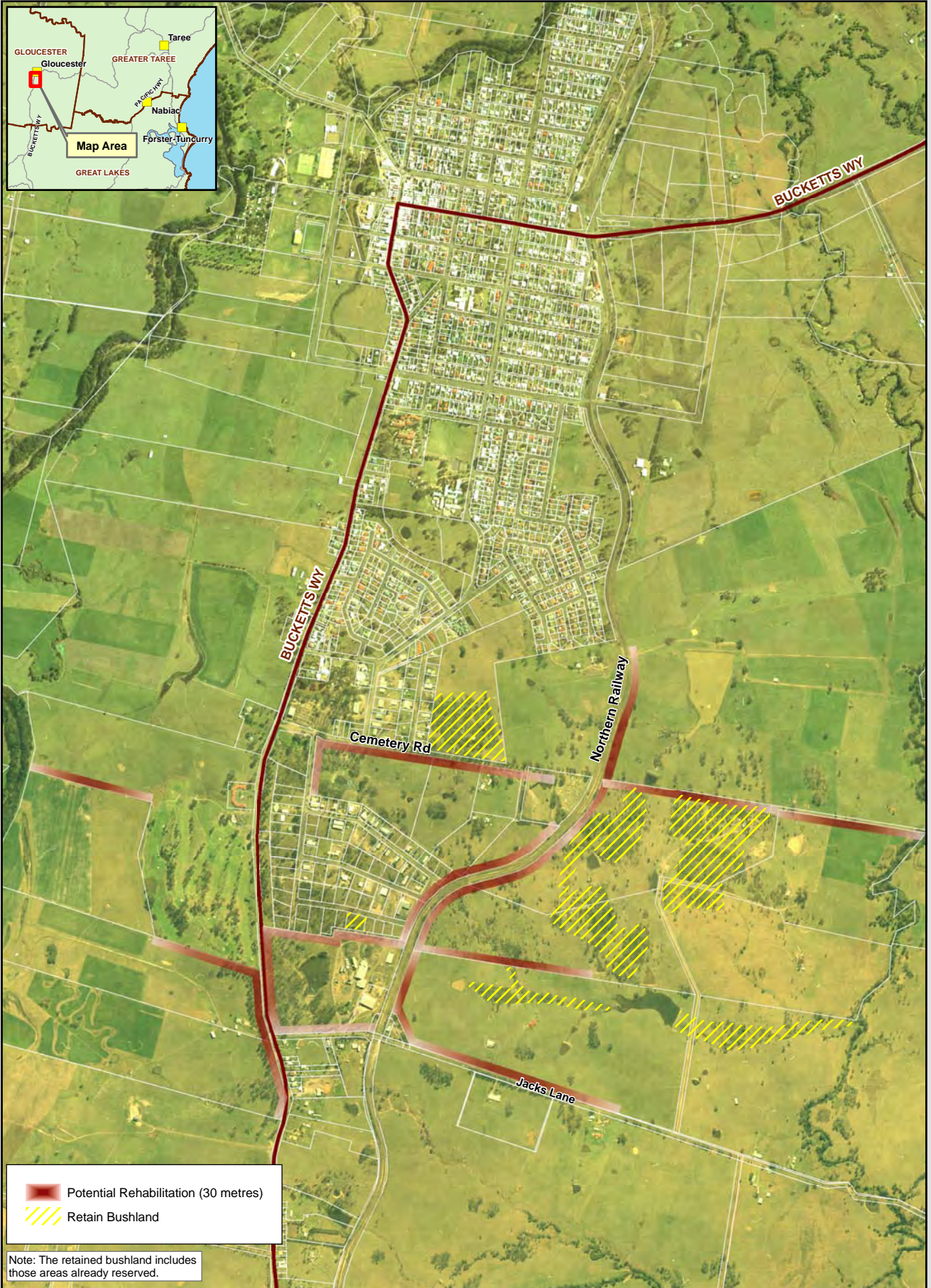
### **Actions**

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#### **Action**

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- Increase the width of roadside vegetation along Cemetery Road and Waukivory Road to at least 20 metres. This can be achieved either through purchase of land or as part of future zoning proposals. Reclaimed land should be fenced and allowed to naturally regenerate with minimal maintenance in order to protect the open nature of the woodland vegetation. Revegetation should be used as a secondary program, using a mixture of species and aiming for a mixture of age classes.
  - Create a linear habitat corridor along both sides of the railway line within open space land at the cemetery (west side) and private land zoned as environment protection (east side). The corridors would connect with the southern half of the industrial area near Lowe Street and Jacks Lane. For corridors to be effective they should be a 20 to 30 metres wide and should comprise of native indigenous species such as those listed in *Appendix A*.
  - Increase the width of the corridor south of the current industrial area and extend to the west to join the Buckets Way. This can be best achieved through future rezoning and subdivision. The corridor should be at least 20 metres wide and provide suitable open woodland habitat.
  - Investigate opportunities to increase the width of roadside vegetation along Bucketts Way, through education and providing incentives to landholders.
  - Investigate opportunities for regeneration of native vegetation in the corner of paddocks that would connect to roadside vegetation. Any such areas should be fenced.
  - Allow vegetation to initially naturally regenerate so as to provide variation in ages of plants.
  - Promote mixed plantings of indigenous tree species through a local or regional nursery (*Appendix A*).
  - Provide incentives for private landholders to fence buffer strips next to existing habitat along roads and around remnant vegetation to encourage tree regeneration.
  - Maintain regenerated areas as per Section 6.1 above.
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2116585A\_2007\_Potential\_rehabilitation.mxd

