

## 4 GREYSTANES WOODLAND RESERVE - DESCRIPTION AND ASSESSMENT

### 4.1 General

Alpha Park Reserve is a linear reserve comprising a total area of 7 hectares (HCC, 1998) and is located between Alpha Road/Kurrajong Road and Smithfield Industrial Estate (Map V10). Bounded by Gipps Road to the west Alpha Park Reserve forms the western section of the Greystanes Woodland which is an extensive bushland corridor linking to Gipps and Hyland Road Reserves, Lower Prospect Canal Reserve, Prospect Creek, Prospect Reservoir and other bushland remnants linking to Greystanes Creek (Costigan, 2001). Alpha Park Reserve is zoned 6 (a) Open Space-Recreation under the Holroyd Local Environment Plan 1991. To the east, the Holroyd City Council (HCC) Reserve adjoins private property and this in turn adjoins Widemere Reserve. These additional two land parcels constitute the remainder of the Greystanes Woodland and HCC (2005a) reported that it was still in negotiations with the owners of the 'no development strip' to acquire the remaining parcel of the Greystanes Woodland.

The site occurs on the Blacktown Soil Landscape (Bannerman and Hazelton, 1990) the features of which are described in more detail in Volume 1 of this Citywide Bushland Management Plan (BMP). Previous land uses of this site have resulted in disturbance to surface soils and this includes scalping, minor excavation, fill introduction and altered drainage and hydrological flows. In 1990 the central drainage line was cleared and the natural creek and soils were altered (Costigan, 2001).

Topography of Alpha Park Reserve is gently undulating and the site is situated at approximately 40 metres above sea level on a broad south facing slope that forms part of the low hills surrounding Prospect Hill. There is a broad central north-south gully dividing the Reserve and which is part of a larger topographical feature that incorporates Alpha Park. This broad gully is the major surface drainage feature of the site and is likely to experience concentrated water flows during large rainfall events and have higher soil moisture content than the adjacent broad ridges. At a local scale Alpha Park Reserve falls within the Prospect Creek Catchment, a sub catchment of the Georges River Catchment.

The high conservation significance of the Greystanes Woodland remnants was highlighted by NPWS (1997) due to the presence of an endangered ecological community, the threatened plant species *Pimelea spicata* and other flora species of regional significance including *Hybanthus enneaspermus* subsp. *stellarioides*, *Sida spinosa* and *Scutellaria humilis*.

Alpha Park Reserve has an active Bushcare Volunteer Group and contracting bush regeneration companies have carried out weeding and planting works under direction from HCC.

### 4.2 Plant Communities

Three plant communities were identified within the Reserve in the current survey.

- Planted Shrubland/Woodland;
- Disturbed Shale Plains Woodland; and
- Shale Plains Woodland

The distribution of plant communities within the Reserve are shown in Map V10 and described below.

#### *Planted Shrubland/Woodland*

There are two areas of Planted Shrubland/Woodland within the study site. The small area of plantings mainly of native shrubs such as *Indigofera australis*, Australian Indigo and *Acacia* spp. The larger planting area in the central drainage line is more established and consists of shrub, small tree and canopy species. The groundcover stratum is largely absent due to mulching.

### *Disturbed Shale Plains Woodland*

The Disturbed Shale Plains Woodland (DSPW) is a narrow stand of trees consisting of remnant and regrowth Forest Red Gum, Grey Box and *Eucalyptus fibrosa* Red Ironbark and forms a northern arm of the Greystanes Woodland into Alpha Park. The shrub stratum is absent and this plant community is mown as part of the maintenance of the Alpha Park recreational area.

### *Shale Plains Woodland*

Shale Plains Woodland occurs over the majority of Alpha Park Reserve. The canopy is dominated by remnant and regrowth Forest Red Gum, Grey Box and Red Ironbark is occasional. Regenerating *Eucalyptus* spp form a mid canopy and there is a sparse understorey of native and exotic shrubs including Blackthorn, *Acacia decurrens* Black Wattle, *Leucopogon juniperinus* Prickly Beard-heath, juvenile regenerating tree species and isolated occurrences of Lantana. The groundcover stratum is characterised by large and dense swards of exotic grasses (eg Kikuyu and African Love Grass) and areas that are mainly dominated by native groundcovers that include grasses and other herbs.

Mapping of the native vegetation of the Cumberland Plain by NPWS (2003) has identified the Shale Plains Woodland sub unit of the Cumberland Plain Woodland endangered ecological community at Alpha Park Reserve.

## **4.3 Fauna and Fauna Habitat**

The Reserve forms part of a locally significant wildlife corridor for Western Sydney and supports threatened flora and fauna species. Alpha Park Reserve is incorporated into the larger corridor of native plant communities of Greystanes Woodland, Hyland Road Reserve, the Boral Quarry, Lower Prospect Canal and Prospect Creek. Major fauna habitat of the Reserve includes;

- Revegetation areas;
- Disturbed Woodland; and
- Structured Woodland;

The general habitats above are providing sheltering and foraging resources for fauna and this includes cover from predators, tree hollows, nesting opportunities, water and food resources (eg *Eucalypt* blossoms and nectar, grass seed, aquatic insects and aquatic vegetation). There is a well developed layer of leaf litter in places throughout the main SPW plant community.

## **4.4 Weeds and Resilience**

Weed growth recorded within Alpha Park Reserve generally comprises:

- opportunistic, annual or perennial species (eg Paddy's Lucerne and *Pavonia hastata*) that have colonised disturbed ground and established in resilient areas;
- exotic grasses (eg Kikuyu and African Love Grass); and
- woody weeds (eg Olive and Lantana).

Weed species richness and densities and bushland resilience vary across the study area. Bushland resilience and weed densities are shown in Map C10 and described in more detail below.

### *Planted Shrubland/Woodland*

The two areas of this plant community have a moderate resilience due to the presence of establishing native plants that are supplementing the standing remnant and regrowth SPW, adding to the soil seed bank and providing fauna habitat. Both areas have been mulched and there is some herbaceous

weed regrowth in the smaller area whilst recent mulching of the larger area in the central drainage line is suppressing the germination and establishment of weeds.

#### *Disturbed Shale Plains Woodland*

This linear stand of trees has a low to moderate resilience as the canopy of this area is not as continuous as in the undisturbed SPW and there is an absence of native shrub and understorey stratum. There is potential for the regeneration of native plant species in this area in response to the removal of mowers but this is likely to be slow as organic matter and surface soils in this area are affected by sheet flows during rainfall events potentially depleting soil stored seed resources.

#### *Shale Plains Woodland*

Shale Plains Woodland of Alpha Park has a moderate to high resilience. Regeneration of native plant species is continuing throughout the majority of the Reserve indicating that there is both a viable soil seed bank and remnant and regrowth vegetation is supplementing resilience. As described above there are minor isolated occurrences of woody weed regrowth and large patches of introduced grass species but these are interspersed with areas dominated by native groundcovers.

### 4.5 Threats to Native Plant Communities

The following table provides an inventory of on going or other sources of potential impact that are likely to negatively affect the long term viability of the native vegetation and habitat.

