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THE HUGHES GARRAN WOODLAND

-- a draft Management Plan

A. Fearnside, J.W. Shirley: Friends of ACT Arboreta.
S. Sharp: Ecological Consultant.



The mown walking tracks have greatly increased the local community's use of the Woodland.



ACT
Government



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Thank you also to members of the Hughes Garran Woodland Group who helped with data collection and in producing the report.

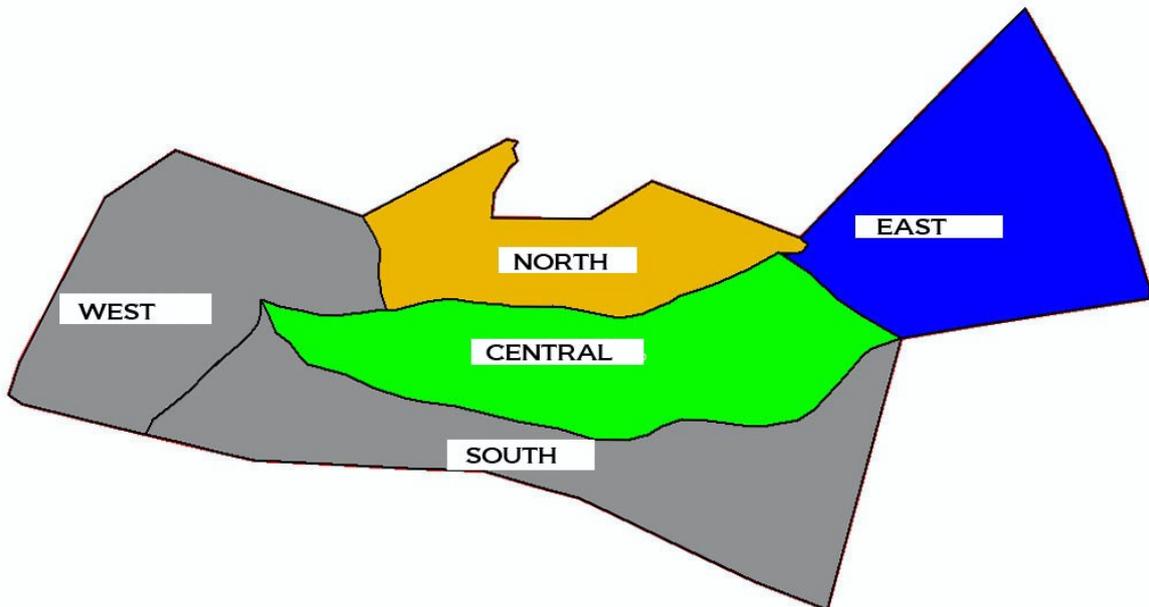


Figure 1. A diagram of the Woodland showing its division into management units. This is central to the proposed management of the Woodland. Each colour is managed differently, according to the features of the site. Further details on page 16.

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HUGHES GARRAN WOODLANDS

- a draft Management Plan

Summary

This draft plan has been produced by consultants in collaboration with the land owner and the volunteer group that contributes to the management of the Woodland. Funding was provided by the ACT Government.

The eight hectare Woodland is partially linked to the Red Hill Nature Park and shares many of its features. It is bordered by the suburbs of Hughes and Garran with the Southern Cross Retirement Village at the western end and Kitchener Street to the east. The original landscape was yellow box-red gum grassy woodland but about a century of grazing and the development of the adjoining suburbs has substantially modified that landscape. Fortunately, in 1965 much of the Woodland was planted up with trees common to the area, eg yellow box, apple box and Blakely's red gum, providing a basis for re-establishing the Woodland. The original understorey was largely destroyed and much of the original wildlife has probably been severely reduced.

The immediate objective of managing the Woodland is to provide a recreational amenity for the local community; it is not a Nature Park. In the longer term, however, the aim is to restore the area to a diverse box-gum grassy woodland.

The consultants anticipate a number of matters that need to be addressed, these include:

- The invasion of weeds including introduced woody weeds; grass and broad leaved weeds dominate the ground cover.
- Opening up some of the densely planted stands to provide a woodland landscape.
- Enhance bird life by re-establishing an understorey and the provision of bird boxes.
- Maintenance of the Woodland to ensure safe access for its users and the protection of the Woodland and surrounding houses from fire.

The area has been mapped to show the vegetation and natural features of the Woodland as well as access roads and walking tracks. The Woodland was divided into five Management Units (MUs) according to their different requirements, their boundaries being defined by service roads and walking tracks. Features of each of these MUs are described in some detail and form the basis of the Management Plan.

The Plan prescribes the activities that both the Hughes Garran Woodland Group and the ACT Government have agreed to undertake in each of the Management Units over a period of ten years. The implementation of the plan will be via a rolling program approved annually by the volunteer Group and the ACT Government.

This draft will then be made available to the local community for further comment.

When concluded, the Plan will be a guide for the parties involved, not a formally binding agreement.

Introduction

The Hughes Garran Woodland

The Woodland is an amenity park (Block 54, Section 8, Hughes) of approximately 8 hectares. It is bordered by the suburbs of Hughes to the north and Garran to the south and east. Kitchener Street delineates the north eastern end and the Southern Cross retirement village the western border. It is located along a ridge connected to Red Hill and is described as remnant yellow box-red gum grassy woodland.

Since European settlement in the 1860s until the mid 1960's the area was grazed. It was held as a grazing lease by Charles C. Russell from the 1930s until the mid 1960s when the area was designated for urban settlement – the first houses built in the Woden Valley.

As indicated by Figure 2, the original woodland had been seriously depleted by this point in time; only three or possibly four original trees can now be identified in the park. However, in 1965 much of the area was planted up to a number of eucalypt species many of which – but not all – were appropriate to the site. From 1965 the Woodland has been maintained by the ACT Government, largely by mowing the boundaries and occasionally prescribed burning of the area. In 2003, a Landcare Group was established to improve the amenity and ecological values of the park. Some tree planting and woody weed control, the latter largely by the Conservation Volunteers of Australia, was undertaken. A combination of drought and a control burn in 2007 resulted in considerable damage to many of the trees. In 2011 the level of activity was increased; walking tracks were cut through the Woodland to improve access and further plantings of trees and shrubs occurred.



Figure 2. An aerial photograph of the 'new' suburb of Hughes taken in 1963 shows the barrenness of the site and the few trees present at the time. Part of the Hughes Garran Woodland is at the base of the photograph (Canberra Weekly 15 Nov 1963).

Community use and participation

The Woodland is used as both a thoroughfare and for recreation. Both children and adults pass through the park to shops and business premises and the three schools in proximity to the park. But since the establishment of the walking tracks it is increasingly used for recreation, with people walking through the Woodland rather than around it.

It is proposed that this report be provided to the ACT Government and the Hughes Garran Woodland Group for their input. Comment on the Working Plan will be sought from residents inside the Kitchener Street, Wisdom Street, Yamba Way loop, by circulating the Summary together with advice that the full report is accessible on line. Finally the land owner (ACT Government) and the volunteer group (the Hughes Garran Woodland Group) must sign off on the Plan. Permanent and/or temporary signage could be erected to further encourage local community participation in the Group's activities.

The consultancy

In 2011 the Hughes Garran Woodland Group obtained a small ACT Environment Grant to develop a Long Term Management Plan for the Woodland. The aim of the Working Plan is to seek a better understanding of the history, community use and the ecology of the Hughes Garran Woodland, and to document an agreed approach to its management. Key stakeholders are the ACT Government (the land owner) and the Hughes Garran Woodland Group.

Local consultants were engaged to develop the draft Plan. Mr Tony Fearnside is an urban forestry consultant with significant experience in forest and bushfire management; Ms Sarah Sharp is a consultant plant ecologist specialising in the conservation of lowland ecosystems in the ACT and surrounding region; Mr Jim Shirley is a professional forester specialising in forest assessment and mapping. Both Tony and Jim participated as members of the Friends of ACT Arboreta. The consultancy has set out to capture the following key elements:

- Document the current status of the Woodland, in particular:
 - The ecology of the Woodland
 - Fire management
 - General management issues/considerations
 - Establishment of Management Units
- Develop a Management Plan for the respective Management Units.

Once approved by the key stakeholders, the Long Term Management Plan will provide the focus and direction for future planned activities for the Hughes Garran Woodland volunteer group.

Characteristics of the Woodland

Mapping

An aerial photograph captured by Nearmap (<http://www.nearmap.com/>) in September 2011 was spatially registered in GIS software, using coordinates determined in Google Earth. Positional accuracy is approximately +/- 10m. The outer edges of individual tree canopies were digitized from the image, where they could be distinguished, and labelled with species common names after field verification. Other vegetation types, such as areas of kangaroo grass and newly planted areas were added from field sketches. Surface rock was plotted. Finally, physical features such as walking tracks, access points and boundary fence-lines were digitized from the photograph.

Maps of the Woodland and the individual Management Units (pages 15-31) were prepared as the basis for establishing the MU's.

Classification of the vegetative cover (Figure 21, page 43) was achieved by intersecting the tree crowns with a 30m x 30m square grid. The percentage of each grid covered by tree crowns was estimated and each grid classified on the basis of Australian Bureau of Agriculture Resource Economics and Sciences' crown cover classification. This classification is as follows: Closed forest 100 to 81% cover; Open forest 80 to 51%; Woodland 50 to 31%; Grassland < 30%.

Soils

Two or three small soil pits were dug in each Management Unit; results are presented in Appendix 2, page 44. The results indicate that apart from the incidence of rock in several Management Units (particularly the West MU and the eastern end of the South MU), the soils are relatively good; with the A1 horizons 8 to 20cm, A2 horizons 25 to 70cm deep. 'A' horizon textures were mostly sandy loams, B horizons red or occasionally yellow red clays. The South MU had a particularly deep and moist A horizon supporting a vigorous cover of couch grass as well as established and newly planted trees. The vegetation suggests the gully part of this MU can be wet for part of the year.

Ecology

Vegetation: The Hughes Garran Woodland is a substantially modified remnant of yellow box-red gum grassy woodland (Appendix 3, page 45). Indigenous species within the park include yellow box (*Eucalyptus melliodora*), Blakely's red gum (*E. blakelyi*), red box (*E. polyanthemos*) and apple box (*E. bridgesiana*). Only three or four trees in the Park are original, and are probably very old (more than 200 years). There is a considerable loss of native diversity, with extensive clearance of trees at some time in the past, and there has also been a significant loss of native herbaceous plants. There has been extensive tree planting, mostly in 1965. Some of the trees that have been planted are not indigenous to the ACT (eg ironbark (*Eucalyptus* sp.), Argyle apple (*E. cinerea*), blue gum (*E. bicostata*), willow-leaved peppermint (*E. nicholli*), or are unlikely to have been present in this woodland prior to disturbance, eg brittle gum (*E. mannifera*). Nevertheless, some are suited to the site and provide habitat for a range of species. Much of the earlier tree planting is closely spaced and has formed a closed canopy, adversely affecting the midstorey and the natural regeneration of trees.

The midstorey is dominated by acacias, including green wattle (*Acacia mearnsii*) and occasional *Cassinia* species and *Grevillea* species.

A plant species list is presented in Appendix 4, page 46. The list is incomplete, based on species observed on one occasion (March 2012) and also includes species that have been planted. Further surveys of the plants in each of the Management Units are recommended, including more quantitative surveys to determine the condition of the woodland in each unit. The ground layer is typical of a site that has had considerable disturbance following the establishment of the residences in the surrounding area. It is very likely that the park was dominated by native ground layer species, possibly with a high diversity of species, prior to the establishment of the suburbs, even though grazing would have been undertaken prior to that.

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Tree health: The control burn under drought conditions in 2007 killed about 80 trees and caused massive damage to most of the remaining trees to the point where many are likely to die. The dead bark still in place around the lower bole and the accumulated debris in the coppice of many living trees will increase the risk that the next control burn kills these trees. Consideration needs to be given as to how best to protect the already damaged trees and to prevent damage to the remainder.



Figure 3. The impact of fire and drought on the 1965 plantings of yellow box. *Left:* Fire-killed trees coppicing from the base. *Right:* The flaky bark on the lower trunk results in the tree being effectively ringbarked, even by a mild burn. Accumulated bark around the base of the tree has been removed.

Weeds: A high level of disturbance has resulted in a high cover of introduced species, including the invasive Chilean needlegrass (*Nassella neesiana*) and African lovegrass (*Eragrostis curvula*), most likely brought in and spread on mowers. Other weeds include St John's wort (*Hypericum perforatum*), blue periwinkle (*Vinca major*), blackberry (*Rubus fruticosus*), perennial couch (*Cynodon dactylon*) and the annual grass, wild oats (*Avena* spp.), which is likely to have invaded as a result of soil disturbance and mowing. The rocky outcrops have retained a higher component of native species, because they have been disturbed less by mowing and other machinery. The Eastern Management Unit is predominantly covered by a low diversity of native species (mostly grasses, but including some other herbaceous species), except for some patches which are invaded by exotic species, including Chilean needlegrass.