Figure 6.1: Areas of priority for potential rehabilitation and retention

## 6.3 Road and traffic management

With the importance of roadside vegetation in the overall management of the Grey-crowned Babbler, there will be situations where birds are put at risk from collision with vehicles.

### **Objective**

Prevent/reduce the incidence of collision of Grey-crowned Babblers with motor vehicles.

### **Criteria**

There is an overall reduction in the number of Grey-crowned Babbler deaths due to vehicle collision.

### **Actions**

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#### **Action**

- Implement go-slow areas through speed restrictions and/ or traffic control measures, particularly along Cemetery Road, the industrial area around Tate Street, and Jacks Lane.
  - Erect road signs with a image of a bird resembling a Grey-crowned Babbler along Cemetery Road, Tate Street, Jacks Lane and at the entrance to the town along Bucketts Way.
- 

## 6.4 Public education

Public participation in the overall protection of the Grey-crowned Babbler is important since private lands will play a significant role in the overall habitat retention.

### **Objective**

To promote public education awareness of the threats, ecology and management issues surrounding Grey-crowned Babbler groups within Gloucester.

### **Criteria**

Residents and visitors to Gloucester are provided with information highlighting the importance of Grey-crowned Babblers and in particular the need for habitat protection and details of management actions implemented.

### **Action**

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#### **Action**

- Raise awareness of Grey-crowned Babbler issues through public workshops and a variety of media (eg. The Environmental Educator quarterly newsletter). The management of Grey-crowned Babbler habitat and other threats to the species should be highlighted through the newsletter, providing a public forum for nature conservation activities.

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**Action**

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- Promote Grey-crowned Babbler habitat friendly land use practices including habitat management and rehabilitation, as well as avoiding planting non-indigenous trees that encourage competitors and nest predators of Grey-crowned Babbler (see *Appendix A* for list of native indigenous tree species).
  - Continue to educate school children through the Schools Environment Program co-ordinated by Gloucester Shire Council. Local schools could be involved in tree planting activities and this process would allow children to be practically involved in conservation.
  - Create an education brochure that contains comprehensive information about Grey-crowned Babblers, their habitats, threats and habitat management. The brochure should be distributed to Gloucester residents (suburban and rural) and school groups as well as tourists through the information centre and Gloucester Department of Environment and Conservation office.
  - Erect educational signs in prominent areas such as the cemetery, the water tower remnant and visitors rest area along Bucketts Way that inform visitors and residents about Grey-crowned Babblers and their status under the *Threatened Species Conservation Act 1995*.
  - Erect signs at restoration sites informing the public of the aims of the restoration and their function in the wider plans for the Grey-crowned Babbler.
- 

## 6.5 Grey-crowned Babbler research

This retention plan is based on a number of assumptions about the viability of the Grey-crowned Babblers within Gloucester Shire. Further research, supported by Council and undertaken by either community groups or university students should be encouraged. Such research will contribute to the better understanding of management issues.

**Objective**

To provide a better understanding of the Grey-crowned Babbler family groups that make up the population in the Gloucester area and the issues surrounding their management.

**Criteria**

The level of knowledge and understanding of the distribution of groups and their viability within Gloucester Shire increases in a manner that contributes to the overall management of the species and their habitats.

**Actions**

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**Action**

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- Study the relationship between the Gloucester/ Monkerai Grey-crowned Babbler population, the Krumbach/Dyers Crossing/Medowie population and the Stroud/ Dungog/ Clarencetown population. This should be encouraged by Council through liaison with local environment groups and nearby universities including the University of Newcastle and University of New England.
- Provide support for monitoring and ecological studies of Grey-crowned Babbler populations in and around Gloucester. The level of detail of the studies would be appropriate for a Masters or Honours level of academic research. Friends of the Grey-crowned Babbler should be approached to assist with research studies.

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**Action**

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- Seek funding assistance from regional and State government, research bodies and non-government organisations for such research. For example, the Upper Hunter Regional Environment Strategy can assist in sourcing funds to provide information on the dynamics and viability of Grey-crowned Babbler population.
- 

## 6.6 Planning controls and options

Planning controls should be implemented for the future expansion of urban and industrial lands to the east and south of the current township taking into consideration the protection of Grey-crowned Babbler habitat. In order for the retention plan to be successful, planning controls have to consider potential adverse social and economic impacts that may result from the implementation of the plan. Consideration of such impacts should be specifically linked to consultation arrangements between residents, property developers, town planners, ecologists, local environment groups (Friends of the Grey-crowned Babbler), Department of Environment and Conservation, as well as other stakeholders.