**Table 4-1** Current threats to native plant communities at Alpha Park Reserve identified in the current survey.

Potential Threat	Potential Impact
Stormwater runoff	Erosion, sedimentation, litter, increased nutrient loads, dispersal of weed propagules.
Garden refuse dumping	Dispersal of weed propagules.
Maintenance mowing at the rear of property boundaries.	Dispersal and introduction of weed propagules and accidental encroachment. Reestablishment and dispersal of exotic perennial grasses and other weeds from recent 'no mow zones' into resilient bushland.
Disbandment or declining participation of Alpha Park Bushcare Group	Loss of major weed management resource for the Reserve.
Continued establishment of exotic and non-locally indigenous plant species and introduction of new weed species.	Further loss of natural resilience.
Failure to implement management measures for an EEC and threatened flora and fauna species.	Further degradation of EEC, continued operation of key threatening process such as 'Invasion of native plant communities by exotic perennial grasses' and the loss of habitat and existence of threatened flora and fauna.
Failure to secure privately owned land parcel within Greystanes Woodland.	Further degradation of EEC and loss of opportunity to implement and create a protected bushland network through targeted land acquisition as land becomes available (ie proposed Cumberland Plain Reservation Strategy from DEC priority actions for CPW).

## 4.6 Vegetation Management Measures

### 4.6.1 Bushland Management Strategy

The aim of vegetation management for Alpha Park Reserve will be to maintain open space that incorporates urban bushland, threatened species and habitat conservation and recreational opportunities. The specific objective for native vegetation will be to enhance the condition of the SPW and maintain or enhance the condition of the DSPW communities. This objective will be met by implementing a program of vegetation management measures that;

- ensures a nil or minimal amount of further disturbance to the remnant and regrowth endangered ecological communities of the sites that would otherwise compromise their current resilience or long term survival;
- improves the habitat value for existing threatened and non-threatened flora and fauna of the SPW and habitat potential for threatened or other fauna recorded from the locality;
- continues to encourage community participation in the management of the Reserve; and
- secures natural heritage for the local community in the long term.

The program will focus on retaining and using the existing native vegetation and natural resilience of the site to meet the guiding objective and this will require:

- weed removal and control;
- bush regeneration techniques;
- erosion control; and
- revegetation.

### 4.6.2 Bushland Regeneration and Restoration Project Planning

Sourcing of adequate and ongoing funding for the implementation of bush regeneration and restoration project is critical for success of any bush regeneration and revegetation works. Council must first decide on the level of financial commitment it is prepared to make over a medium to long term period and funding sources such as rate levies, state and federal grants, developer contributions and the stability of current volunteer resources before commencing bush regeneration or restoration projects.

Planning of the implementation of bush regeneration and restoration project must also consider that departures from the works recommended in the BMP may be required in response to changing site conditions due to natural processes or future land uses of the locality.

### 4.6.3 Bushland Regeneration and Restoration Works

#### *Noxious Weed Control*

Weeds that are listed as 'noxious' for Holroyd LGA must be removed from the site or controlled, depending on the control class of weed and according to the provisions of Weed Control Order No. 20 from the *NSW Noxious Weeds Act 1993*. Noxious weed control must also be consistent with specific regional weed control strategies that are currently under review or in development. Noxious weeds have previously been targeted throughout the Reserve but are re-establishing in places. It is recommended that Council carry out noxious weed targeting on a quarterly basis in the Reserve through either the engagement of bush regeneration contractors or redirection of volunteer bush regenerator resources. Noxious weed control in this Reserve should be incorporated in a strategically developed LGA wide noxious weed control plan.

### *Maintenance Weeding*

Maintenance weeding is carried out in the reserve by HCC bushland management staff, bush regeneration contractors the Alpha Park Bushcare Group and it is likely that this will continue. The majority of the SHW has a moderate to high resilience and this would be consolidated and improved by more regular scheduled works carried out by a contracting bush regeneration company. A contracting bush regeneration company may also provide supervision or input to the Alpha Park Bushcare Group on strategic whole of Reserve management. Regular scheduled works by contracting bush regenerators should focus on broadscale weed control such as targeting woody and vine weed regrowth and controlling or reducing the extent of invasive perennial grasses such as African Love Grass and Kikuyu through handweeding and spot spraying.

Other bush regeneration techniques such as hand weeding, spot spraying, assisted seedling recruitment, soil scarification, brush matting and other appropriate techniques would benefit the SPW plant community.

### *Revegetation*

As identified, natural regeneration of native groundcover, shrub and canopy species is occurring throughout the SPW of the Reserve, and this is likely to continue with the implementation of appropriate vegetation management techniques. Significantly, planting works over several years and regeneration of the SPW is creating age class structure in the canopy stratum and this important ecological function is absent from the area of DSPW. Recent planting and mulching works have been carried out in the Widemere Reserve section and these require maintenance. It is recommended that revegetation be focused on DSPW with the objective of creating a canopy of variable age class (as current management is preventing this from occurring through natural processes) and improves canopy cover within the DSPW and canopy continuity to the SPW through infill planting of canopy species and midstorey tree species (eg *Melaleuca linariifolia* Flax-leaved Paperbark). Additional planting of midstorey and canopy tree species throughout areas of Alpha Park that are not used for active recreation (eg verges of the playing field) would in the long term provide improved habitat and additional vegetated continuity with the SPW. Revegetation in the DSPW should use semi advanced or advanced plant stock.

### *Open Space Maintenance*

The DSHW plant community is currently managed as open space and it is recommended that this continue with the inclusion of canopy management as described in *Revegetation* above. Parts of the DSHW may benefit from the removal of mowing practices but only if adequate resources were available to establish and maintain a no mow zone that incorporated regeneration and/or plantings. Mowing of the fire breaks along the rear of adjacent private properties should continue.

### *Threatened Species Management*

Current management of *P. spicata* includes the fence surrounding the Reserve, bush regeneration works by the Alpha Park Bushcare volunteers, mower exclusion bollards and some level of signage. The *Draft NSW and National Recovery Plan for Pimelea spicata*. (DEC 2004a) has identified that remnant populations of *P. spicata* are threatened by competition from environmental weeds (including exotic grasses recorded from the Reserve) and the key threatening process, 'Invasion of native plant communities by exotic perennial grasses' is a particular threat to the survival of *P. spicata* due in part to the species herb-like habit. Additionally the DEC (2004a) state that 'It is likely that adults can persist for some time when competing with weeds due to the presence of an underground storage organ' and that the species does respond to disturbance such as fire and the removal of dense weed infestations and this also includes germination from soil stored seed.

The Recovery Plan recommends that land managers exercise caution when implementing weed control measures in known locations of the species and urge the adoption of a precautionary principle in the application of herbicides, mechanical weed removal or the use of fire. However the DEC (2004a) suggest that weed control methods to protect or promote the species survival will 'need to be determined on a site by site basis and will need to be implemented in an experimental manner to gain further insight into the control of environmental weeds in *P. spicata* habitat.' It is recommended that for the conservation of threatened biodiversity Council incorporate 'experimental' methods as

suggested by the DEC (2004a) that combines the use of monocot specific herbicides, fire and mechanical removal targeting some of the large patches of Kikuyu within the SPW but which considers management of conservation of the Cumberland Plain Land Snail as well.

For example a trial experimental program might include the following methodology.

- Identify two areas of dense exotic grass infestation that may support *P. spicata* propagules (eg areas that are infested with Kikuyu but have some resilience);
- Carry out a detailed survey targeting for *P. spicata*, other threatened flora and fauna species in the experimental areas;
- Where no threatened flora and fauna species are located in a proposed trial area, target spray exotic grasses with a monocot selective herbicide in both plots;
- Monitor both plots over several months for germination of *P. spicata* and continue to spot spray exotic grass regrowth with a monocot selective herbicide;
- Where regeneration of *P. spicata* is not observed over several months of monitoring the experimental plots carry out a low intensity ecological burn of one plot and remove dead weed biomass from the second plot by scalping to 10mm. Prior to these treatments carry out detailed survey of the plots for Cumberland Plain Land Snail and translocate to suitable habitat within the Reserve if located; and
- Monitor plots for germination of *P. spicata* and implement appropriate management if this occurs.