Weeds are the greatest threat to both amenity and ecological values in the park. Threats include:

- Increased cover of woody weeds including wattle (both local and introduced) limiting diversity of ground layer species and creating a fire fuel hazard.
- Replacement of native species by more invasive species (especially Chilean needlegrass and African lovegrass).
- Increased fire hazard by annual species which die in summer (especially wild oats).

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Declared pest plants present in the park are Chilean needlegrass, African lovegrass and Cootamundra wattle. In addition, there are other less invasive weeds that are a fire fuel threat (including wild oats and woody weeds). Where it is dominant wild oats is a strong competitor and effectively prevents many native species from establishing. Other weeds reduce the amenity of the park (including woody weeds, mullein, horehound, fleabane, milk thistle and mustard weed).

The environmental weed danger rating of the **declared pest plants** in Hughes Garran Woodland is presented in Table 1. The rating is taken from ACT Parks and Conservation Service (2011).

Table 1. Environmental weed danger rating of Hughes Garran Woodland weeds.

Environmental weed danger rating	Extreme	Very high	High	Moderate
Species	Chilean needlegrass African lovegrass		Cootamundra wattle	

Remnants of a number of woody weeds – mostly escapes from domestic gardens – remain but these have largely been controlled by the volunteer group. These include nettle tree (*Celtis australis*), cotoneaster (*Cotoneaster* sp.), black locust (*Robinia pseudoacacia*), oak (*Quercus* spp.), plum (*Prunus* sp.) and claret ash (*Fraxinus* sp.). Since the control burn in 2007, green wattle (*Acacia decurrens*) and Cootamundra wattle (*A. baileyana*) have proliferated in separate parts of the park. A list of introduced species and weeds in the Woodland is given in Table 7 (page 46) and Table 9 (page 51).

Birds and other fauna: Bird species that have been observed at a nearby residence are listed in Table 2. Planting species such as bottlebrushes (*Callistemon* spp.) attract birds, but generally only larger birds. By enhancing habitat for invertebrates (shelter and food) a wider range of bird species are attracted to an area, particularly small woodland birds. This can be achieved by planting indigenous native species and providing other habitat such as fallen timber (Taws, 2003). Efforts will be made to contain the spread of feral birds, ie Indian mynas and feral pigeons.

It is unknown what other native fauna occur in the park, but it is likely to be inhabited by possums and small lizards. It is likely that cats (domestic and wild) inhabit the park, and that foxes are also present. However, it is not likely that either can be controlled successfully.

Table 2. Birds observed at Lynch Street, Hughes, 1970-2012.

Australian birds		Exotic birds
Sulphur-crested cockatoo	Pardalotes (feed on lerp insects etc; nest in garden soil)	Black birds
Eastern rosella	Tufted or crested pigeons	Starlings
Crimson rosella	Spotted turtle dove (looks like a spotted pigeon)	Indian mynas
Australian king parrot	Robins	Feral pigeons
Galahs	Blue wrens	Sparrows- house sparrow
Gang-gangs	Silver eyes	
Superb parrots (a pair for 2 weeks)	Thornbills	
Red rump parrot (often mistaken for the superb parrot)	Finchs – zebra finch	
Some green lorikeets	Apostle birds	
Some green and blue parrots	Currawongs	
Cuckoos	Choughs	
Owls	Magpies	
Red wattlebird, other wattlebirds	Crows/ravens	
Friar birds	Wild ducks (with ducklings)	
Noisy miners	2 visits several years apart	
Kookaburras		
Mudlarks		
Willie wagtails		

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Microhabitat characteristics that are important for fauna of the box-gum woodland include:

- Hollow-bearing trees (five trees only).
- Emergent/standing dead trees.
- Fallen timber and logs.
- Structural complexity.
- Mosaic habitat.
- Rocky outcrops.
- Connectivity.

The Woodland is connected at its eastern end to the Red Hill Nature Reserve, via a scattered woodland and planted areas within the Royal Golf Club. While the link would be tenuous for many species, some birds would be likely to move between the Woodland and the Red Hill Reserve.

Restoration of the Woodland – a model

The existing trees, shrubs and to a lesser extent, the ground cover, provide a good basis for restoring the Woodland to something approximating the original landscape and habitat. To achieve this, future plantings should focus (but not exclusively) on the core elements of the yellow box-red gum grassy woodland which are shaded in the **Recommended Planting List** (Table 8, page 48). A typical yellow box-Blakely's red gum open grassy woodland is described below (adapted from Environment ACT 2004). This can be used as a model for restoration of the Woodland, one that is unlikely to be fully realised but which provides a goal.



Figure 4. A yellow box-red gum grassy woodland. Components of an unmodified woodland would include a few, scattered mature trees, regenerating trees of different ages, an understorey of shrubs 1-2 metres high, and ground cover including tussocks, grasses and forbs (ACT Government).

Dominant tree species: Yellow box (*Eucalyptus melliodora*) and Blakely's red gum (*E. blakelyi*) are the dominant tree species in the ACT. Common eucalypt associates are apple box (*E. bridgesiana*), brittle gum (*E. mannifera*), scribbly gum (*E. rossii*) and red stringybark (*E. macrorhyncha*). Other trees and tall shrubs include cherry ballart (*Exocarpus cupressiformis*), silver wattle (*Acacia dealbata*), black wattle (*A. mearnsii*) and hickory wattle (*A. implexa*). Open woodlands have a canopy tree cover of approximately 20%, which equates to approximately 10 mature trees per hectare. Some of the plantings in the Woodland are as high as 300 trees per hectare.

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Mid-stratum: Shrubs and sub-shrubs less than 0.5m tall include bitter cryptandra (*Cryptandra amara*), urn heath (*Melichrus urceolatus*) and shrubby rice flower (*Pimelea glauca*). Shrubs occur more frequently on higher slopes as the community merges into forest, and within areas that have been disturbed (eg by fire); acacias may be temporarily common. Regenerating eucalypt seedlings and saplings form a midstorey, particularly after cessation of grazing, when they may form thickets.

Groundlayer: The groundlayer is dominated by native tussock grasses and a high diversity of native forbs (herbaceous non-grass species). The dominant grasses are kangaroo grass (*Themeda triandra*), spear grasses (*Austrostipa bigeniculata* and *A. scabra*), wallaby grasses (*Rhytidosperma*¹ species) and tussock grass (*Poa sieberiana*). Many families of plants are represented in the woodlands, including daisies, sedges, lilies and orchids. Many native forbs are only found in woodlands that have been subject to lower levels of disturbance, particularly the use of fertilisers and/or ploughing. In the ACT all remaining box-gum woodland contains introduced species, ranging from **declared pest plants** such as St John's wort (*Hypericum perforatum*) to less competitive but widespread species such as flatweed (*Hypochaeris radicata*) and common centaury (*Centaureum erythraea*).

Habitat: Box-gum woodland provides habitat for a wide diversity of birds, bats, invertebrates and arboreal mammals. Important habitat features include hollows of all sizes, dead standing trees, thickets of trees and shrubs, rocky outcrops and loose rocks, fallen timber, fine litter, open grassy areas and wet areas (creeks, drainage lines, dams and springs).

Native fauna and flora: Large areas of woodland in relatively good condition support a greater number of threatened species (and other species), than more modified woodland areas. However, birds and other mammals are often highly mobile, and utilise a variety of areas, and thus may be found only sporadically in any particular area. Species utilise different parts of the landscape. For example, hooded robin require large trees for protective cover, areas of grass that support insects and other invertebrates, perching sites within grassy areas and trees and shrubs for sites for nesting. Brown treecreepers require relatively undisturbed grassy woodland with native understorey, large living and dead trees and fallen timber as foraging habitat.

All these characteristics can be enhanced within the Hughes Garran Woodland through restoration. It is recommended that some standing dead trees be retained as these provide important habitat. As such trees may be safety hazards; expert advice should be obtained on how to manage the dead and dying trees in the Park. Thickets of acacias provide habitat for a range of species, and in select locations such thickets should remain. They will naturally thin over time.

Bushfire management

The ACT Government's fire management strategy has been to manage fuel levels by a combination of regular slashing or mowing and fuel reduction burning at five to six year intervals.

Situation: The Garran Hughes Woodland is aligned in a NNW – SSE direction which is the wind direction associated with the most damaging (severe, extreme and catastrophic) bushfire conditions. It is possible to imagine that a fire lit under such conditions at the NW corner would burn very quickly through the whole parkland and threaten houses and property at the SE side, ie, the NE part of Fitchett Street and Maurice Place. However the chances of this happening are low, particularly as there is no "wick" to open areas to the NW.

Under milder conditions, it can be expected that fire crews would be quickly on the scene to control fires, **unless there is a multiple fire situation**. Provided that the vegetation is not allowed to become overgrown, the risk of damage to privately owned property is low under mild bushfire conditions. The bare earth service tracks on all sides of the parkland would be more effective if the breaks alongside the service tracks were mowed as scheduled (on the western boundary there is a concrete path). This would help to prevent fires on the woodland damaging private property.

¹. Wallaby grasses have been recently reclassified at the genus level: *Austrodanthonia* species are now *Rytidosperma* species (Lepschi *et al.* in press).

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Recent fire history: In 2003 the ACT Government undertook fire fuel reduction activities which included the removal of dead trees and shrubs, trees under power lines, woody weeds and approximately 20 self-sown pine trees. There was also a general pruning and removal of rubbish.

Unusually, the burning carried out under the above strategy led to the deaths of a number of yellow box trees following burning in 2007. This was during a prolonged drought period when there were accumulations of dry bark at the bases of the trees and bark on the lower trunks was very dry. When burnt, the trees were effectively ringbarked, with many deaths followed by regeneration from coppice shoots. These are mainly in the eastern end of the Northern and Central Management Units.

There is no known history of unplanned fires apart from fires that were started by children several years ago. These were small and did not cause any damage to property.

Current bushfire management strategy: During the preparation of this plan, officers from the Territorial and Municipal Directorate visited the parkland and modified the fire management strategy which is summarised in the table below.

Table 3. Summary of current fire management strategy

Management Unit	Burning	Slashing	Remarks
WEST	2012-13 and then at 5-6 year intervals	Boundaries by ACT Govt. Walking track boundaries by HGWG.	Burning is expected to benefit the kangaroo grass. HGWG to protect recent plantings.
NORTH	No burning	Boundaries by ACT Govt. Walking track boundaries by HGWG.	HGWG to reduce fuel loadings and widen fire breaks to 15m.
CENTRAL	No burning	None by ACT Govt. Walking track boundaries by HGWG.	Minimum disturbance area.
SOUTH	2012-13 and then at 5-6 year intervals	Boundaries by ACT Govt. Walking track boundaries by HGWG.	HGWG to protect recent plantings.
EAST	No burning	Whole area slashed by ACT Govt.	Slashing only.

This strategy will allow for the development of an understorey in the Central Management Unit which will be an enhanced habitat for wildlife, especially birds.

There are some recent plantings within the Management Units to be burnt. These will require protection by the Group for several years at least if they are to survive a fire.

The areas to be slashed for bushfire mitigation are adjacent to houses. Slashing is likely to spread weeds, especially Chilean needlegrass and African lovegrass, and result in high cover of wild oats.

It is noted that this strategy pays no regard to assessing and reducing fire hazards in gardens or fences adjacent to leased land (ie, outside the fire breaks formed by mowing or slashing beside the service roads).

Risk: The above strategy does not entirely remove the risk of damage from bushfires (a residual risk will remain) but the risk will be kept down to an acceptable level provided that the strategy is effectively applied.

Walking tracks and service roads

The establishment of a number of walking tracks through the woodland has had a major impact on park usage. The tracks also facilitate the division of the Woodland into a number of Management Units (MUs), allowing for the more appropriate management of different parts of the Woodland. It has involved mowing the tracks with equipment provided by the Group and removing midstorey (mostly wattles) from five metres on either side of the track to improve security.

The service roads surrounding the Woodland are maintained by the ACT Government. The location of the service roads and walking tracks are shown on the maps of each MU on pages 15- 31.

Erosion and disturbed ground: Serious erosion is occurring on the service road behind Bamford St. Most of the walking tracks are stable although the one down the western face of Hawk Hill is showing signs of erosion as is the track from the top of the kangaroo grassland (West MU) down slope in a north westerly direction (Sharp 2011).

Rubbish: Adjacent residences, occasionally dump vegetative or other waste, or extend their gardens outside properties. This may require the dissemination of information to residents by the ACT Government. Such activities can result in the spread of garden plants into the park, restrict the ability of slashing of boundaries for fire hazard reduction and in themselves may increase fire fuel hazard.



