

**WEED MANAGEMENT PLAN**  
for  
**PROPOSED RIVERVIEW DEVELOPMENT**  
**WEST BELCONNEN**

**August 2014**



*View to south showing the continuum of St John's Wort and sprayed Briar Rose in foreground.*

**Geoff Butler & Associates**  
**Environmental & Horticultural Consultancy**  
Ph: (02) 6236 9158; Mob:0427 488845; Email: [gbu22182@bigpond.net.au](mailto:gbu22182@bigpond.net.au)

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## 1. Introduction

### 1.1 Description and purpose of the site

This weed management plan (WMP) has been prepared for the Riverview Group’s urban development proposal west of Macgregor in the ACT. The Riverview Group are the project managers for the development proposal on behalf of Corkhill Brothers Pty Limited, the lessees of the land.

The overall area is 1010 hectares, with 332 hectares in NSW and 678 hectares in the ACT (Mills 2009). Some 359.2 hectares have been found to have high flora, fauna and overall ecological values. A fuller description of the site is available in *Ecological Studies, West Belconnen, Australian Capital Territory* (Mills June 2014).

The development proposal is for urban development over much of the suitable flatter terrain of the site. Most of these flatter sites have been intensively disturbed and have little to no ecological value. However, parts of the delineated area have been recorded as having high flora, fauna and overall ecological and conservation value, and has been proposed to be designated as the West Belconnen Conservation Corridor (WBCC). This includes the eastern part of Woodstock Nature Reserve with some additional areas of box/gum woodland and *Aprasia* rock outcrop habitat added to it (Mills June 2014).

The area as defined (see map under 1.2 below) incorporates the eastern part of the Woodstock Nature Reserve, which is the eastern bank of the Murrumbidgee River along the eastern side of the river. It also includes a large area of land zoned “river corridor” which is currently included in a rural lease (Block 1605 Belconnen) primarily covering the steep land falling down to the river. Woodstock Nature Reserve was declared in April 1991 under the Nature Conservation Act 1980 (ACT Govt. 2014). Woodstock is managed by the ACT Parks, Conservation and Lands and is subject to a legislated plan of management, *the Murrumbidgee River Corridor Management Plan* (MRCMP) (Dept. Urban Services 1998). The intention is that the area designated “river corridor” within the Block 1605 rural lease (and which is subject to a withdrawal clause in the lease) would be incorporated in the nature reserve. The woodland is located in the rural lease outside of the current river corridor and is currently zoned broadacre.

### 1.2 Boundaries

The map (following page) indicates the boundaries to be considered under the WMP:



Map 1: Boundaries of study area. (Map provided by Riverview Group Feb 2014)



The map illustrates the WBCB proposed boundary and highlights the natural assets of high and low quality *Aprasia* habitat and box/gum woodland. The locations of the box/gum woodland and extensive areas of *Aprasia* habitat were noted in preparation of this WMP.

The ecological summary report also stated:

*“...significant improvement to the diversity and structure of the woodland within the conservation area is possible, particularly for threatened passerine birds and other for woodland fauna. The ecosystems present are modified, some greatly so, but they can be improved through appropriate management actions.”(Mills June 2014 p 26)*

The “...*significant improvement to the diversity and structure of the woodland...*” appears to suggest woodland restoration. Such restoration can be a very useful management tool for some weed species and situations, and was also noted in preparation of this WMP.

## 3 Weeds and Weed Management

### 3.1 The context of weed management at Riverview.

Throughout Australia there has been a massive expansion of existing weed species and a plethora of sites of new incursion by both existing and new weed species. If left unchecked, weeds can incur massive economic losses and management costs for agriculture in all its varying forms. In natural and near natural areas weeds can modify ecosystem processes and in some cases exclude regeneration of native species. It has often been suggested that weeds are one of the most pressing problems that production and environmental land managers face.

Governments around Australia have recognised the environmental and economic impacts of weeds, as well as the related recreational and social problems they create. Weeds threaten the survival of many ecosystems and individual native plant species through:

- in some cases, better post-germination survival rates than native flora. The natural controls that may affect the survival rates of weeds are often not present;
- more rapid growth rates than many native plants, often colonising bare soil created through disturbances (e.g. machinery, fire) thus competing for available growing space, water, nutrients and light;
- impacts on natural systems through both competition and smothering native plant regeneration. The gradual replacement of native vegetation through weed infestation may have repercussions for native fauna for feeding, reproductive habitat and general shelter.

There are many more subtle biological interactions occurring due to the presence of weeds that are not well understood.

All states and territories have prepared weed management strategies and re-enforced or prepared new weed legislation. Many have also increased their monitoring and enforcement activities accordingly.

The ACT and NSW governments have greatly strengthened their strategies and legislation over the last two decades. These strategies and legislative requirements place strong emphasis on the responsibilities of land managers and the community generally for weed prevention, management and monitoring. There is an expectation that existing weed issues are addressed during any planning processes and changes of landuses, and which can involve a number of disciplines.

The area at Riverview was examined for weed issues in light of the proposed future urban development proposal. The visits to the site led to delineating the defined area into 2 broad areas, the first being the intensively cropped and grazed areas on the flatter terrain proposed for urban development. The second area is that proposed as the West Belconnen Conservation Corridor on the steeper slopes falling to the river.