### *Bushcare*

As highlighted the Alpha Park Reserve Bushcare volunteer group are a significant component of the on ground bush regeneration works in the Reserve. Council provides resources to assist and promote the continuing participation of the group and it is recommended that this continue and Council provide some additional resources (such as supervision and supplementary works by bush regeneration contractors).

Council has reported that employees of local business have participated in bush regeneration works in the reserve and the business has contributed funding to revegetation (HCC, 2006). It is recommended that Council continue to promote such relationships with local businesses with an 'Adopt a Plot' scheme that provides recognition to participating organisation through signage (on site or at entrances to buildings or driveways), public Council circulars, or awards for conserving and enhancing valuable natural and community resources.

### *Recreation*

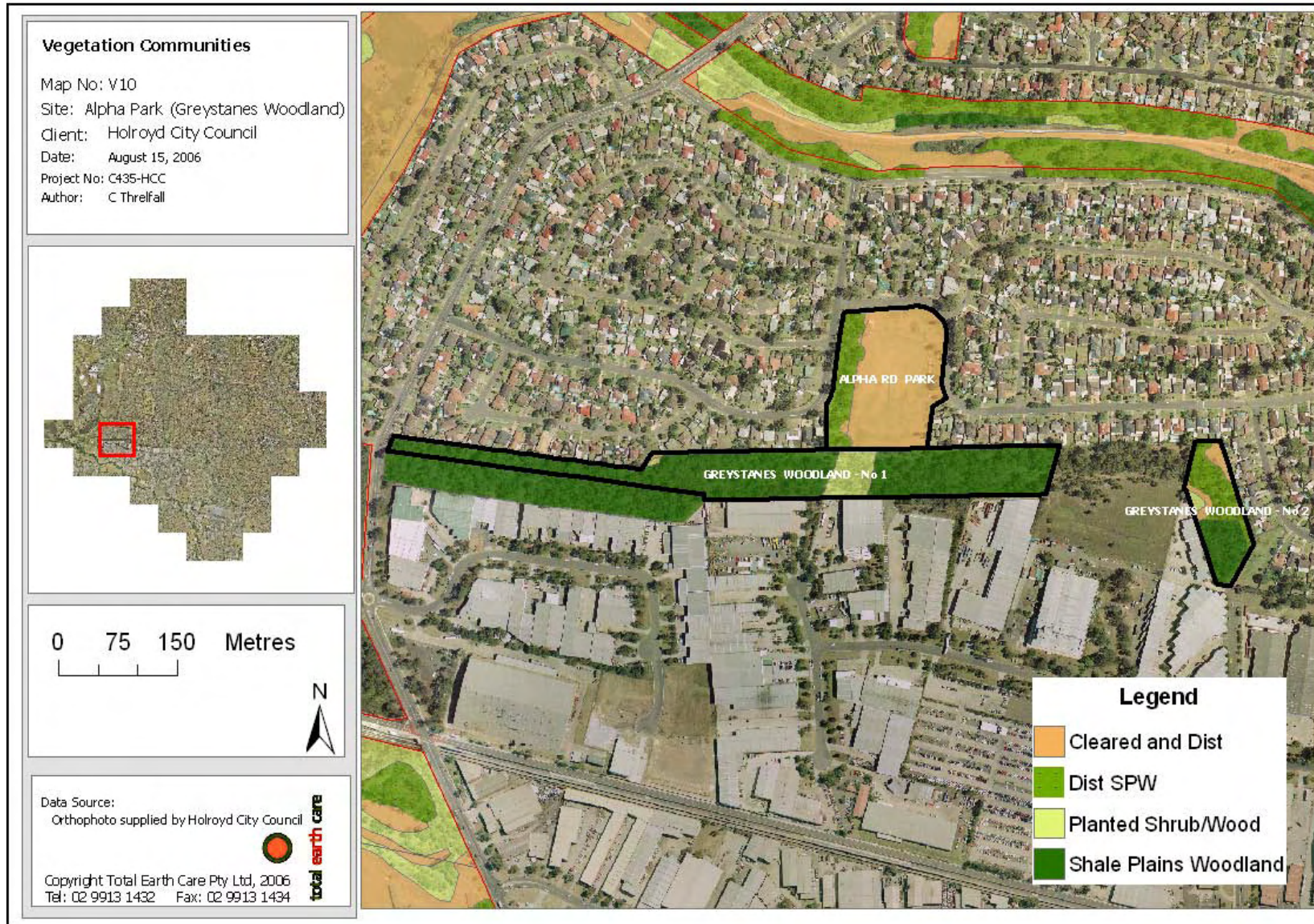
Due to the presence of threatened flora and fauna species within the SPW it is not suited to uncontrolled recreation activities and adequate recreational facilities are provided in Alpha Park open space and sporting field. Some interpretive signage relating to threatened species habitats has been provided in the reserve and this educational material is a part of passive recreation.

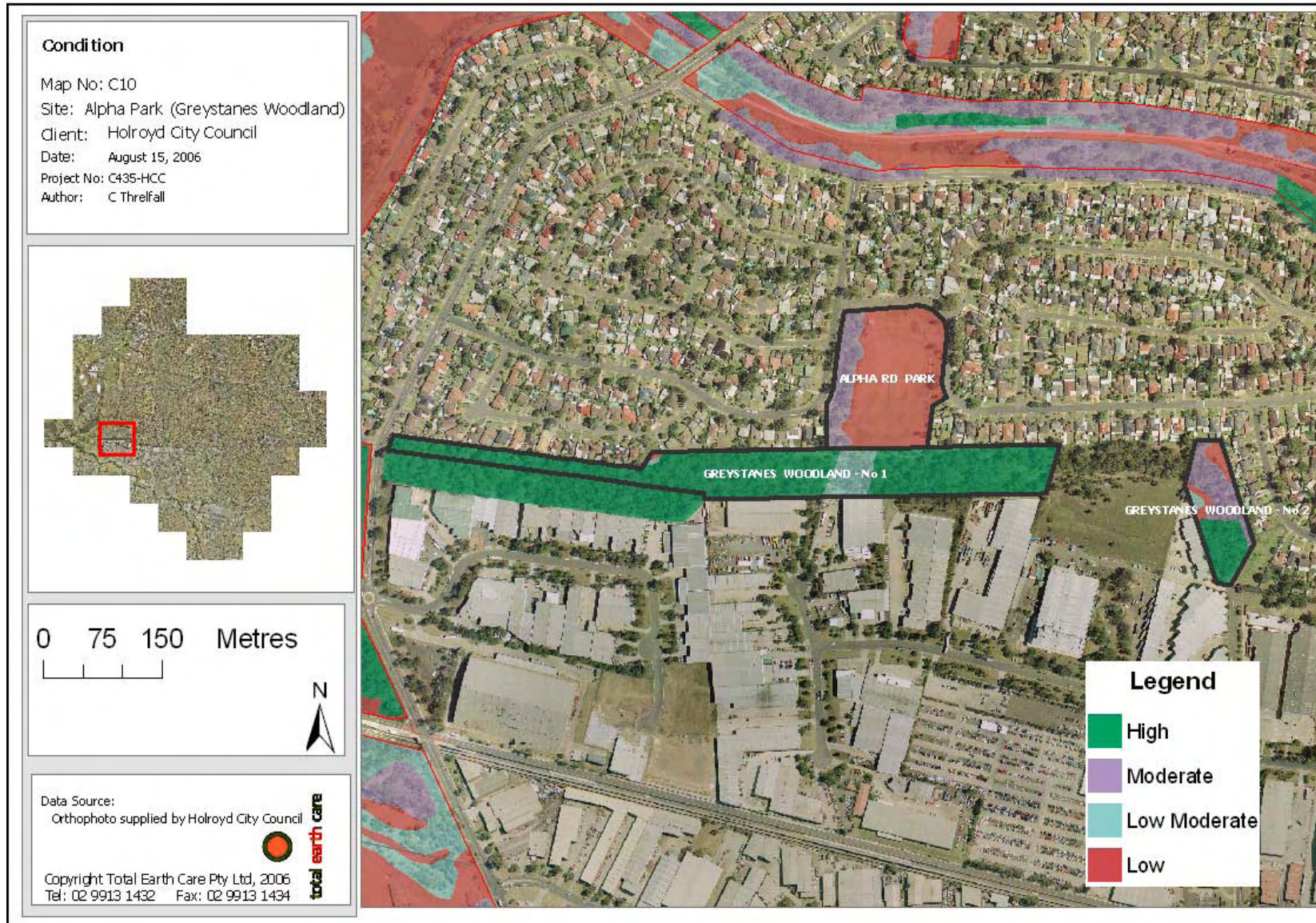
#### 4.7 Summary of Actions, Targets and Performance Indicators