Figure 5. A walking track along the boundary between the South and Central Management Units.

The Management Units (MUs)

The aerial photographs and information on the vegetation, physical properties and infrastructure were used to divide the Woodland it into a number of Management Units (MUs), each having particular management requirements.

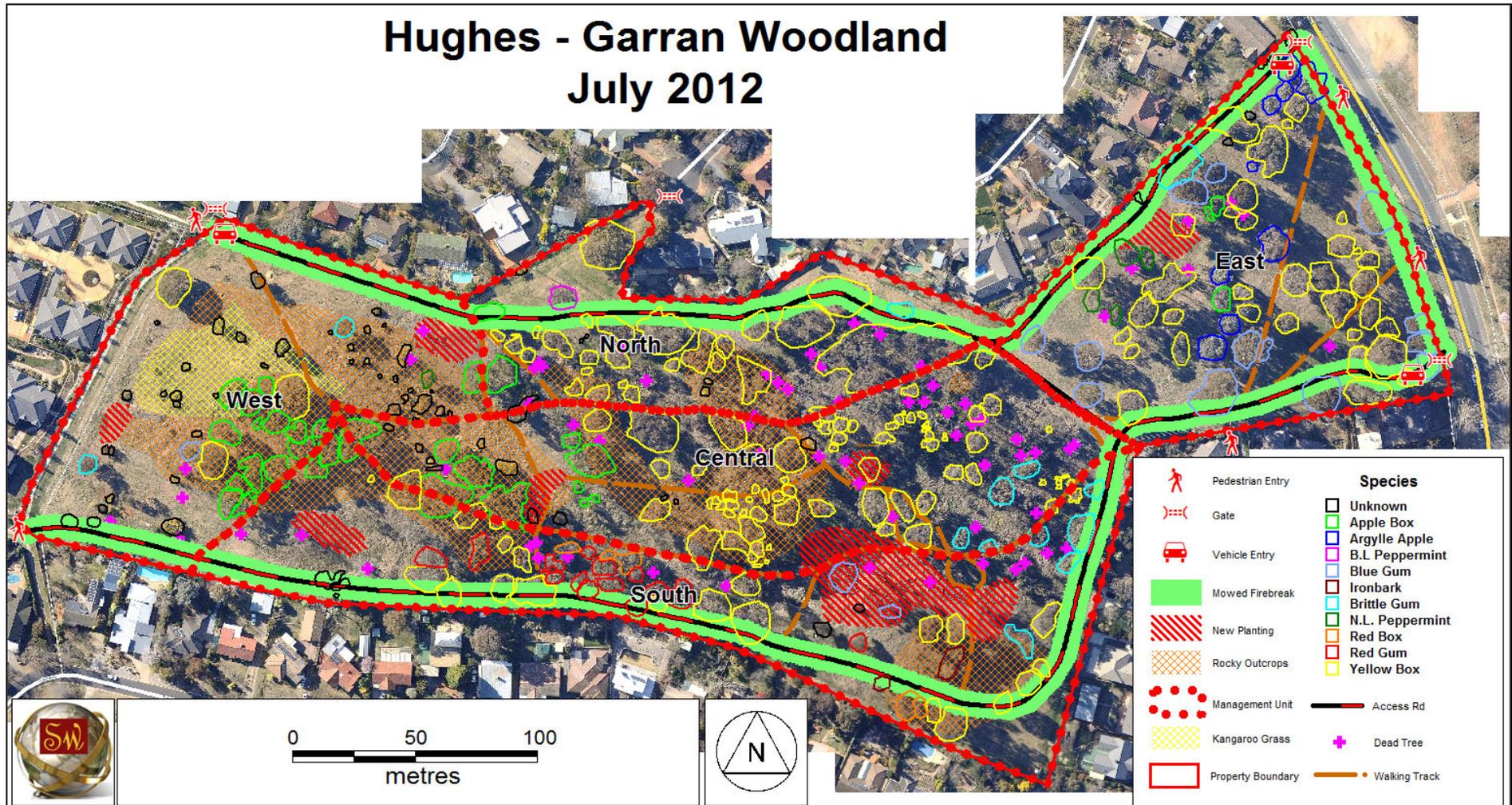


Figure 6. An enhanced aerial photograph showing the trees, grassland, plantings, physical and infrastructure features.

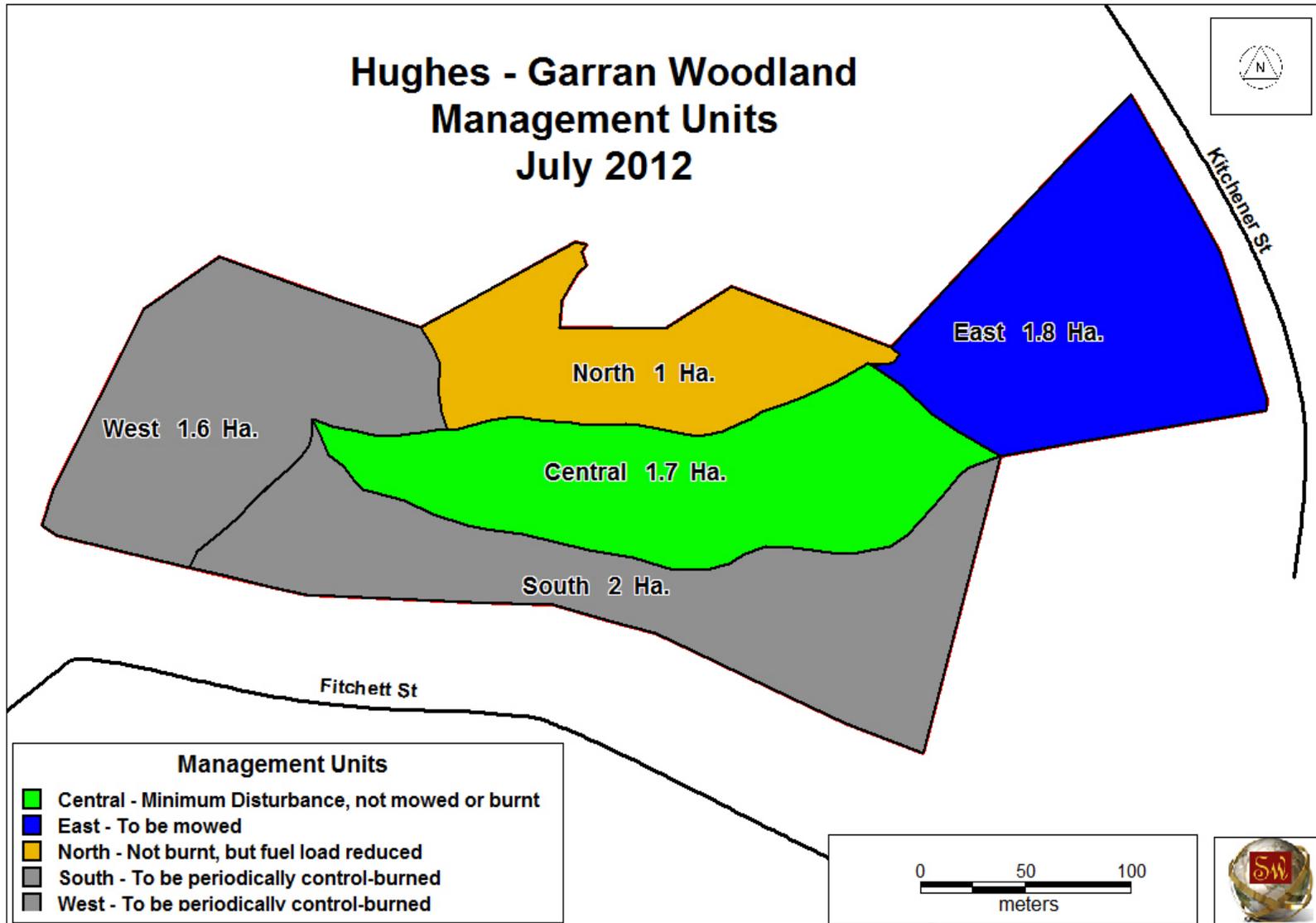


Figure 7. A diagrammatic representation of the five different MUs. Each has a different management requirement and utilises walking tracks and service roads to define their boundaries.

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WEST Management Unit



Fig 8. Map of West Management Unit.

WEST Management Unit

Flora & Fauna:

Vegetation cover: Open forest 10%, Woodland 20%, Grassland 70%.

Trees: Apple box (*E. bridgesiana*), yellow box (*E. melliodora*), occasional ribbon gum (*E. viminalis*).

Height: 15m.

Health: Fire damage, particularly on the SW face. Dead trees. Ribbon gum in poor condition due to fire, drought and being off-site.

Understory: An occasional cassinia (*Cassinia* sp.) bush. A few bushes of grevilliea (*G. rosmarinifolia*) towards eastern end of the MU (considered an environmental weed in some jurisdictions but is not declared or considered noxious by any state government authorities).

Ground cover: Good cover of kangaroo grass (*Themeda triandra*), some spear grasses (*Austrostipa bigeniculata* and *A. scabra*).

Weeds present: Woody weeds largely under control except for the dense stand of Cootamundra wattle (*A. baileyana*). Heavily weed infested area around outer borders of the MU.

Recent plantings: Ground cover and shrubs planted in 2011 in two rocky areas - 4 hardenbergia (*Hardenbergia violacea*) and 3 *Dillwynia sericea* on the western face and 7 *Oxylobium ellipticum* in plantings on the eastern edge of the MU.

Fauna: Lizards, birdlife. The occasional fox and rabbit.

Rare/significant plants & animals: The area of grassland contains a variety of native species within a rocky patch, which provide habitat for small animals including lizards. The grassland should be retained, and existing kangaroo grass should be enhanced (ecological burning, whipper snipping and selective weeding, possibly by hand). Native ground cover to be encouraged in rocky areas.



Figure 9. West MU has great views of Phillip and the mountains. The considerable area of native kangaroo grass has recently been burnt by a mild fire to regenerate the grass.

Physical Characteristics

Soil/Surface rock: Most of the MU is very rocky except for SW corner. In the absence of rock, soils are sandy clay loams over clay; A horizon 30 to 40cm deep. Further details in Appendix 2, page 44.

Service roads, walking tracks: Service road on southern and northern boundaries, vehicle access on western side, other boundaries defined by walking tracks which can be traversed by small 4x4 vehicles. See Fig. 8, page 17

Access: Vehicle access via locked gate off Wisdom St. Pedestrian access from western end of Fitchett St. and Boake Pl.

Power line: Running SW across MU.

Management

Fuel management: This MU is to be control burnt by the ACT Government during 2012–13 for both fire fuel management and ecological for enhancement of the native grassland.

Fire break: A 10m wide break is meant to be mowed by the ACT Government along the southern and northern sides of this MU but is frequently overlooked.

Track maintenance: Group maintains walking tracks, mowing and removing understory from 5m either side of tracks. Service road along northern boundary is eroding.

Tree maintenance: A few trees on SW face fire damaged and require maintenance.

New plantings: Two separate areas to be mowed/slashed by Group.

Weed management: Woody weeds visually monitored and controlled by Group using glyphosate and cut and daub. Cootamundra wattle to be partially removed. Emphasis is placed on weeding areas of kangaroo and spear grasses. Other exotic grassy weeds include couch grass, wild oats etc.

Wildlife habitat: Wattles provide some habitat for small birds but these will gradually be removed and replaced by appropriate shrubs such as *Cassinia* sp. and *Bursaria spinosa*. Nesting boxes could be installed to increase habitat. Blue tongue lizards.

Comment

Regular mowing of the southern and northern boundaries should be implemented as this MU is close to Fitchett St houses and the MU is to be control burnt.

Service road on northern border should be repaired as it is currently in a dangerous condition and is access to 3 schools and a shopping centre.

This rocky, west facing MU does not favour planting; existing native ground cover should be encouraged. The kangaroo grass in particular should be maintained weed free, burnt every 4-5 years and extended.