Primarily, habitat protection should be considered in planning decisions where appropriate with revegetation works considered as a supplementary and longer term action to protect the species.

**Objective**

To incorporate the consideration of Grey-crowned babbler family groups in Gloucester, early in the decision making and land use planning process.

**Criteria**

Future planning decisions take into consideration habitats of the Grey-crowned Babbler.

**Actions**

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**Action**

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- Protect Grey-crowned Babbler habitat to the east of the north coast rail line through provisions of the local environment plan at the rezoning stage. This would apply to land proposed for small rural 1(c). The habitat and a suitable buffer can be transferred into public ownership and management (with a zoning 7(I) Wildlife Habitat). Alternatively public positive covenants can be placed over the land with suitably sized lots created for habitat protection that would allow a dwelling to be constructed. For the purpose of these developments Council may consider including these larger lots in the calculation of average lot size, while at the same time setting a limit on the minimum lot size.
- Extend the 'no cat zone' implemented in the recent residential subdivision to all new subdivisions including small rural, residential and industrial.
- Implement a tree preservation order for the Shire that applies to small rural and residential areas that protects native species of tree with a diameter at breast height greater than 50 centimetres and a height greater than two metres. This should focus on rough-barked species.
- Incorporate buffer zones of 10 to 20 metres between proposed developments and significant habitats (including corridors) of the Grey-crowned Babbler. For example, the development areas surrounding habitats used at the water tower on Cemetery Road and along Tate Street.

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**Action**

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- Incorporate landscaping/ streetscape guidelines as part of a development control plan for new subdivisions that take into consideration potential habitat creation through the use of native indigenous plant species.
  - Include roadside reserves in structure plans for new subdivisions that strategically link habitats.
  - Ensure that all levels of development applications undergo a thorough and appropriate development assessment process taking into consideration the full impacts on Grey-crowned Babblers and their habitat.
- 

## 6.7 Monitoring

Monitoring is an important element of any conservation plan, particularly where management actions should be adaptive.

**Objective**

To determine if management activities meet the stated aims and objectives.

**Criteria**

The effectiveness of management actions are appropriately determined and necessary changes made to future actions.

**Actions**

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**Action**

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- Review this retention plan yearly with regard to any future recovery plans as well as any best practice guidelines produced by the NSW Department of Environment and Conservation as part of the recovery planning process.
  - Monitor the following at least twice per year: restoration works undertaken; regeneration of native plant species; weed species regeneration; and, presence of feral animals within remnant habitat. Monitoring should be structured to determine the success of the program in relation to the quality of the Grey-crowned Babbler habitat.
  - Monitor numbers of Grey-crowned Babblers including nesting and breeding activity within the groups at least twice per year.
-

## **7. Communications, reporting and review requirements**

Reporting of the outcomes of management actions is important in ensuring their effectiveness. Details of management actions undertaken must be recorded along with any subsequent outcomes.

All contractors must report on all management actions completed including weeding, revegetation and rehabilitation. This information should be provided monthly and should include details of the area worked, the type of work carried out and any problems encountered. This information should be provided to the Director of Planning and Environment or their representative, who will regularly brief the relevant Council members, staff and management.

Council should report yearly on the success or otherwise of the retention plan in Gloucester's State of the Environment Report.

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## **Appendix A**

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Native plant species from the  
Gloucester township area

## **Appendix A: Native plant species indigenous to Gloucester township area**

<b>Scientific name</b>	<b>Common Name</b>
<i>Eucalyptus carnea</i>	Broad-leaved White Mahogany
<i>Eucalyptus paniculata</i>	Grey Ironbark
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus tereticornis</i>	Forest Redgum
<i>Eucalyptus globoidea</i>	White Stringybark
<i>Eucalyptus eugenoides</i>	Narrow-leaved Stringybark
<i>Eucalyptus maculata</i>	Spotted Gum
<i>Eucalyptus molluccana</i>	Grey Box
<i>Eucalyptus. amplifolia</i>	Cabbage Gum
<i>Eucalyptus microcorys</i>	Tallowwood
<b><i>Angophora subvelutina</i></b>	Broad-leaved Apple
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Allocasuarina torulosa</i>	Forest Oak
<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark
<i>Acacia irrorata</i>	Wattle
<i>Acacia ulicifolia</i>	Prickly Moses
<i>Pultanea villosa</i>	Hairy Bush Pea
<i>Jacksonia scoparia</i>	Winged Broom-pea, Dogwood
<i>Exocarpos cupressiformis</i>	Native Cherry
<i>Bursaria spinosa</i>	Blackthorn
<i>Themeda australis</i>	Kangaroo Grass
<i>Poa labillardierei</i>	Tussock Grass
<i>Cymbopogon refractus</i>	Barbwire Grass