Table 4-2 following summarises the vegetation management measures (actions) and recommends targets and performance indicators for the implementation of the Citywide BMP at Greystanes Woodland. As described in earlier sections of the Citywide BMP targets should specify achievable outcomes to meet objectives, whilst performance indicators should provide a means of measuring progress of the action relative to the objective.

**Table 4-2** Actions, targets and performance indicators for the implementation of the Citywide BMP for Greystanes Woodland.

Action	Target	Performance Indicators
Noxious weed control	Noxious weeds are managed according to the control category specified in the <i>Noxious Weeds Act 1993</i> and species specific regional management plans.	The distribution and percentage cover of noxious weeds is reduced in the reserve. Occurrences of previously unrecorded noxious species for the reserve are prevented from establishing.
Bush regeneration	Management and conservation of the endangered ecological communities and other native plant communities of the reserve.	Increased area of native plant communities under bush regeneration contract. Increased native plant species richness in areas under bush regeneration contract as determined by ongoing flora survey and monitoring.
Revegetation	Creation of age class structure in the canopy.	Increased native plant species cover and species richness in stands of native plant communities within the reserve.
	Improved vegetation connectivity from structured woodland to disturbed woodland and other areas of parkland.	Increased native plant species cover and species richness between stands of native plant communities within the reserve.
Threatened flora species management	Management and conservation of the endangered <i>P. spicata</i> at the reserve.	No loss of or damage to <i>P. spicata</i> at the reserve. Implementation of DECC recovery strategies, actions and plan for the species. Regular monitoring of the population including census.
Recreation	Provision of recreational opportunities that does not compromise the management and conservation of the endangered ecological communities and threatened flora species of the reserve.	No further development of recreation infrastructure or facilities in the fenced remnant area..
Bushcare	Participation of the community in natural resource management and biodiversity conservation.	Increased participation of Bushcare Volunteers. Provision of opportunities for one off or event based participation by the wider community.





## 5 HYLAND ROAD RESERVE - DESCRIPTION AND ASSESSMENT

### 5.1 General

Hyland Road Reserve incorporates two main areas that are separated by Hyland Road in Greystanes (Map V11). The Reserve is currently zoned 6 (a) Public Open Space under the *Holroyd Local Environmental Plan 1991* and is approximately 32.5 hectares in size. The Hyland Road Reserve North site has most recently been used as an Arboretum and this included seedling displays, plant holding areas, machinery shed and caretaker's residence. Planting of locally and non-locally occurring native plant species has been carried out at the site as part of the former Arboretum project. The Hyland Road Reserve South site has been used as a land fill tip site (now decommissioned) and part of the site is used as a Holroyd City Council depot for materials storage.

Hyland Road Reserve is mapped as occurring on the Blacktown Soil Landscape by Bannerman and Hazelton (1990). Geographical features of the Blacktown Soil Landscape are broad rounded crests and ridges, gently undulating rises falling with gently inclined slopes with local relief approximately to 30m. Soils are shallow to moderately deep hard-setting mottled texture contrast soils with red and brown podzolic soils on crests grading to yellow podsolic soils on lower slopes and in drainage lines. The Blacktown Soil Landscape occurs over Wianamatta Group shales and soil limitations include low soil fertility and poor soil drainage.

Surface soils across the northern sections of the Reserve are likely to be affected by previous agricultural practices and the construction of the adjacent Lower Prospect Canal. Earthworks have occurred for levelling of the former playing field in the northern area, construction of open swales to direct surface drainage into Munro Creek and vehicular access tracks have been maintained by grading with loose road base.

The surface soil profile in the area on the east bank of Munro Creek along the rear of the Munro Street property boundaries is likely to have been significantly disturbed during housing development construction in the locality.

Erosion and slumping has occurred along the upper sections of Munro Creek especially where tree cover is absent and is this is likely to continue if not addressed. Ponding of stormwater at the lower section of Munro Creek at the Hyland Road culvert has resulted in the deposition of a silt and sediment plug creating a broader channel and altered soil nutrient conditions that has promoted and is sustaining a high level of weed growth.

Surface soils across the southern section of the Reserve are likely to be affected by previous agricultural practices, capping of the former waste tip and construction of the adjacent Lower Prospect Canal. Earthworks have most likely occurred along this section of Munro Creek to manage surface drainage and mitigate flooding.

The surface soil profile in the area on the east bank of Munro Creek along the Gipps Rd bank have been disturbed in places and this includes the introduction of fill material.

The southeast section of the Reserve, including the lower section of Munro Creek is relatively flat. A gentle slope forming a broad arc rises from the flat open grassed area to the adjoining Lower Prospect Canal Reserve along the western and northern sections of the site. Local relief is between 40m above sea level in the southeast to approximately 60m above sea level at the highest point in the northwest area of the Reserve.

Slopes rise steeply beyond the Prospect Canal Reserve Cycleway to the 120m contour on Prospect Hill to the west and northwest and gentle slopes continue in a southerly direction toward Prospect Creek.

At a regional scale Hyland Road Reserve North falls within the Georges River Catchment. Munro Creek enters the Reserve from the north and runs south through the eastern section joining Prospect Creek to the south at Wetherill Park. Prospect Creek intersects the Georges River further to the southeast at Georges Hall.

The steep slopes to the west and north of the Reserve and gentle slopes of the site provide surface drainage in the direction of Munro Creek. The upper section of Munro Creek is characterised by low flow and high flow channels. An open stormwater drain joins the central northern section of Munro Creek from Munro Street and there are constructed open drainage swales and stormwater outlets around the lower west bank. Munro Creek is piped under Hyland Road and the channel is broader and wider through the southern section of the Reserve. There is a large semi-permanent wetland at the lower end of the southern section of Munro Creek and a large stormwater inlet, capturing runoff from urban and industrial development to the east, discharges via an open channel to the wetland. Munro Creek drains under the bus-way and into a constructed pond in the northeast corner of Gipps Road Reserve.

## 5.2 Plant Communities

Five plant communities were identified within the Reserve in the current survey:

- Cleared and Disturbed;
- Exotic Shrubland;
- Native Grassland;
- Planted Shrubland/Woodland; and
- River Flat Eucalypt Forest on Coastal Floodplains.

The distribution of plant communities within the Reserve are shown in Map V11 and described below.