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SOUTH Management Unit

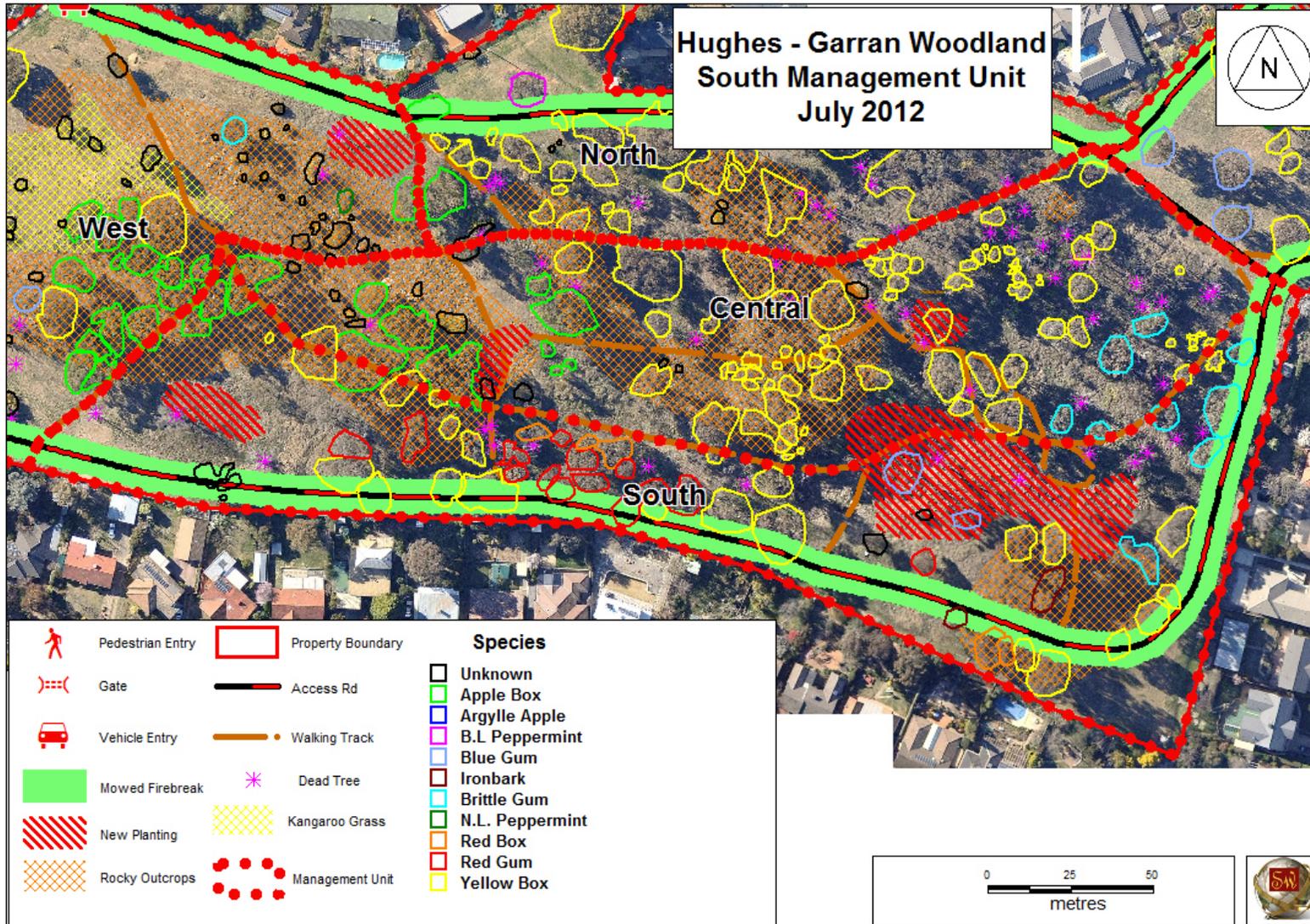


Fig 10. Map of South Management Unit.

SOUTH Management Unit

Flora & Fauna

Vegetation cover: Crown cover; Open forest 10%, Woodland 50%, Grassland 40%.

Trees: Red box (*E. polyanthemos*), apple box (*E. bridgesiana*), Blakely's red gum (*E. blakelyi*), blue gum (*E. bicostata*), Argyle apple (*E. cinerea*), yellow box (*E. melliodora*).

Height: 15 – 20m.

Health: Limited fire damage, excessive density along southern border.

Understory: Occasional *Cassinia* bush, some tree regeneration in open areas.

Ground cover species: Heavily weed infested grassed area close to houses. Contains a rocky patch with speargrass.

Weeds present: Woody weeds, eg black locust or false acacia (*Robinia pseudoacacia*) largely under control, a few green wattle (*A. decurrens*). Groundcover weeds include vinca, couch grass, thistles, wild oats, etc.

Recent plantings: In grassland at east end of MU, 4 iron bark, 2 apple box, 11 Wee Jasper grevilleas (*Grevillea iaspicula*) and 3 knife-leaved wattle (*Acacia cultriformis*). In the grassed area at the western end, 7 yellow box and 1 apple box.

Fauna: Little evidence of native animals other than birdlife. The occasional fox and rabbit. Rosellas nesting in hollows of 2 blue gums.

Rare plants & animals: n/a

Physical Characteristics

Soil/Rock: Rock at eastern end of the MU. Mostly sandy clay loam A horizon over clay B horizon. Deep moist soils in valley supports a luxuriant ground cover of weeds. Further details in Appendix 2, page 44.

Service roads, walking tracks: Service road on southern side. Other boundaries defined by walking tracks which only can be traversed by smaller 4x4 vehicles.

Access: No direct access from outside park.



Figure 11. Dense grass and trees close to the houses along Fitchett St. requires the attention of both householders and ACT Government.

Management

Fuel management: MU to be control burnt by Dept. during 2012–13 for fire fuel management purposes.

Fire break: Both grass and trees are very close the backs of houses on Fitchett St. A 10m wide break is meant to be mowed along the southern border of this MU but is often overlooked.

Track maintenance: Group maintains walking tracks, mowing and removing understory from 5m either side of tracks.

Tree maintenance: Some thinning of overly dense stands desirable.

New plantings: Three separate areas to be mowed/slashed by Group.

Weed management: Woody weeds visually monitored and controlled by Group using glyphosate and cut and daub. Some St John's wort controlled by spraying.

Wildlife habitat: Some opening up of dense stands along southern border would improve tree growth and nesting hollows. If shrubs are planted they should be limited in height and protected by the Group. Nesting boxes could be installed to increase habitat.

Comment

The mowing of the southern boundary is an urgent matter as this MU will be control burnt and should be maintained on a regular basis.

The overly dense stands along the southern boundary should be thinned. Selected trees close to the houses should be removed and stumps ground to facilitate mowing.

The heavily weed infested grassland on moist, fertile soils is a major challenge.



Figure 12. Wee Jasper grevilleas flourishing on a rocky noll towards the eastern end of MU South.

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CENTRAL Management Unit

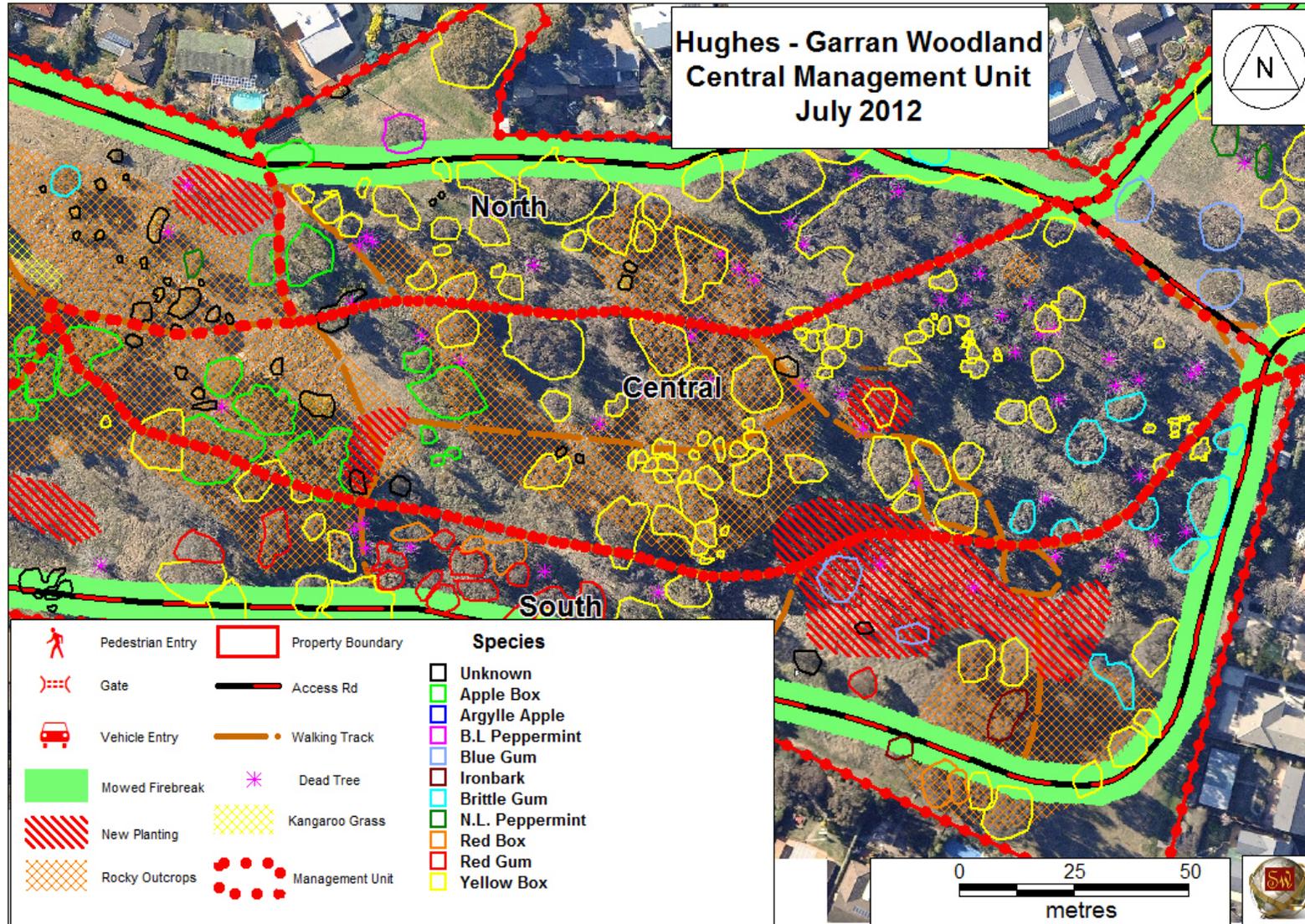


Fig 13. Map of Central Management Unit.

CENTRAL Management Unit

Flora & fauna

Vegetation cover: Crown cover: Open forest 10%, Woodland 70%, Grassland 20%.

Trees: Mostly yellow box (*E. melliodora*), occasional apple box (*E. bridgesiana*); planted 1965.

Height: 15–20m.

Health: In the dense stand, many trees fire damaged to the point where they will probably die in the next dry period. Some are already dead. Many suppressed trees in the overly dense stand.

Understory: Dense local green wattle (*A. decurrens*) and occasional Cootamundra wattle (*A. baileyana*). A few cassinia (*Cassinia* sp.) bushes.

Groundcover species: Predominantly weedy exotic groundcover.

Weeds present: Woody weeds largely controlled include St John's wort, blackberry, occasional Cootamundra wattle, fleabane (*Conza bonariensis*). In grassed areas there is dense couch grass, thistles, phalaris, paspalum and wild oats. Chilean needle grass along central walking track.

Recent plantings: About 12 yellow box trees planted in the grassed area towards the eastern end of the MU in 2005. Some shrubs planted in the grassed area at the foot of Hawk Hill All these plantings are mowed around by the Group.

Fauna: The occasional fox and a few rabbits. Undocumented birds and small mammals.

Rare/significant plants & animals: n/a

Physical characteristics

Soils/surface rock: Brown, sandy clay loams A horizon over red clay B horizon. Details in Appendix 2, page 44. About 50% of this MU has rocky outcrops.

Service roads, walking tracks: Walking tracks define other boundaries.



Figure 14. Central MU will receive minimum disturbance.

Access: No vehicle access except for small 4x4 vehicles. These might have difficulties with western third of MU because of rock. Power line easement to NE.

Management

Fuel management: This MU will not be burnt and logs, etc will be left to provide habitat. Walking tracks mown and understorey removed 5m either side of walking tracks by group.

Track maintenance: Walking tracks will be mown by the Group. Minor erosion.

Tree maintenance: Serious fire caused tree damage exists at the eastern end of this MU and coppice and accumulated debris should be removed from the base of many trees. However this is not as urgent as it will not be burnt. As with the North MU, if an open woodland landscape is to be achieved the removal of at least some dead and suppressed trees is suggested.

Understorey: A dense understorey of a green wattle (*A. decurrens*) has developed in parts of this MU. Consideration could be given to thinning it.

New plantings: Note: this MU will not be control burnt providing an opportunity for planting ground cover, shrubs and trees.

Weed management: A wide range of weeds occur in this MU, some of which are adequately addressed (woody weeds, St John's wort), some partially under control (vinca, blackberry). Also couch, paspalum, phalaris, thistles and Chilean needlegrass.

Fire breaks: Group to maintain breaks around new plantings.

Wildlife habitat: Opening up of the canopy and the encouragement of fewer, larger trees is required to increase bird habitat. As this MU is not to be control burnt, larger dead trees and logs will be left in place to provide habitat. Nesting boxes could be installed to increase bird habitat.

Comment

This MU will not be burnt and offers the greatest opportunity to plant shrubs and diversify habitat.

Some removal of coppice and fuel from the eastern end of this MU is necessary for fire protection purposes and for the health of the trees.

Great views from top of Hawk Hill and western end of MU.



Figure 15 The Central MU is managed to maximise habitat.

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NORTH Management Unit

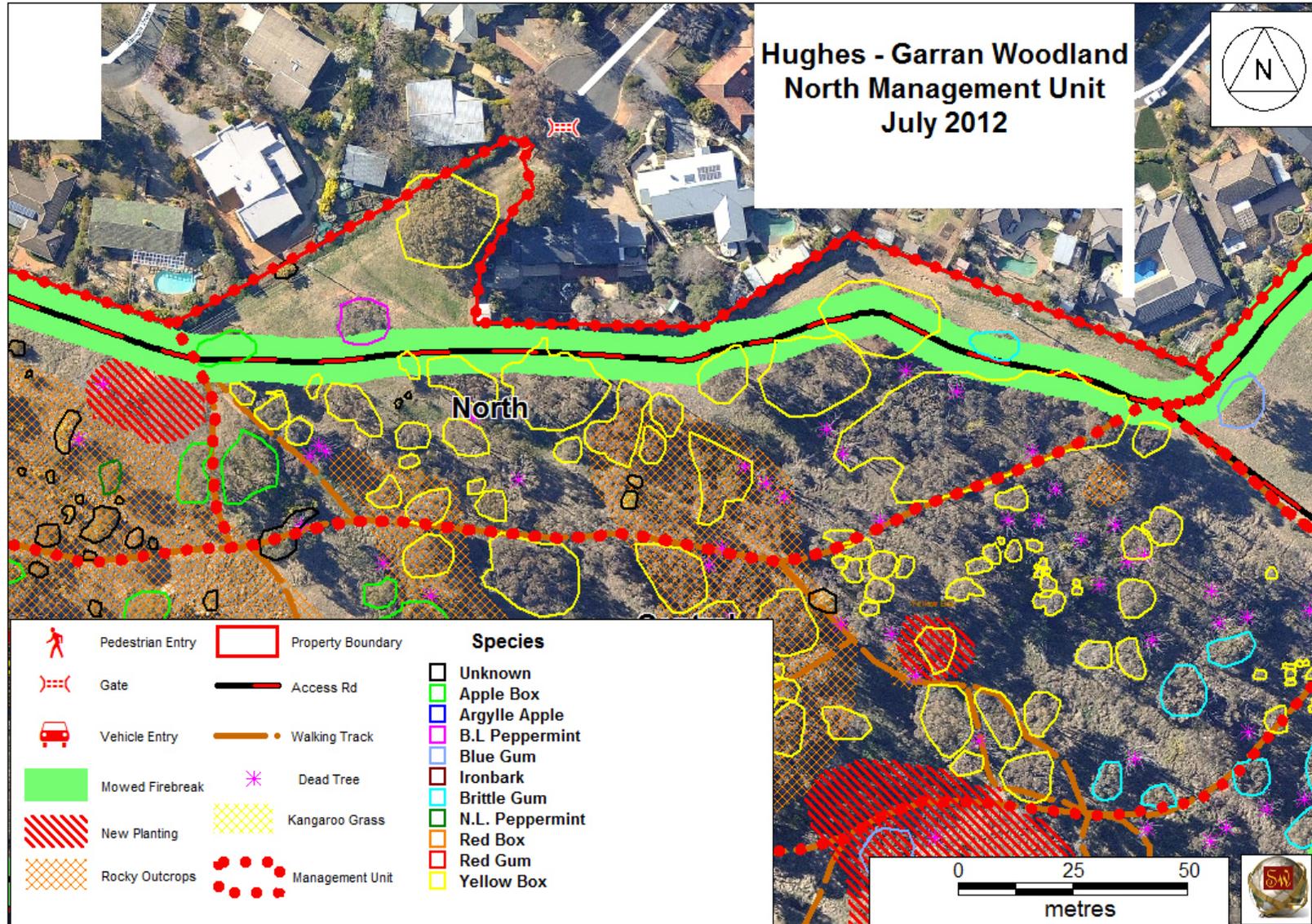


Fig 16. Map of North Management Unit.

NORTH Management Unit

Flora & fauna

Vegetation cover: Forest 20%, woodland 70%, grassland 10%.

Trees: Mostly yellow box (*Eucalyptus melliodora*), occasional apple box (*E. bridgesiana*).

Height: 15–25m.

Health: Most trees fire damaged; some dead, many damaged to the point where they will probably die in the next dry period. Many suppressed trees as a result of overly dense spacing.

Understory: Dense green wattle (*A. decurrens*).

Ground cover species: Mostly grasses and broadleaved weeds.

Weeds present: Woody weeds (controlled except for wattles), thistles, African lovegrass (ALG) behind houses. Chilean needle grass (CNG) along southern boundary.

Recent plantings: Two or three apple boxes planted 2010. Unprotected.

Fauna: Undocumented birds and small mammals.

Rare/significant plants & animals: Large remnant yellow box with nesting hollows. In good health.

Physical characteristics

Soils/surface rock: Brown, sandy clay loam A horizon over a red clay B horizon. Some rocky outcrops, heaviest along the ridge, occupy approximately 20% of MU area (Appendix 2, page 44).

Service roads, walking tracks: Service road on northern boundary. Mown walking tracks define other boundaries.

Access: Access for small vehicles off Lynch St. via locked barrier.



Figure 17. A rocky outcrop in North MU.

Management

Fuel management: Firebreak 10m wide mown periodically by the ACT Government along northern boundary. Walking tracks maintained by Group. This MU will not be burnt but this requires that fuel loadings be reduced and the fire break extended to 15m wide where required by the Group. Density of green wattle to be reduced.

Track maintenance: Walking tracks mowed by Group; understorey removed from a 5m wide strip either side of the walking track.

Tree maintenance: To achieve an open woodland landscape, the removal of at least some dead and suppressed trees will be required. Unless the coppice and accumulated debris is removed from the base of remaining trees, they will be extremely vulnerable to the mildest fire and future drought.

Understorey: A dense understorey the green wattle (*A. decurrens*) has developed in parts of this MU. Consideration will be given to thinning or removing some of this material.

New plantings: Limited opportunity until canopy is opened up.

Weed management: Woody weeds to be monitored and controlled by the Group using glyphosate and cut and daub. Area of African lovegrass on northern boundary and Chilean needle grass towards the centre of the MU should be addressed.

Fire breaks: Dept. to continue periodic mowing 10m wide strip along northern edge. In lieu of burning this MU, the Group is to extend the break by mowing to 15m where necessary. Group to mow and remove understorey along the walking tracks.

Wildlife habitat: Opening up of the canopy and the encouragement of fewer, larger trees is required to diversify wildlife habitat. As the Group is required to reduce the fuel loading of this MU in lieu of burning, there is only limited scope for leaving logs and debris. Nesting boxes could be installed to increase habitat.

Comment

This MU was scheduled to be burnt during this coming year but it was agreed not to burn because of past fire damage to trees. The overly dense planting requires some canopy reduction to allow trees to grow and habitat to develop.

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EAST Management Unit

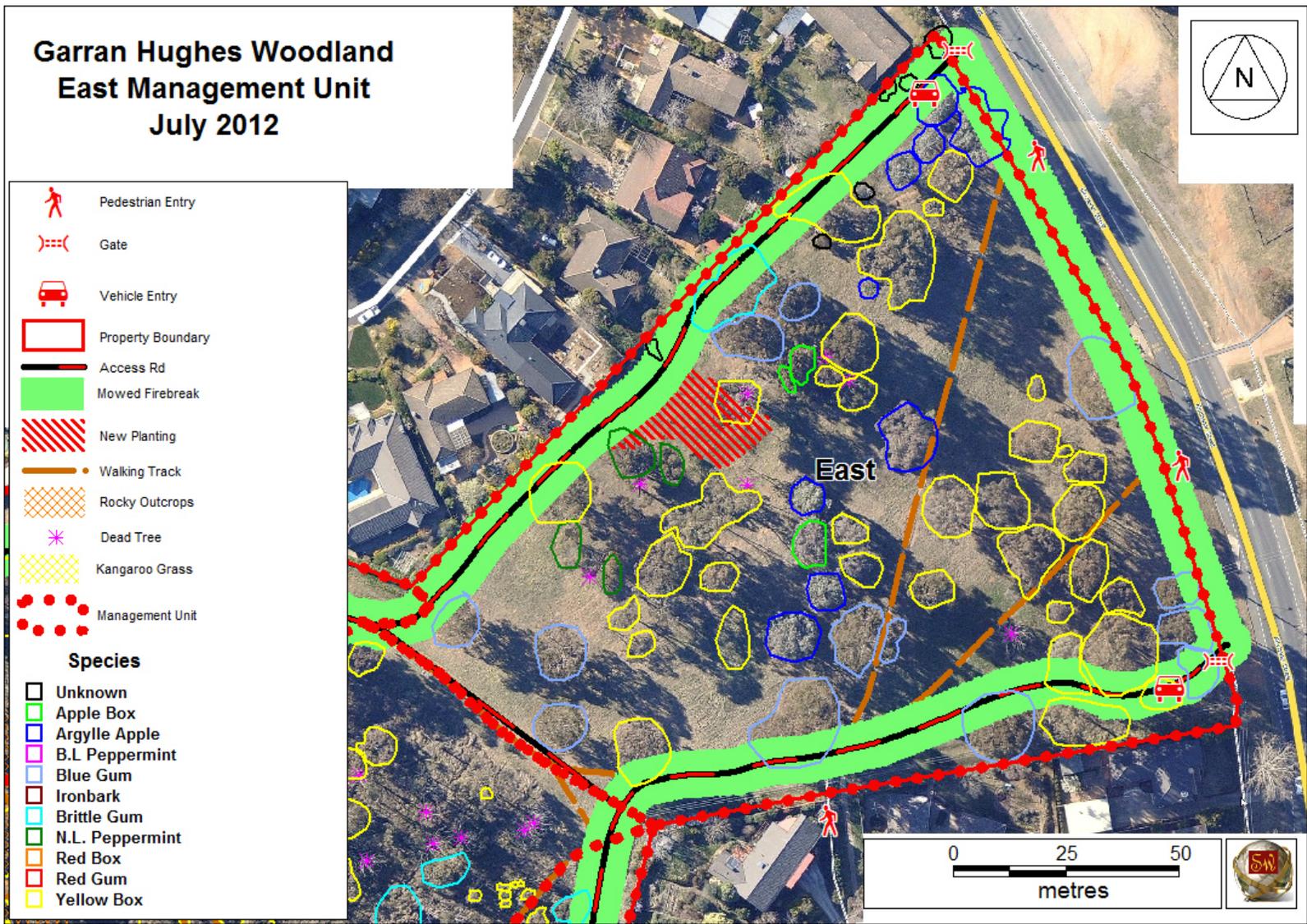


Fig 18. Map of East Management Unit.

EAST Management Unit

Flora & fauna

Vegetation cover: Woodland 60%, Grassland 40%.

Trees: Apple box (*Eucalyptus bridgesiana*), blue gum (*E. bicostata*), Argyle apple (*E. cinerea*), yellow box (*E. melliodora*), narrow leafed black peppermint (*E nicholli*).

Height: 15–20m

Health: No fire damage, 2 old remnant trees under pressure from adjacent blue gums.

Understory: Nil - all of area periodically mowed.

Ground cover species: Various grasses.

Weeds present: Some nettle tree (*Celtis australis*) around tree trunks, grasses and some broad leaved weeds.

Recent plantings: Householder planted trees, mostly yellow box on NW side.

Fauna: Little evidence of other than birdlife.

Rare/significant plants & animals: Two original trees, an old apple box and a yellow box near Kitchener St.

Physical Characteristics

Soil/Surface rock: A horizon brown sandy loam over a red clay B horizon. Surface rock nil (Appendix 2, page 44).

Service roads, walking tracks: Service road on 3 sides, but not on Kitchener St. side.

Access: Vehicle access points off Kitchener St. Pedestrian access from Maurice Place and Kitchener St.

Management

Fuel management: All of area mowed infrequently by the ACT Government. Householder mows between new plantings.

Track maintenance: Walking tracks mowed by the Group.

Tree maintenance: If remnant trees are to survive **some blue gums should be removed as a priority.**



Figure 19. East MU adjoining Kitchener St, is relatively flat, open and mowed periodically.

Weed management: Hardly any woody weeds – some nettle tree to be visually monitored and controlled by the Group using glyphosate and cut and daub.