### 5.2.1 Cleared and Disturbed

The Cleared and Disturbed plant community occurs over the majority of Hyland Rd Reserve in both the northern and southern sections (Map V11). The structure of the Cleared and Disturbed community consists of scattered native trees to 8m (mainly in the northern section), scattered native and exotic shrubs, dense and large brambles of Blackberry *Rubus fruticosus* agg sp, with the groundcover stratum consisting predominately of exotic pasture grasses with common occurrences of perennial and annual weeds. Dominant exotic grasses throughout the groundcover stratum are Kikuyu *Pennisetum clandestinum*, Paspalum *Paspalum dilatatum*, *Briza subaristata*, *Nassella neesiana*, Pigeon Grass *Setaria gracillis* and African Love Grass *Eragrostis curvula*. Commonly occurring perennial and annual weeds are Lambs Tongue *Plantago lanceolata*, Purpletop *Verbena bonariensis*, Spear Thistle *Cirsium vulgare* and Fleabane *Conyza* sp. Native grasses and groundcover species are widely distributed throughout this community and are either mixed amongst exotic grasses or occur in patches. Common native species are *Bothriochloa macra* Red-leg Grass, *Sporobolus creber* Western Rat-tail Grass, *Cymbopogon refractus* Barbed Wire Grass and *Centella asiatica* Indian Pennywort.

### 5.2.2 Exotic Shrubland

The Exotic Shrubland is located at the northern end of the Reserve incorporating Munro Creek and extends to the boundary fence (Map V11). The Exotic Shrubland community is dominated by Small Leaved Privet *Ligustrum sinense* and *Ligustrum lucidum* Large Leaved Privet to 3m high and is fringed by brambles of Blackberry.

### 5.2.3 Native Grassland

This plant community occurs in the southeast section of Hyland Road Reserve North and the central area Hyland Road Reserve South (Map V11). Despite the abundance of exotic grasses such as Paspalum, *B. subaristata* and Pigeon Grass native grass species are common and include Red-leg Grass, Early Spring Grass *Eriochloa pseudoacrotricha*, Western Rat-tail Grass and *Microlaena stipoides* Weeping Grass.

### 5.2.3 Planted Shrubland/Woodland

There are five areas of Planted Shrubland/Woodland at Hyland Road Reserve North and two at Hyland Road Reserve South (Map V11). The northern areas of this plant community are planted with *Eucalyptus* species including non-locally indigenous species such as *Eucalyptus microcorys* Tallowwood and *Eucalyptus torelliana* Cadaghi. Locally occurring native canopy species are more common in the southern areas of this community type and common species are *Eucalyptus tereticornis* Forest Red Gum, *Eucalyptus crebra* Narrow-leaved Ironbark and *Casuarina glauca* Swamp Oak. As with the canopy species non local and locally occurring shrubs have been either planted or direct seeded and common species include *Acacia cultriformis* Knife-leaf Wattle, *Acacia saligna* Golden Wreath Wattle, *Acacia binervia* Coast Myall, *Acacia parramattensis* Sydney Green Wattle, *Hakea sericea* Needlebush, *Dodonaea triquetra* Large-leaf Hop-bush. The groundcover stratum is similar in floristic composition to the Cleared and Disturbed plant community and is dominated by exotic pasture grasses with common occurrences of some native grass and groundcover species.

### 5.2.5 River Flat Eucalypt Forest on Coastal Floodplains

The River Flat Eucalypt Forest on Coastal Floodplains (RFEFCF) occurs along Munro Creek in both the northern and southern sections of the Reserve (Map V11). RFEFCF is listed in Part 3 of Schedule 1 of the TSC Act as an endangered ecological community and RFEFCF includes and replaces the Sydney Coastal River-Flat Forest endangered ecological community (NSW Scientific Committee, 2005) previously described by Tozer (2003). Mapping of the native vegetation of the Cumberland Plain by NPWS (2003) has identified the riparian vegetation of Munro Creek at Hyland Road North as the Shale Plains Woodland sub unit of the Cumberland Plain Woodland endangered ecological community but the current floristic composition is more representative of RFEFCF than Shale Plains Woodland. Additionally, as stated by the NSW Scientific Committee (2005) RFEFCF may adjoin or intergrade with several other endangered ecological communities indicating that elements of both these community types could be present.

The RFEFCF is dominated by Swamp Oak and *Eucalyptus moluccana* Grey Box with Forest Red Gum, while planted Eucalypt species are common on the western margin and *Eucalyptus amplifolia* Cabbage Gum occur occasionally. Canopy height is up to 20 metres and Foliage Projection Cover (FPC) is approximately 60%. The understorey is between 3 and 8 metres and consists of regenerating native tree and shrub species including *Eucalyptus* spp, *Melaleuca styphelioides* Prickly-leaved Tea Tree, *Melaleuca decora* and *Acacia floribunda* White Sally Wattle and non locally indigenous native and exotic species such as *Grevillea robusta* Silky Oak, *Acacia baileyana* Cootamundra Wattle, Broad-leaved Privet, *Senna pendula* var. *glabrata* and *Salix babylonica* Weeping Willow is uncommon. The groundcovers on the western bank of the channel are generally sparse and patchy due to a thick mulch of Swamp Oak branchlets and are a mix of native and exotic herbaceous species such as Red-leg Grass, *Einadia hastata* Berry Saltbush, *Atriplex semibaccata* Creeping Saltbush, *Bidens pilosa* Cobblers Pegs, *Araujia sericifera* Moth Vine and *Sida rhombifolia* Paddy's Lucerne. On the eastern bank this community is much more disturbed and the groundcover stratum is dominated by exotic grasses and herbs. Kikuyu has invaded from the adjacent open space and *Tradescantia fluminensis* Wandering Jew has spread outward from the main channel.

Common native aquatic and semi-aquatic plant species within the channel are *Persicaria decipiens* Slender Knotweed, *Typha orientalis* Broadleaf Cumbungi and *Carex longibrachiata* with the lower silted section of the channel dominated by exotic plant species including *Arundo donax* Giant Reed, *Ageratina adenophora* Crofton Weed and Wandering Jew.

## 5.3 Fauna and Fauna Habitat

The Reserve forms part of a locally significant wildlife corridor for Western Sydney particularly the riparian vegetation and aquatic habitat of Munro Creek. Although the riparian vegetation is degraded and not fully continuous between Hyland Road North and South, or Alpha Park to the east and less continuous to the CPW of the Boral Quarry site to the north, these habitats form the basis for a core corridor that may (with an appropriate management regime) be linked to other areas of remnant or regrowth native plant communities such as occur nearby along the Lower Prospect Canal Cycleway.

The open space and disturbed plant communities throughout the remainder of the site adjoin other large areas of open space. At a regional scale Munro Creek joins Prospect Creek to the south and forms part of the Georges River catchment. Major fauna habitat of the Reserve includes;

- Open grasslands;
- Revegetation areas;
- Woodland;
- Riparian;
- Aquatic; and
- Weed thickets and infestations.

The general habitats above are providing sheltering and foraging resources for fauna and this includes cover from predators, tree hollows, nesting opportunities, water and food resources (eg Eucalypt blossoms and nectar, grass seed, aquatic insects and aquatic vegetation).

## 5.4 Weeds and Resilience

Weed growth recorded within the study area generally comprises:

- opportunistic, annual or perennial species (eg Sowthistle, Spear Thistle, Purpletop, and Paddy's Lucerne) that have colonised disturbed ground;
- exotic grasses (eg Kikuyu, Paspalum and Pigeon Grass);
- woody weeds (eg Blackberry, Olive and Broadleaf Privet); and
- aquatic weeds (eg *Isolepis prolifera* and *Cyperus eragrostis*).