Fire breaks: Park firebreaks: Dept. to continue periodic mowing of total area. Householder to mow new plantings.

Wildlife habitat: Residual trees require maintenance if they are to survive and provide nesting hollows. Logs, nesting boxes could be installed to increase habitat.

Comment

There are no urgent management issues in relation to this MU with the exception of the survival of the 2 remnant trees that are being suppressed by blue gums.



Figure 20. A relic of the past – a remnant apple box in the East MU near Kitchener St. Surrounding blue gums are hastening its demise.

The Management Plan

The management plan has two components, firstly, a ten-year plan that describes what the interested parties plan to achieve in the long term and who is responsible for different activities. The second component is a one-year rolling plan that sets out the activities of the coming year. The latter is more detailed in terms of activities and their timing and is reviewed each year by the ACT Government and the Hughes Garran Woodland Group. Both plans apply to the individual Management Units (MUs).

Objectives

The Management Plan is intended to provide guidance for the Hughes Garran Woodland volunteer group, ensuring that it satisfies the requirements of both the landowner (the ACT Government) and the amenity needs of the local community. The Hughes Garran Woodland has been significantly disturbed and is not a nature park but it does retain important natural values which the Woodland group wishes to retain and enhance. Specific objectives of the Management Plan are to:

1. Enhance amenity values of the Woodland for the local community.
2. Improve the condition of the yellow box–red gum grassy woodland.
3. Protect the Woodland and surrounding residences from wildfire.

Management actions

The following describes the activities that should be addressed and how they might be implemented.

Amenity

- Improving access and security in the Woodland by mowing walking tracks and removing understory from 5m on either side of the tracks (HGWG).
- Improving the condition of eroding tracks and service roads (HGWG and ACT Government).
- Providing opportunities for residents and others to learn more about the values of the park and its management (HGWG).

Tree health

- Obtain advice on the best way to improve the health of the trees in parts of the North and Central MUs. Options may include the removal of dense litter and coppice from the base of drought and fire-affected trees and the removal of selected trees and opening up some of the denser plantings (HGWG).

Weed control

- Map the major weed populations (HGWG).
- Remove some Cootamundra wattles from West MU by cut and daub (HGWG).
- Thin native acacias within the fire hazard zones (West, South and North MUs) (HGWG).
- Remove other woody weeds, including any that regenerate after treatment (HGWG).
- Remove isolated plants or contain patches of African lovegrass and Chilean needlegrass where it occurs, by spraying and where necessary, revegetating (HGWG).
- Maintain vigilance to remove re-invading woody or herbaceous weeds (HGWG).
- Reduce the abundance of blue periwinkle, fleabane, mullein, milk thistle, St John's wort and mustard weed, with priority being given to Central MU and the grassland in West MU (HGWG).
- Replant bare areas with native grasses that are easy to establish (gain advice from Greening Australia ACT). Minimise re-invasion (HGWG).

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Erosion

- Control erosion of the tracks (HGWG).
- Reduce erosion on service road on northern boundary of West MU (ACT Government).
- Consider the use of rocky 'weirs' (Sharp, 2011) (HGWG).

Fire protection

- Ensure planting areas are mapped and fire officers are aware of their locations (HGWG).
- Mow around the plantings prior to burns being undertaken (HGWG).
- Remove risk factors (eg fallen timber, inflammable vegetation, debris and litter) along West, South and North MUs, which are on the boundaries of the reserve (HGWG, ACT Govt).
- Slashing a 10m wide break around the boundaries of the Woodland, including the West and South MUs which are usually overlooked (ACT Government).
- Removal of woody weeds that provide a 'fire ladder' (HGWG).
- Mowing along walking tracks on MU boundaries to provide small fire breaks (HGWG).

Enhancement of native plants and habitat diversity

- Undertake a more detailed plant survey in each of the MUs and identify patches of the more diverse native areas.
- Thin tree plantings to open up the canopy in selected areas (to be planned and mapped prior to removal). Target non-indigenous species including blue gum and ribbon gum (both of these are highly flammable due to the long ribbons of bark that are retained on the trees).
- Retain a diversity of structure, including some patches of tree and shrub thickets where possible to provide a diversity of habitat for small woodland birds.
- Retain or enhance fallen timber to provide habitat for reptiles and other fauna particularly in Central MU.
- Plant up areas to species that attract birds and other fauna, a list of recommended plants is given in Table 8 (page 48), taking into account the need to prevent any increase in fire hazard. Central MU in particular, should be targeted for enhancement of diversity.
- Undertake an ecological burn approximately twice in ten years (which may also be a control burn to reduce fire fuel) of the grassland in West MU.

Monitoring and evaluation

- Establish photo-monitoring points at selected locations to track changes to structure and composition over time. Suggest that spring is the appropriate time to do this (HGWG).
- Retain a list of species planted in areas and monitor survival to get an idea of the most successful species to plant. Ensure the locations are mapped (HGWG).
- Maintain a diary of management activities and dates of control burns or other major events.
- Determine if any local residents may be able to undertake monitoring of bird populations and diversity using methods recommended by Canberra Ornithologists Group or seek assistance from Red Hill Regenerators. If possible undertake this before and after major changes to the site's structure and composition (HGWG).
- Develop a list of birds encountered in the park and monitor them annually, ideally using the methods recommended by Canberra Ornithologists Group (a 2ha plot is surveyed for 20 minutes on select dates several times a year). The results can therefore be used to track changes to bird abundance and diversity and to compare to results from other areas, including Red Hill Nature Reserve (HGWG).
- Monitor bird boxes to determine what species are using them, ensure that Indian mynas are not invading the boxes and displacing native species (HGWG).
- Undertake a condition assessment similar to that done by the Red Hill Regenerators, based on the percentage cover of exotics in the groundcover.

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Table 4. Ten-Year Plan for Individual Management Units.

Shaded activities to be carried out by ACT Government.

Walking track maintenance involves mowing, under-storey removal either side of track and erosion control

	Western MU	Southern MU	Central MU	Northern MU	Eastern MU
Fuel management	To be burnt 2012-13 & then at 5-6 yr intervals. Fire breaks (see map) slashed by ACT Govt. New plantings to be protected by Group	To be burnt 2012-13 & then at 5-6 yr intervals. Fire breaks (see map) slashed by ACT Govt. New plantings to be protected by Group	No treatment	Fire breaks (see map) slashed by ACT Govt. Group to widen fire break to 15m and reduce fuel loading in lieu of burning	Total area slashed by ACT Govt. New plantings to be protected by Group
Access roads and walking tracks	Walking tracks maintained by Group. Erosion. Service road up-graded by ACT Govt.	Walking tracks maintained ¹ by Group	Walking tracks maintained by Group Control erosion on Hawk Hill.	Walking tracks maintained by Group.	Walking tracks maintained by Group.
Weed management	Woody weed control. Cootamundra wattle removed & replaced by kangaroo grass or other ground cover	Woody weed control, also vinca, St John's Wort, wattles. Replace weeds with natives	Emphasize weed control, & replace with native shrubs and ground cover common to box-gum woodlands.	Woody weed and wattle control. Also vinca, St Johns Wort. CNG*, ALG** Replace weeds with natives	Woody weed control. Remove areas of CNG.
Trees	Clear base of trees prior to control burns	Clear base of trees. Reduce density, remove trees near houses. Additional tree planting in open areas	Remove coppice, fuel from base of damaged trees.	Remove coppice, fuel from base of damaged trees. Thin some trees, remove small dead trees.	Remove blue gums around remnant apple box. Thin some trees, remove small dead trees.
Shrubs	Protect existing plantings; limit future plantings to small shrubs & ground cover because of control burning.	Protect existing plantings; limit future plantings to small shrubs & ground cover because of control burning.	Plant shrubs eg bursaria & other box-gum woodland species in this, protected MU.	Limit understorey to minimise fuel in lieu of burning this MU	Plant clumps of shrubs to provide bird bridge to Red Hill Nature Park. .
Grasslands	Extend kangaroo grass by removing wattle. Burn every 5-6 yrs. Extend native forbs in rocky area	Heavily weed infested grass on deep moist soils will make alternative ground cover hard to establish.	Replace weed species, eg vinca, CNG, with native ground cover.	Replace weed species (ALG, CNG) with native ground cover.	This whole area to be slashed by the ACT Govt.
Plantings including maintenance	Protect existing plantings. Extend kangaroo grass. New planting of forbs.	Protect existing plantings. New tree planting in open areas.	Plant shrubs & accumulate logs to max. habitat as this is a no burn area.	A no burn area if fuel levels are kept low. Coppice around burnt trees removed, some small dead trees removed.	Protection of new plantings by householder Shrubs could be planted to link to Red Hill
Wildlife	n/a	Bird boxes	Bird boxes, logs, plant shrubs	Bird boxes	Bird boxes, plant clumps of shrubs
Public use.	Recreation for children and adults, access to schools (3), shopping, workplaces.				
Monitor & evaluate					
Community interaction	(i) Hughes – Garran Community input into consultants report. (ii) Signs explaining the woodland and its management.				

* CNG = Chilean needlegrass

** ALG = African lovegrass

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Table 5. The one-year rolling plan for 2012 to 2013 as developed by the HG Woodlands Group and the ACT Government.

Shaded activities to be carried out by ACT Government.

Season	M' Unit	Activity	Details	Comments/follow up required
WINTER 2012	ALL	Obtain advice on planting species. Mow walking tracks.	Contact and discuss with Greening Australia.	Planting list developed, additional info. required. Only one mow required.
	WEST	Boundary mowing.	North and south boundaries to be slashed before burn.	Completed. Rock removed, out crops pegged.
		Remove wattles.	Cut and daub. Hand pull wattle seedlings.	About half total Cootamundra wattles removed leaving one clump and a few scattered trees. Chipped by Dept.
		Control burn	To reduce fuel and regenerate kangaroo grass.	Good, mild burn completed end of August.
	SOUTH	Boundary mowing.	Southern boundary to be mowed before burning.	Complete.
		Vegetation removed prior to burning. Rake around trees.	Fallen trees, branches and coppice removed to service road and chipped. Vulnerable trees protected.	Complete. Some raked, further work may be required prior to burn.
		To be burnt 2012-13.	Dense grass to be burnt when cured.	
CENTRAL				
NORTH	African love grass.	Mowed		
EAST				

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Season	M' Unit	Activity	Details	Comments/follow up required
SPRING 2012	ALL	Mow fire breaks. Walking tracks. Map and list species in each management unit.	ACT Government to mow fire breaks. Mowing and maintenance of walking tracks. Consultant to undertake condition assessment of each unit, including weed and plant species surveys.	
	WEST	Plant forbs. Control weeds.	With help from Greening Aust. two areas of forbs will be planted outside kangaroo grass area. Reduce weeds in and around the grassland to improve amenity and competition for native species.	
	SOUTH	Prepare for control burn. Seed areas where vinca has been removed.	Additional raking required around trees. To be replaced by microleana (native grass).	Microleana (native grass) is relatively shade tolerant.
	CENTRAL	Weed removal. Seed areas from which vinca has been removed.	All woody and herbaceous and grass weeds. To be replaced by microleana.	
	NORTH	Coppice/fuel removal. Chilean needle grass. African love grass.	Removal of fuel in lieu of burning. Spray small patches with glyphosate. Spray mowed fire break when actively growing.	
	EAST	Chilean needle grass.	Spray small patches with glyphosate.	

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Season	Unit	Activity	Details	Comments/follow up required
SUMMER 2012-13	ALL	Mow fire breaks. Mow walking tracks. Signs.	Slashing mowing of designated fire breaks. Undertake routine mowing and maintenance of walking tracks. Design prepare and erect signs about the Woodland	
	WEST	Control weeds. Watering.	Reduce weeds in and around the grassland to improve amenity and competition for native species. Monitor water needs of newly planted forbs.	
	SOUTH			
	CENTRAL	Watering.	Check microleana.	
	NORTH	Chilean needle grass.	Spray small patches.	
	EAST	Chilean needle grass.	Spray small patches.	

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Season	Unit	Activity	Details	Comments/follow up required
AUTUMN 2013	ALL	Fire breaks. Mow tracks. Woody weeds. Protect new plantings.	Slashing/mowing of designated fire breaks. Walking track maintenance. Cut and daub exotics, hand-pull Cootamundra wattle seedlings. Spay scattered Chilean needle grass. Mow/whipper snip around new plantings.	Nettle tree, cotoneaster, ash, etc. Cootamundra wattle seedlings.
	WEST	Control grassland weeds.	Reduce weeds in and around the grassland to improve amenity and competition for native species.	
	SOUTH	Extend plantings of trees or small shrubs. Thin dense box-gum.	Trees should be indigenous, shrubs small as area is control burnt. Overly dense forest red gum-red box along southern boundary to be thinned under ACT Govt. supervision.	
	CENTRAL	Control weeds. Plant shrubs/ground cover.	Spray with glyphosate. Shrubs suited to box-gum woodland (see Table 8).	Blackberry, St John's wort, vinca.
	NORTH	Thin dense stands of box.	Overly dense forest red gum & red box to be thinned under ACT Govt. supervision.	
	EAST	Blue gums	Remove from around old apple & yellow box.	