Bushland resilience varies across the study area and between plant communities, and bushland resilience is shown in Map C11 and described in more detail below.

### 5.4.1 Cleared and Disturbed

The Cleared and Disturbed plant community has a low resilience with weed densities estimated at between 80 and 100% cover. Due to a high level of disturbance including the loss of native vegetation cover, modification of surface soils and hydrological flow regimes from previous land management practices, the Cleared and Disturbed community has very little to no potential to naturally recover to a fully structured native plant community. However, there are scattered planted, remnant and regenerating native plant species throughout the Cleared and Disturbed community. Native groundcover, shrub and tree species are a significant component of the present and future natural resilience of the site (eg seed source, habitat, age class diversity and canopy linkages).

### 5.4.2 Exotic Shrubland

The Exotic Shrubland is currently assessed as having a low resilience and has established as a result of the previous land uses and disturbances described above for the Cleared and Disturbed plant community. There is potential for the regeneration of native plant species in this community through the implementation of vegetation management measures but it is unlikely that a fully structured native plant community would naturally re-establish. Weed densities of 90 to 100% are estimated for this plant community.

### 5.4.3 Native Grassland

Both Native Grassland communities mapped for Hyland Road Reserve have a medium resilience. As highlighted these plant communities are dominated by native grass and groundcover species although they have been subject to disturbance such as the clearing of other strata and earthworks there is a

high capacity for these communities to sustain native species richness in the groundcover stratum with the implementation of vegetation management measures.

The Native Grassland of the Hyland Road Reserve North has previously been target weeded for *N. neesiana*.

#### 5.4.4 Planted Shrubland/Woodland

The Planted Shrubland/Woodland plant communities have a low to medium resilience. These are relatively isolated islands of locally and non-locally indigenous plant species with low resilience. This is due mainly to a groundcover stratum dominated by exotic plant species, presence of some non-locally indigenous shrub species that are considered to be invasive and sparse canopy cover. Generally weed densities in this community type are 80 to 90%.

#### 5.4.5 River Flat Eucalypt Forest on Coastal Floodplains

The Hyland Road Reserve North RFEFCF has a low to moderate resilience. Long edges with the Cleared and Disturbed plant community and continuing impacts from stormwater runoff, erosion and sedimentation are contributing to the establishment and perpetuation of exotic plant species within the groundcover, understorey and canopy stratum. Weed species richness and densities are highest in the channel and on the east bank of Munro Creek. Resilience is higher on the west bank (but not exceeding a moderate class) with a dominance of native plant species in all stratum and remnant and regrowth canopy. The Hyland Road Reserve North RFEFCF has an aggregate weed density of 60 to 70%.

## 5.5 Threats to Native Plant Communities

The following table provides an inventory of on going or other sources of potential impact that are likely to be negatively affecting the long term viability of the native vegetation and habitat.

**Table 5-1** Current threats to native plant communities at Hyland Road Reserve identified in the current survey.

Potential Threat	Potential Impact
Proposed Hyland Road sporting complex and future development within Munro Creek catchment.	Further alteration to hydrological regimes in Munro Creek during and post construction resulting in elevation of stormwater volumes, flow velocities, erosion, sedimentation, litter and increased nutrient loads. Accidental damage to vegetation of EEC during construction. Increased vandalism in EEC as a result of improved access and increased recreational usage of the area.
Stormwater runoff	Erosion, sedimentation, litter, increased nutrient loads, dispersal of weed propagules and chemical spills/discharge from adjacent industry and commercial development.
Garden refuse dumping	Increased nutrient loads and dispersal of weed propagules.
Continued establishment of exotic and non-locally indigenous plant species and introduction of new weed species.	Further loss of natural resilience.
Failure to implement vegetation management measures in an EEC	Further degradation of EEC and continued operation of key threatening process such as 'Invasion of native plant communities by exotic perennial grasses'

## 5.6 Vegetation Management Measures

### 5.6.1 Bushland Management Strategy

The aim of vegetation management for the northern and southern sections of Hyland Road Reserve will be to maintain open space that incorporates urban bushland, threatened species and habitat conservation and recreational opportunities. The specific objective for native vegetation will be to enhance the condition of the River Flat Eucalypt Forest on Coastal Floodplains (RFEFCF) communities. This objective will be met by implementing a program of vegetation management measures that;

- ensures a nil or minimal amount of further disturbance occurs to the remnant and regrowth endangered ecological communities of the sites that will compromise their current resilience or long term survival;
- restores or replicates native plant communities that are similar in structure and floristics to RFEFCF;
- improves the habitat value for existing fauna of the sites and habitat potential for threatened or other fauna recorded from the locality;
- secures natural heritage for the local community in the long term.

The program will focus on retaining and using the existing native vegetation and natural resilience of the site to meet the guiding objective and this will require:

- weed removal and control;
- bush regeneration techniques;
- erosion control; and
- revegetation.

#### 5.6.2 Bushland Regeneration and Restoration Project Planning

Sourcing of adequate and ongoing funding for the implementation of bush regeneration and restoration project is critical for success of any bush regeneration and revegetation works. Council must first decide on the level of financial commitment it is prepared to make over a medium to long term period and funding sources such as rate levies, state and federal grants, developer contributions and the likelihood of volunteer resources before commencing bush regeneration or restoration projects.

Planning of the implementation of bush regeneration and restoration project must also consider that departures from the works recommended in the Bushland Management Plan may be required in response to changing site conditions due to natural processes or future land uses of the locality.

#### 5.6.3 Bushland Regeneration and Restoration Works Hyland Road North

##### *Noxious Weed Control*

Weeds that are listed as 'noxious' for Holroyd LGA must be removed from the site or controlled, depending on the control class of weed and according to the provisions of Weed Control Order No. 20 from the *NSW Noxious Weeds Act 1993*. Noxious weed control must also be consistent with specific regional weed control strategies that are currently under review or in development.

##### *Primary Weeding*

Primary weeding is to commence in the RFEFCF and should not progress into other plant communities of Hyland Road North (other than as noxious weed control) until the RFEFCF is stabilised and maintenance weeding is providing a level of certainty to the long term survival and enhancement of resilience for this community. Primary weeding should progress in stages throughout the remainder of Hyland Road North from areas of highest resilience to areas of lower resilience.

Primary weeding of the RFEFCF at Hyland Road North will take several weeks to complete and the bulk of weed biomass should be transported off site. Noxious weeds that have potential for vegetative reproduction must be removed from site and disposed of appropriately. Woody debris from noxious weeds that have little potential for vegetative reproduction (eg Broadleaf Privet) can remain on site for composting and provision of habitat. Compost piles are to be placed well away from the Munro Creek channel so they are not washed into stream flow during storm events.

Retention of habitat should be considered during the primary weeding of woody weed thickets. During the current field survey small bird species (Superb Blue Wren and Red Browed Firetail) were observed using Blackberry and Privet infestations for foraging and cover. Some woody weed thickets (such as Blackberry) should be initially treated and left in situ with follow up treatment until regeneration or revegetation works are providing suitable replacement habitat.

Primary weeding has previously been carried out in the Regenerating Closed Grassland at Hyland Road North.

##### *Secondary Weeding*

Secondary weeding will occur three to six months after the completion of primary weeding, depending on the amount of regrowth of herbaceous annuals (and other weeds that have an abundant seed source present in the soil) that typically occurs after primary weeding. The appropriate timing of

secondary weeding will vary according to the timing of the primary weeding, insofar as regrowth will be stronger if primary weeding occurs during spring and summer, and slower during autumn and winter. The need for secondary weeding will also depend on climatic conditions in the intervening period (eg periods of sustained rainfall will promote germination of weed seeds and require secondary weeding to occur sooner than it would under dry conditions).