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Season	Unit	Activity	Details	Comments/follow up required
WINTER 2013	ALL	Fire breaks. Walking tracks.	Mow/slash designated fire breaks. Mow and maintain.	
	WEST			
	SOUTH			
	CENTRAL			
	NORTH			
	EAST			

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Season	Unit	Activity	Details	Comments/follow up required
SPRING 2013	ALL	Fire breaks. Walking tracks.	Mow/slash designated fire breaks. Mow, maintain.	
	WEST			
	SOUTH			
	CENTRAL	Weed.		
	NORTH	Vegetation/fuel removal.	In lieu of control burn.	
	EAST			

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Season	Unit	Activity	Details	Comments/follow up required
SUMMER 2013-14	ALL	Fire breaks. Walking tracks.	Mow/slash designated fire breaks. Mow and maintain.	
	WEST			
	SOUTH			
	CENTRAL			
	NORTH			
	EAST			

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Greening Australia, ACT Division

Canberra Ornithologists Group

Friends of Grasslands (FOG)

APPENDICES

Appendix 1. Mapping

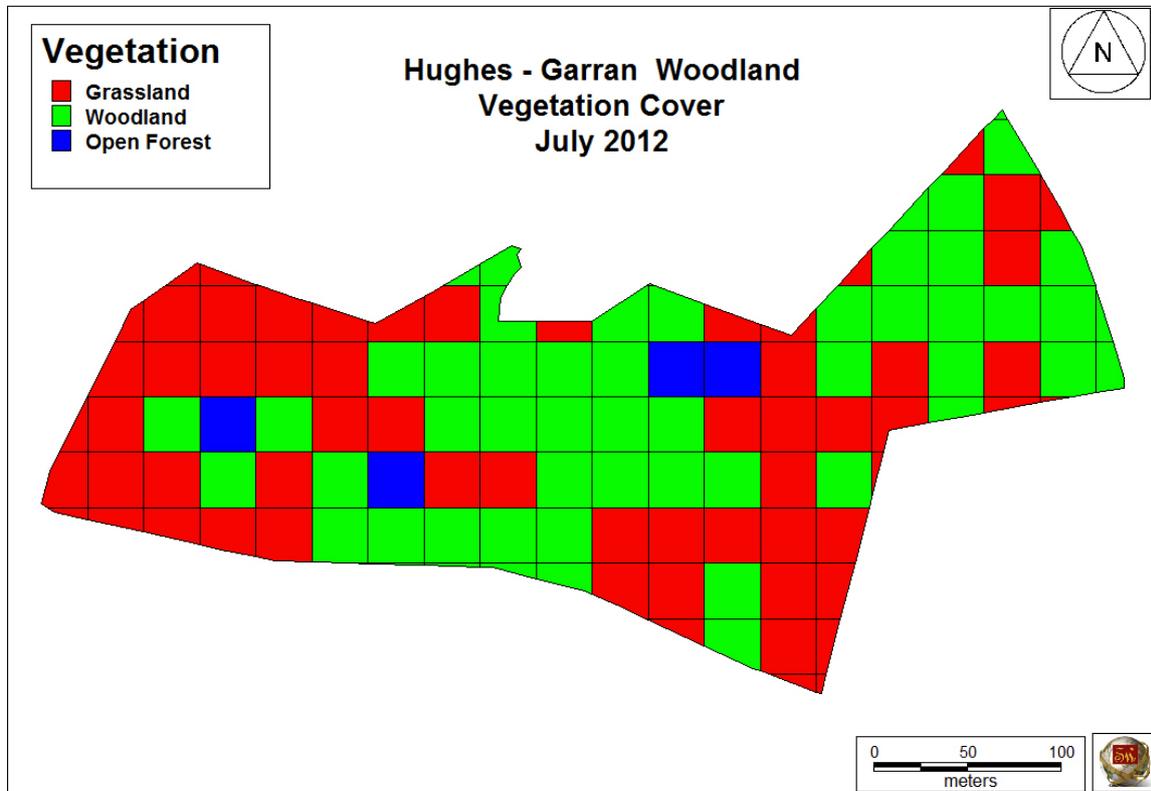


Figure 21. A vegetation map illustrating canopy density of the Woodland.

Other maps prepared for this report include:

- The master map of the Hughes Garran Woodland (Figure 6, page 15).
- Maps (5) of individual management units (pages 17-31).
- Diagram of Management Units (Figure 7, page 16).

Appendix 2. Soils

Table 6. Soil Samples Hughes Garran Woodland

MU	Pit no.	Horizon	Colour	Texture	Depth (cm)	pH	Comments
EAST	1	A1	Brown	Sandy clay loam	10	5	
		A2	Brown/yellow	Sandy clay loam	30	5.5	
		B	Red	Clay	> 30	6.5	
	2	A1	Brown	Sandy clay loam	10	5	
		A2	Brown/yellow	Sandy clay loam	25	5.5	
		B	Red	Clay	> 25	6	Rock fragments
CENTRAL	3	A1	Brown	Sandy loam	10	5.5	
		A2	Brown	Sandy loam	25	6	Granite floaters
		B	Red/yellow	Clay	> 25		Decomposed granite
	4	A1	Brown/yellow	Sandy loam	10	6.5	Rocky outcrop
			-	Rock	-	-	Too rocky to dig
SOUTH	5	A1	Brown	Sandy (gravel) loam	6	7.5	
		A2	Brown	Sandy (gravel) loam	30	5.5	
		B	Red	Clay	> 30	6	Decomposed granite
	6	A1	Brown	Sandy clay loam	20	6	More gradational soil
		A2	Brown	Sandy clay loam	70	5.5	
		B	Red	Clay	>70	7	
	7	A1	Brown	Sandy loam	10	5.5	
		A2	Brown	Sandy clay loam	35	5.5	
		B	Red	Clay	> 35	6	
WEST	8	A1	Brown	Sandy clay loam	8	6	Rocky surrounds
		A2	Brown	Sandy clay loam	30	6	
		B	Red/yellow	Clay	> 30	7	Gravel
	9						Rock, unable to dig
	10	A1	Brown	Sandy loam	8	6	Kangaroo grass
		A2	Brown	Sandy clay loam	25	6.5	
B		Red	Clay	>25	6.5	Decomposed granite & hornfels	
NORTH	11	A1	Brown	Sandy clay loam	5	7	
		A2	Brown	Sandy clay loam	30	5.5	Granite floaters & hornfels
		B	Red	Clay	> 30	6	Rocky
	10		Red	Clay	10	7	Overlaid by displaced earth
		A	Brown	Sandy clay loam	50	6.5	
		B	Red	Clay	>50	7	

Appendix 3. Ecology

Classification of the condition of Box-Gum Woodlands in the ACT

Condition of Box-Gum Woodlands and other woodlands have been defined in the ACT (ACT Government 2004). The majority of the Hughes Garran Woodland falls within the category, '**Substantially Modified Woodland**', as described below.

Lowland woodland is unmodified, containing only native species, reflecting biological diversity prior to European settlement. No areas remain in this condition.

Partially modified woodlands are largely intact remnants. These are characterised by a high diversity of plants and animals, including species that are uncommon and/or disturbance sensitive, such as orchids, and a diversity of habitat. These woodlands have been modified, but are unlikely to have been heavily grazed, had additions of fertiliser or to have been subject to soil disturbance. They retain an intact structure of trees, shrubs and groundlayer species.

Moderately modified woodlands are similar to that above, except that land uses have resulted in the loss of a component of the native groundlayer, particularly the most disturbance-sensitive species. Tree cover is similar to partially modified woodlands. It is unlikely that these areas have been subject to high levels of nutrient addition, but it is likely that they have been subject to a higher level of disturbance.

Moderately modified secondary (derived) grassland has a groundlayer similar to partially or moderately modified woodland, but the tree cover has been totally or partially cleared.

Substantially modified woodlands have a low or very low diversity of native plants, and the groundlayer is dominated by native grasses or exotic species, with very few other herbaceous species. The tree cover is intact.

Severely modified woodlands contain only scattered trees over a groundlayer dominated by exotic species.

Remnants that meet the criteria of the Environment Protection and Biodiversity Conservation Act have listed ecological communities, including partially modified woodland, moderately modified woodland or moderately modified secondary grassland.



Figure 22. *Cassinia* shrub, one of the few remaining understory species in the Woodland.

Appendix 4. Plant Lists

Table 7. Hughes Garran Woodland plants as surveyed March 2012 (including planted species).

* introduced weeds, both exotic and native ** planted native species P present

	EXISTING SPECIES	West MU	South MU	Central MU	North MU	East MU
Trees	Apple box (<i>Eucalyptus bridgesiana</i>)	P	P	P		P
	Blakely's Red Gum (<i>E. blakelyi</i>)		P			
	Green wattle (<i>A. mearnsii</i>) ?	P				
	Red Box (<i>E. polyanthemos</i>)		P			
	Yellow box (<i>Eucalyptus melliodora</i>)	P	P	P	P	P
	**Argyle apple (<i>E. cinerea</i>)					P
	**Blue gum (<i>E. bicostata</i>)	P			P	P
	**Brittle Gum (<i>E. mannifera</i> var <i>maculosa</i>)	P		P		P
	**Ironbark (<i>E. sideroxylon</i>)		P			
	**Narrow leafed peppermint (<i>E. nicholli</i>)	P				P
	**Ribbon gum (<i>E. viminalis</i>).					
	*Cootamundra wattle (<i>A. baileyana</i>)		P		P	
Shrubs	<i>Acacia implexa</i>	P				
	Cassinia (<i>Cassinia</i> sp.)	P				
	** <i>Calothamnus</i> sp.	P				
	** <i>Dillwynia</i> (<i>Dillwynia sericea</i>)	P				
	** <i>Grevillea</i> sp.	P				
	**Knife-leaved wattle (<i>Acacia cultriformis</i>)	P				
	** <i>Oxylobium</i> (<i>Oxylobium ellipticum</i>)	P				
	**Silver banksia (<i>Banksia marginata</i>)	P				
	**Wee Jasper grevillea (<i>Grevillea iaspicula</i>)	P				
	* <i>Grevillea rosmarinifolia</i>		P			
Grasses	Hairy Panic (<i>Panicum effusum</i>)	P		P		P
	Kangaroo grass (<i>Themeda triandra</i>)	P				
	Kneed Speargrass (<i>Austrostipa bigeniculata</i>)	P	P	P		P
	Red-leg Grass (<i>Bothriochloa macra</i>)	P				
	Slender Speargrass (<i>Austrostipa scabra</i>)			P		
	Snowgrass (<i>Poa sieberiana</i>)					
	Wallaby grasses (<i>Rytidosperma</i> species)	P				P
	Weeping Grass (<i>Microlaena stipoides</i>)	P				P
	Windmill Grass (<i>Chloris truncata</i>)					P
	Wiregrass (<i>Aristida ramosa</i>)	P				
	*African Lovegrass (<i>Eragrostis curvula</i>)					P

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	EXISTING SPECIES		West MU	South MU	Central MU	North MU	East MU
	*Brome species (<i>Bromus</i> sp.)		P		P		P
	*Chilean Needlegrass (<i>Nassella neeseiana</i>)						P
	*Paspalum (<i>Paspalum dilatatum</i>)				P		
	*Phalaris (<i>Phalaris aquatica</i>)		P				P
	*Wild Oats (<i>Avena fatua</i>)		P	P	P	P	
Other ground cover	Bluebell (<i>Wahlenbergia</i> sp)		P		P		P
	Common Woodruff (<i>Asperula conferta</i>)				P		P
	Dichondra (<i>Dichondra repens</i>)	P					
	Flax Lily (<i>Dianella</i> sp.)				P		
	Fuzzweed (<i>Vittadinia cuneata</i>)			P			P
	Geranium (<i>Geranium solanderi</i>)		P		P		
	Hardenbergia (<i>Hardenbergia violacea</i>)	P					
	Long-leaved Matrush (<i>Lomandra longifolia</i>)		P				
	Narrow-leaved New Holland Daisy (<i>Vittadinia muelleri</i>)						P
	Native Oxalis (<i>Oxalis perennans</i>)		P				P
	Pink Bindweed (<i>Convolvulus angustissimus</i> syn. <i>C. erubescens</i>)		P				
	Rock Fern (<i>Cheilanthes austrotenuifolia</i>)		P				
	Sheep's Burr (<i>Acaena ovina</i>)		P	P	P		
	Short Matrush (<i>Lomandra filiformis</i> ?)		P				
	Slender Tick-trefoil (<i>Desmodium varians</i>)		P		P		P
	Stinking Pennywort (<i>Hydrocotyle laxiflora</i>)		P		P		
	Yellow Buttons (<i>Chrysocephalum apiculatum</i>)				P		
	**Billy Button (<i>Craspedia globosa</i>)	P					
	*Common Centaury (<i>Centaureum erythraea</i>)				P		
	*Common Violet (<i>Viola odorata</i>)						P
	*Conyza (<i>Conyza bonariensis</i>)		P		P		P
	*Flatweed (<i>Hypochaeris radicata</i>)		P				
	*Great Mullein (<i>Verbascum thapsus</i>)		P				
	*Horehound (<i>Marrubium vulgare</i>)						P
	*Plantain (<i>Plantago lanceolata</i>)		P				P
	*Prickly Lettuce (<i>Lactuca serriola</i>)				P		
	*Salsify (<i>Tragopogon porrifolius</i>)			P			
*Sorrell (<i>Acetosella vulgaris</i>)		P				P	

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Table 8. Recommended Planting List .