Secondary weeding is to focus on the RFEFCF and Regenerating Closed Grassland. Secondary weeding will require targeted removal of noxious weed regrowth and hand removal and spot spraying of exotic grasses, herbaceous weeds and seedlings of woody weeds throughout both areas.

### *Maintenance Weeding*

Maintenance weeding will be required in the RFEFCF and Regenerating Closed Grassland to ensure that weed growth following secondary weeding is controlled in the long-term. Maintenance will be on going and as mentioned previously, the undertaking of a bush regeneration and restoration project is likely to only be successful and an efficient allocation resources if there is a long-term commitment. Weeding activities will include continued noxious weed control (throughout Hyland Road North) and bush regeneration techniques such as hand weeding, spot spraying, assisted seedling recruitment, soil scarification, brush matting and other appropriate techniques as determined by site response.

### *Revegetation*

The UBBS (NPWS, 1997) suggests the establishment of vegetated links between existing vegetated corridors of the LGA such as Prospect Creek and Lower Prospect Canal Reserve. The existing native plant communities of the Hyland Road Reserves, including Hyland Road North, provide the core for a corridor to link the two larger reserves for such a strategic approach. Generally revegetation works will aim to: supplement and consolidate the RFEFCF and extend and create canopy cover to nearby areas of highest resilience or remnant bushland; reduce the potential for erosion in Munro Creek; and be consistent with the floristics of RFEFCF or other native plant communities that occur nearby or are likely to have been present on the site, for example Cumberland Plain Woodland (CPW). Additionally plantings will need to be staged over several years to replicate or supplement age class recruitment and be of local provenance stock.

Revegetation of the core RFEFCF is likely to require planting of native groundcover, shrub and small to medium sized tree species. Ultimately the species and life form required in the revegetation works will be determined by regeneration in response to weeding and other bush regeneration works.

The short term revegetation strategy should also aim to provide a vegetated link from the RFEFCF to the Regenerating Closed Grassland and to create a structured native plant community in the Regenerating Closed Grassland. Installation of canopy species should form the first stage and once established these should be supplemented by shrub species. Native groundcover species are well represented in the Regenerating Closed Grassland but this does not exclude the potential for supplementary ground cover plantings in this area. Due to previous disturbances and high percentage cover of exotic grasses in the area between the RFEFCF and the Regenerating Closed Grassland the installation of groundcover species should only occur if adequate resources can be allocated in maintenance.

Longer term vegetation planning for Hyland Road North should aim to link the northern limit of the RFEFCF along the upper section of Munro Creek and on to areas of CPW of Lower Prospect Canal Reserve. Revegetation of this area will need to be staged commencing with canopy species providing the initial corridor linkage. The addition of understorey and groundcover stratum by planting works should only be carried once canopy is becoming established and sufficient resources can be committed in the long term to create and maintain a fully structured plant community.

Planting works should attempt, where possible, to utilise existing site features that will improve survival rates including landscape features such as dips or depressions, natural water sheds and shade.

### *Stormwater Management*

Munro Creek forms part of the local stormwater system which is impacting on the RFEFCF of Hyland Road North. Impacts include stream bank erosion and slumping, scouring, sedimentation, elevated

and altered plant nutrient fluxes, weed plumes and weed seed and litter dispersal. Stormwater management in this section of Munro Creek could include piping of low flows, sub surface infiltration devices, GPT's, sediment traps and rock armouring, and drainage line reconstruction works that may include some of the above management devices.

Management of stormwater in this section of Munro Creek also needs to take a strategic approach and should involve design that primarily considers flood and erosion prevention. Design should also incorporate ecological function (aquatic and terrestrial) and long term maintenance including routine works (eg removal of litter and silt) and potential for expansion or alteration of stormwater management in response to changing conditions in the catchment locality.

#### *Open Space Maintenance*

The Cleared and Disturbed plant community can be broadly described as open space. In the short term it is unlikely that Council will have sufficient resources to carry out bushland regeneration or restoration works in this plant community and as such it can be managed as open space. Current vegetation management of this plant community the site involves little or no intervention to control weeds or other practices. Despite the diversity and cover of weed species in the Cleared and Disturbed plant community the current minimal management strategy is resulting in the provision of a large area of habitat for small bird species (foraging, sheltering and nesting resources) and potential habitat for reptile and small mammal species.

#### *Recreation*

Hyland Road North is proposed as an optional site for the development of a new sporting complex and which is currently the subject of a review and assessment process. Any assessment in relation to this proposal must incorporate the potential impacts (eg stormwater runoff or trampling in regeneration areas) on the mapped RFEFCF during construction and operation. The resulting opportunity and constraints analysis must address how the need for provision of built community resources can be best integrated with community natural resources that have statutory protection.

Hyland Road North is currently used for passive recreation (ie community accessible open space) but could support other passive and active recreation opportunities that should be limited to the Cleared and Disturbed plant community.

### 5.6.4 Bushland Regeneration and Restoration Works Hyland Road South

#### *Noxious Weed Control*

Weeds that are listed as 'noxious' for Holroyd LGA must be removed from the site or controlled, depending on the control class of weed and according to the provisions of Weed Control Order No. 20 from the *NSW Noxious Weeds Act 1993*. Noxious weed control must also be consistent with specific regional weed control strategies that are currently under review or in development.

#### *Primary Weeding*

Hyland Road South has previously been proposed for bushfire hazard reduction works through a broad area burn (HCC, 2004). Although it is not the main intent for this action, a hazard reduction burn would provide a substantial amount of primary weed removal and other ecological benefits including the stimulation of the soil stored native seed bank.

As an alternative to a broad area burn primary weeding should be carried out throughout the RFEFCF (except the channel and wet areas) targeting woody weeds. Burn piles should be created with the woody weed debris and a program of pile burning carried out.

Where hazard reduction burns are not carried out for the site primary weeding is to commence in the eastern section of RFEFCF between Munro Creek and Gipps Road. This section of the RFEFCF has the highest resilience for the site and continued primary works should not progress into the drainage line or other plant communities to the west of Munro Creek (other than as noxious weed control) until the RFEFCF is stabilised and maintenance weeding is providing a level of certainty to the long term

survival and enhancement of resilience for this community. Primary weeding should progress in a second stage to the RFEFCF and Regenerating Closed Grassland on the western side of Munro Creek.

Primary weeding of the eastern RFEFCF at Hyland Road South will take several weeks to complete and the bulk of weed biomass should be transported off site if not used for creating pile burns. There is potential for the regeneration of a greater diversity of native shrub and groundcover species in this section through the selective culling of Native Blackthorn. If the current dense stand of Native Blackthorn is thinned it should be trialled in a small area first, and if there is a positive regeneration response then the culling should then be expanded. Culling should also take place to be timed with seed fall with the resultant plant material used as brush matting elsewhere at Hyland Rd South or North.

Noxious weeds that have potential for vegetative reproduction must be removed from site and disposed of appropriately. Woody debris from noxious weeds that have little potential for vegetative reproduction (eg Broadleaf Privet) can remain on site for composting and provision of habitat. Compost piles are to be placed well away from the Munro Creek channel so they are not washed into stream flow during storm events.