Shaded in grey – plants suitable for the Hughes-Garran Woodland (Greening Australia).

Species	Common Name	Form	Habitat
<i>Eucalyptus bridgesiana</i>	Apple Box	Tree > 15m	grassy woodland lower slopes, south facing
<i>Allocasuarina verticillata</i>	Drooping She-oak	Tree 10-15m	dry slopes
<i>Brachychiton populneus</i>	Kurrajong	Tree 10-15m	forest
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Tree 10-15m	grassy woodland, low lying
<i>Eucalyptus dives</i>	Broad-leaved Peppermint	Tree 10-15m	dry, sheltered
<i>Eucalyptus goniocalyx</i>	Bundy	Tree 10-15m	dry skeletal
<i>Eucalyptus melliodora</i>	Yellow Box	Tree 10-15m	Grassy woodland deeper soils
<i>Eucalyptus nortonii</i>	Large-flowered Bundy	Tree 10-15m	dry areas, more in south
<i>Eucalyptus pauciflora ssp pauciflora</i>	Snow Gum	Tree 10-15m	lower slopes, frost hollows
<i>Eucalyptus polyanthemus</i>	Red Box	Tree 10-15m	grassy woodland, shrubby woodland
<i>Acacia buxifolia</i>	Box-leaved Wattle	Tree or shrub <10m	Woodland, forest
<i>Acacia dealbata</i>	Silver Wattle	Tree or shrub <10m	habitat: birds, sugar gliders
<i>Acacia mearnsii</i>	Black Wattle	Tree or shrub <10m	Woodland
<i>Bursaria spinosa</i>	Australian Blackthorn	Shrub >4m	Bird habitat, woodland, forest
<i>Dodonaea viscosa</i>	Narrow-leaved Hopbush	Shrub >4m	
<i>Grevillea lanigera</i>	Woolly Grevillea	Shrub >4m	
<i>Leptospermum lanigerum</i>	Woolly Teatree	Shrub >4m	
<i>Acacia rubida</i>	Red-leaved Wattle	Shrub 2-4m	Woodland, forest
<i>Acacia genistifolia</i>	Early Wattle	Shrub <2m	Woodland, forest
<i>Acacia implexa</i>	Lightwood	Shrub <2m	Woodland, forest
<i>Daviesia genistifolia</i>	Broom Bitter Pea	Shrub <2m	Woodland, forest
<i>Daviesia mimosoides</i>	Narrow-leaved Bitter Pea	Shrub <2m	Woodland, forest
<i>Derwentia perfoliata</i>	Blue Veronica	Shrub <2m	Dry sites
<i>Hibbertia obtusifolia</i>	Hoary Guineaflower	Shrub <2m	30 cm
<i>Hovea heterophylla</i>	Creeping Hovea	Shrub <2m	Woodland, forest
<i>Indigofera adesmifolia</i>	Leafless Indigo	Shrub <2m	Woodland, forest
<i>Indigofera australis</i>	Australian Indigo	Shrub <2m	Frost sensitive in exposed areas
<i>Kunzea parvifolia</i>	Violet Kunzea	Shrub <2m	wet areas or sheltered aspects
<i>Leptospermum ovoabatum</i>	Creek Teatree	Shrub <2m	Drainage lines
<i>Pultenaea subspicata</i>	Low Bush Pea	Shrub <2m	Woodland, forest
<i>Austrodanthonia species</i>	Wallaby Grasses	Grass	Grassland, woodland
<i>Austrostipa bigeniculata</i>	Kneed Speargrass	Grass	Grassland
<i>Austrostipa densiflora</i>	Foxtail Speargrass	Grass	low fertility soils
<i>Austrostipa scabra</i>	Slender Speargrass	Grass	Grassland, woodland
<i>Bothriochloa macra</i>	Red Grass	Grass	Grassland

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Species	Common Name	Form	Habitat
<i>Chloris truncata</i>	Windmill Grass	Grass	Grassland
<i>Cymbopogon refractus</i>	Barbed-wire Grass	Grass	woodland
<i>Joycea pallida</i>	Red-anthered Wallaby Grass	Grass	Woodland
<i>Microlaena stipoides</i>	Weeping Grass	Grass	Grassy woodland
<i>Poa sieberiana</i>	Snow Grass	Grass	Grassland, woodland
<i>Themeda triandra</i>	Kangaroo Grass	Grass	Grassland, woodland
<i>Arthropodium minus</i>	Small Vanilla Lily	Herb	Grassland, woodland
<i>Brachyscome rigidula</i>	Hairy Cutleaf Daisy	Herb	Grassland, woodland
<i>Brunonia australis</i>	Blue Pin Cushion	Herb	Grassland, woodland
<i>Bulbine bulbosa</i>	Bulbine Lily	Herb	Grassland, woodland
<i>Burchardia umbellata</i>	Milkmaids	Herb	Grassland, woodland
<i>Caesia calliantha</i>	Blue Grass Lily	Herb	Grassland, woodland
<i>Calocephalus citreus</i>	Lemon Beauty Heads	Herb	Grassland, woodland
<i>Carex appressa</i>	Tussock Sedge	Herb	Grassland, woodland
<i>Chrysocephalum apiculatum</i>	Common Everlasting Daisy	Herb	Grassland
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting Daisy	Herb	woodland
<i>Coronidium scorpiodes</i>	Button Everlasting Daisy	Herb	Grassland, woodland
<i>Craspedia variabilis</i>	Variable Billy Buttons	Herb	Grassland, woodland
<i>Dianella longifolia</i>	Smooth Flax Lily	Herb	upland
<i>Dianella revoluta</i>	Spreading Flax Lily	Herb	grassy woodland
<i>Arthropodium fimbriatum</i>	Chocolate Lily	Herb	Grassland, woodland
<i>Eryngium ovinum</i>	Blue Devil	Herb	Grassland, woodland
<i>Goodenia pinnatifida</i>	Scrambled Eggs	Herb	Grassland, woodland
<i>Coronidium oxylepis</i> subsp. <i>lanatum</i>	Woolly Pointed Everlasting	Herb	Grassland
<i>Leptorhynchos squamatus</i>	Scaly Buttons	Herb	Grassland, woodland
<i>Leucochrysum albicans</i>	Hoary Sunray	Herb	grassy woodland, dry sites
<i>Linum marginale</i>	Native Flax	Herb	Grassland, woodland
<i>Lomandra bracteata</i>	Small Matrush	Herb	Grassland, woodland
<i>Lomandra filiformis</i>	Wattle Matrush	Herb	Grassland, woodland
<i>Lomandra longifolia</i>	Long-leaved Matrush	Herb	Woodland
<i>Lomandra multiflora</i>	Many-flowered Matrush	Herb	Grassland, woodland
<i>Microseris lanceolata</i>	Yam daisy	Herb	Grassland
<i>Podolepis jaceoides</i>	Showy Copperwire Daisy	Herb	Grassland, woodland
<i>Rutidosia leptorhynchoides</i>	Button Wrinklewort	Herb	Woodland
<i>Stylidium graminifolium</i>	Trigger Plant	Herb	Grassland, woodland
<i>Thysanotus patersonii</i>	Twining Fringe lily	Herb	Grassland, woodland

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Species	Common Name	Form	Habitat
<i>Thysanotus tuberosus</i>	Fringe Lily	Herb	Grassland, woodland
<i>Vittadinia cuneata</i>	Fuzzweed	Herb	Grassland, woodland
<i>Vittadinia muelleri</i>	Narrow-leaved New Holland Daisy	Herb	Grassland, woodland
<i>Wahlenbergia species</i>	Native Bluebell	Herb	Grassland, woodland
<i>Wurmbea dioica</i>	Early Nancy	Herb	Grassland, woodland
<i>Xerochrysum viscosum</i>	Sticky Everlasting	Herb	Grassy woodland
<i>Clematis leptophylla</i>	Small-leaved Clematis	Climber	Woodland
<i>Hardenbergia violacea</i>	False Sarsparilla	Climber	Woodland, forest



Figure 23. Some of last year's plantings clockwise from top left: Apple box, *Oxylobium*; *Hardenbergia* and *Dillwynia* struggle on the hot, rocky western slope.

Appendix 5. Weeds and Their Control

Table 9. Weeds observed in Hughes-Garran Woodland (not complete).

	Exotic weeds	Native "weeds"
TREES	Pistacia (<i>Pistacia sinsensis</i>) – autumn colour Cotoneaster (<i>Cotoneaster</i> sp.) Nettle tree (<i>Celtis australis</i>) Black locust, false acacia (<i>Robinia pseudoacacia</i>) Firethorn (<i>Pyracantha</i> sp.) Radiata pine (<i>Pinus radiata</i>) Tree of heaven (<i>Ailanthus altissima</i>) Various <i>Prunus</i> spp. Purple-leaved prune (in leaf) Privet (<i>Ligustrum</i> spp.)	Sydney bluegum Cootamundra wattle Other wattles
SHRUBS	St John's wort Black berry Scotch broom (<i>Cytisus</i> sp.)	Cootamundra wattle
GROUND COVER	BROADLEAFED - Many, eg Vinca (<i>Vina major</i>) various clovers, glycine various Brassicas various flowers, eg marigolds, irises Aaron's rod (<i>Verbascum</i> sp.) Proliferous pink (<i>Petrorrhagia prolifera</i>) Salsify (<i>Tragopogon</i> sp.) Sheep's Burnett (pasture weed) GRASSES - Many, eg Wild oats Winter grass Kikuyu Chilean needlegrass African lovegrass Milk thistle Thistles Fleabane	BROADLEAFED

Many evergreen woody weeds are relatively easy to see eg wattles, blackberry, vinca. Some are obvious when they flower, eg St John's wort, iris, marigolds. Other are obvious when they have autumn colours eg *Pistacia*. In the growing season some have coloured leaves, eg purple-leaved plum.

Table 10. Weed Control Calendar (prepared by the Molonglo Catchment Group)

		Molonglo Catchment Group Weed Information Pack																										
		WEED CONTROL CALENDAR																										
Common Name		The following calendar provides a seasonal overview of the control options available for each species in the Molonglo Catchment Priority Weeds List. It can be used as a quick reference guide to plan your management activities throughout the year. Refer to the individual weed fact sheets for detailed information about how to implement controls. If you require assistance in weed management planning contact your local council or Parks, Conservation and Lands ACT.																										
		CONTROL METHODS/SEASON																										
		Summer				Autumn				Winter				Spring														
		Hand pull	Dig	Cut (no chemicals)	Grazing	Competitive Pasture	Cut & paint	Drill & fill	Spray	Biological	Hand pull	Dig	Cut (no chemicals)	Grazing	Competitive Pasture	Cut & paint	Drill & fill	Spray	Biological	Hand pull	Dig	Cut (no chemicals)	Grazing	Competitive Pasture	Cut & paint	Drill & fill	Spray	Biological
African boxthorn																												
African lovegrass																												
Blackberry																												
Broom spp (Cape/ Montpellier & Scotch/English)																												
Burrs (Noogoora & Bathurst)																												
Chilean needle grass																												
Cootamundra wattle																												
False acacia / black locust																												
Fireweed																												
Gorse																												
Hawthorn																												
Horehound																												
Paterson's curse & viper's bugloss																												
Pine (Monterey / Radiata)																												
Poplars (White & Lombardy)																												
Privet																												
Serrated tussock																												
St John's wort																												
Sweet briar / briar rose																												
Thistles (Scotch / Illyrian & Nodding)																												
Tree of heaven																												
Willows (except weeping (Salix babylonica) and two types of pussy willow (S. x reichardtii and S. x calodendron))																												