Retention of habitat should be considered during the primary weeding of woody weed thickets in the RFEFCF and Regenerating Closed Grassland on the western bank of Munro Creek. During the current field survey small bird species (Superb Blue Wren) were observed using Blackberry infestations for foraging and cover. Some woody weed thickets (such as Blackberry) should be initially treated and left in situ with follow up treatment until regeneration or revegetation works are providing suitable replacement habitat.

### *Secondary Weeding*

Secondary weeding will occur three to six months after the completion of primary weeding, depending on the amount of regrowth of herbaceous annuals (and other weeds that have an abundant seed source present in the soil) that typically occurs after primary weeding. The appropriate timing of secondary weeding will vary according to the timing of the primary weeding, insofar as regrowth will be stronger if primary weeding occurs during spring and summer, and slower during autumn and winter. The need for secondary weeding will also depend on climatic conditions in the intervening period (eg periods of sustained rainfall will promote germination of weed seeds and require secondary weeding to occur sooner than it would under dry conditions).

Secondary weeding is to be carried out in the RFEFCF and Regenerating Closed Grassland on both sides of the creek and following this a staged approach should be taken with the western side weeding following works on the eastern side of Munro Creek. Secondary weeding will require targeted removal of noxious weed regrowth and hand removal and spot spraying of exotic grasses, herbaceous weeds and seedlings of woody weeds throughout both areas.

### *Maintenance Weeding*

Maintenance weeding will be required in the RFEFCF and Regenerating Closed Grassland to ensure that weed growth following secondary weeding is controlled in the long-term. Maintenance will be on going and as mentioned previously, the undertaking of a bush regeneration and restoration project is likely to only be successful if there is a long-term commitment and an efficient allocation of resources. Weeding activities will include continued noxious weed control (throughout Hyland Road South) and bush regeneration techniques such as hand weeding, spot spraying, assisted seedling recruitment, soil scarification, brush matting and other appropriate techniques as determined by site response.

### *Revegetation*

Revegetation of Hyland Road South will follow a similar strategic approach and general aims as described above for Hyland Road North.

Revegetation of the core (eastern section) RFEFCF will only be required if the regeneration response to either hazard reduction burns or weeding works is not as predicted. Revegetation in the eastern RFEFCF will generally only require small tree, shrub and groundcover species as there is currently a good cover of canopy.

Revegetation of the western RFEFCF will aim to create or supplement canopy where it is absent, such as the Regenerating Closed Grassland and where there is currently little recruitment. The addition of groundcover and shrub species in the planting works for this area should be carried out in areas that have an existing or emerging resilience in response to weeding works and only if there are sufficient resources to consolidate and maintain a fully structured plant community. Where there are insufficient resources to achieve this then less resilient sections of the western RFEFCF should be managed for canopy and prevention of weed dispersal back into resilient regeneration areas.

Planting works should attempt, where possible, to utilise existing site features that will improve survival rates including landscape features such as dips or depressions, natural water sheds and shade.

### *Fire*

HCC has previously carried out a Review of Environmental Factors (REF) to assess a proposed bushfire hazard reduction burn in the bushland at Hyland Road South (HCC, 2004a). The REF suggests an absence of fire in the RFEFCF of the reserve for at least 20 years and recognises the potential ecological benefits to the native plant community as well as the reduced fire hazard. Key issues are addressed such as potential impacts on threatened communities and species and the recommendations reference the approvals processes and outline a planning strategy (HCC, 2004a).

Consistent with the previous assessments by HCC (2004a) this survey and report recommends the carrying out of hazard reduction burns in areas of the RFEFCF at Hyland Road South Reserve. The native plant community is likely to respond well to either broad burning or pile burning carried out as part of a bushfire hazard reduction. As previously noted by HCC (2004a) follow up control of weeds post burn will be a critical element in protecting the resilience of the RFEFCF that will have been triggered in using fire for assisted regeneration.

### *Stormwater Management*

As previously mentioned Munro Creek forms part of the local stormwater system which is also impacting on the RFEFCF of Hyland Road South. Impacts include stream bank erosion and slumping, scouring, sedimentation, elevated and altered plant nutrient fluxes, weed plumes and weed seed and litter dispersal. Stormwater management in this section of Munro Creek could include piping of low flows, sub surface infiltration devices, GPT's, sediment traps and drainage line reconstruction works that may incorporate some or all the above management devices.

Design and construction of any stormwater management works in this section of Munro Creek must be incorporated into a strategic approach taken for the northern section in Hyland Road North.

### *Open Space Maintenance*

The Cleared and Disturbed plant community at Hyland Road South incorporates open space and Council managed materials storage and depot. Parts of the site have been used as a waste facility in the past and in the short term it is unlikely that Council will have sufficient resources to carry out bushland regeneration or restoration works in this area. Current vegetation management of this plant community on the site involves slashing of the grassed area adjacent to the western portion of RFEFCF and this should continue. Despite the diversity and cover of weed species in the Cleared and Disturbed community the area provides some potential habitat for small bird species (foraging, sheltering and nesting resources) and potential habitat for reptile and small mammal species.

### *Recreation*

Hyland Road South is proposed as an optional site for the development of a new sporting complex and which is currently the subject of a review and assessment process. Any assessment in relation to this proposal must incorporate the potential impacts (eg stormwater runoff or trampling in regeneration areas) on the mapped RFEFCF during construction and operation. The resulting opportunity and constraints analysis must address how the need for provision of built community resources can be best integrated with community natural resources which also have statutory protection.

Hyland Road South is currently used for passive recreation (ie community accessible open space) but could support other passive and active recreation opportunities that should be limited to the Cleared and Disturbed plant community.

## 5.7 Summary of Actions, Targets and Performance Indicators

Table 5-2 following summarises the vegetation management measures (actions) and recommends targets and performance indicators for the implementation of the Citywide BMP at Hyland Road Reserve. As described in earlier sections of the Citywide BMP targets should specify achievable outcomes to meet objectives, whilst performance indicators should provide a means of measuring progress of the action relative to the objective.

**Table 5-2** Actions, targets and performance indicators for the implementation of the Citywide BMP for Hyland Road Reserve.

Action	Target	Performance Indicators
Noxious weed control	Noxious weeds are managed according to the control category specified in the <i>Noxious Weeds Act 1993</i> and species specific regional management plans.	The distribution and percentage cover of noxious weeds is reduced in the reserve. Occurrences of previously unrecorded noxious species for the reserve are prevented from establishing.
Bush regeneration	Management and conservation of the endangered ecological communities and other native plant communities of the reserve.	Increased area of native plant communities under bush regeneration contract. Increased native plant species richness in areas under bush regeneration contract as determined by ongoing flora survey and monitoring.
Revegetation	Expansion of native plant communities to form a regional vegetation corridor.	Increased native plant species cover and species richness in stands of native plant communities within the reserve. Increased native plant species cover and species richness between stands of native plant communities within the reserve. Increased native plant species cover and species richness between other reserves within the LGA.
Fire	Fire hazard reduction and ecological burns are carried out in native plant communities according to the <i>Rural Fires Act 1997</i> and RFS guidelines and standards.	Approvals gained from consent authorities. Broad burns or pile burns carried out.

**Table 5-2** Actions, targets and performance indicators for the implementation of the Citywide BMP for Hyland Road Reserve.

Action	Target	Performance Indicators
Stormwater Management	Management and conservation of the endangered ecological communities and other native plant communities of the reserve without compromising flood mitigation.	Installation of stormwater management devices and flood mitigation works that integrate engineering and ecological restoration works.
Recreation	Provision of recreational opportunities that does not compromise the management and conservation of the endangered ecological communities and other native plant communities of the reserve.	No loss of native plant cover from the construction of recreational facilities or infrastructure.