The Murrumbidgee River Corridor Management Plan (MRCMP) states an estimate “..... *that there are 100 to 150 weed species in the Corridor.*” (Dept. Urban Services 1998 p 39). While this may be so, many of these are ubiquitous and innocuous, while others may have more serious implications. This WMP presents the options for managing the weeds of concern on the site.

The flatter terrain of the site has been intensively used for cropping and grazing. While weeds do occur in these areas, most are the fairly ubiquitous species always associated with this form of land disturbance, and which are usually managed by grazing and land preparation for cropping purposes. By their very nature they will always be present, but in most cases do not have impacts of great consequence. However, a few species (e.g. St John's Wort, African Love Grass) have spread and infestations of various sizes were located. Grazing and crop establishment are two activities that may have kept a check on some of these infestations.

The sloping and sometimes steep terrain on the western part of the site (the proposed West Belconnen Conservation Corridor incorporating Woodstock Nature Reserve) has also been considerably disturbed. Exotic pasture species are widespread and well established, possibly indicating the use of fertiliser on (at least) the more accessible parts of this area. It was obvious that certain species (e.g. Blackberry and Briar Rose) have been targeted for management over recent years, as dead remnant patches, thickets and individuals were noted throughout the area. However, multitudes of small blackberries were arising across the site, more often than not growing along the ground amongst the grasses and making them difficult to see. On the lower to mid slopes there are small to moderate infestations of African Love Grass, almost certainly a result of the species being carried down the river and establishing a sideways spread from that source. There are also very occasional adventitious willows and Firethorn on drainage lines, the latter almost certainly arising from cultivated plants at Strathnairn.

### **3.2 Approach to weed management at Riverview**

On examining aerial maps and Google Earth imagery, the Riverview area formerly carried various woodland associations which have been previously well described (Mills June 2014). The woodland vegetation types are still well displayed in extant occurrences on the slopes and plateaux on the western side of the river and other (somewhat disturbed) locations within the reserve.

The Riverview land has been used for intensive grazing and cropping activities over the 150 years since European settlement, and this has led to clearing of much of the original woodland, opening the area to establish improved feed sources (exotic pasture species and fertilizer) for grazing on the slopes leading to the river, and intensive grazing, cropping and fertilizer use on the more amenable, flatter eastern portion. This is a consistent pattern over the whole area.

A significant consequence of agricultural landuse is the gradual introduction of weeds. The preparation of this WMP was to examine the weed issues in a defined area (see map under 1.2).

This WMP is an adaptive management plan. The WMP:

- establishes the goals for the site;
- identifies species that impede reaching these goals, and proposes priorities based on the severity of their impacts;
- considers control methods to eliminate or diminish their impacts and assigns priorities based on potential impacts on target and non-target species;
- provides weed control plans based on this information;
- expects the effectiveness of management actions to be reviewed to modify and improve priorities, methods and the specific weed management plans.

The general management philosophy for this WMP is containment and continued management of weeds within the area proposed for urban development, and management and some gradual restoration of that part of the area that is to form the expanded conservation reserve. The WMP has a focus on the conservation land leading to a restoration of desirable native species and communities that can compete with and diminish weed species, rather than on simply eliminating weed species (which is not feasible for some species).

Preventative programs to keep the area free of species that are not yet present are important, but are not considered in detail in this WMP other than noting it as a potential priority action. There are recent incursions of new weed species in the ACT (e.g. Madagascan Fireweed – *Senecio madagascariensis*) known to be serious pests elsewhere in the region. However, any new incursions will need to be assessed and dealt with under specific management actions and programs as they arise, with the objective of eradication.

The WMP sets priorities for the management of weeds already established on the site. Priority actions are proposed according to the actual and potential impacts on native species and communities. The actions proposed have considered the consequences of leaving weeds unchecked as to managing them with available methods.

Priorities are set to minimize workload. Otherwise, existing infestations are prioritised by:

- the fastest growing and most damaging species;
- their effect on the values of the area;
- the difficulty of management, with highest priority given to infestations able to be managed with available methods and resources.

### 3.3 The Plan of Management for Woodstock Nature Reserve

The management objectives for the MRC are contained in the Murrumbidgee River Corridor Plan of Management (Dept. Urban Services 1998). The broad management objectives for the Murrumbidgee River Corridor are:

1. to **conserve the endemic aquatic, riparian and riverine ecosystems**;
2. to provide for recreational activities appropriate to rural and natural river settings;
3. to conserve natural landforms and the **valley's scenery**;
4. to **conserve and enhance habitat links** through the regional landscape;
5. to maintain water quality;
6. to provide formal and informal educational opportunities;
7. to **conserve the cultural heritage landscapes, areas and sites**; and
8. to **maintain a corridor of open rural and natural land on the western edge of Canberra, and to give clear definition to the transition from the urban landscape to the rugged forested landscape of the mountainous skyline to the west of the city.**
9. to provide educational and interpretative opportunities associated with water issues relevant to the Corridor.(authors emphasis)

The management objectives specific to the Woodstock Nature Reserve are:

1. to protect highly significant aquatic habitats, bird habitats and nesting sites;
2. to provide low-key recreation opportunities close to Belconnen;
3. to help the river recover from upstream impacts of the urban development of Canberra;
4. to **promote landscape regeneration at the sand and gravel extraction site and in the tea-tree scrub areas, consistent with the protection of significant ecological, geological and geomorphological sites**; and

5. *to establish practices compatible with the proposed extension of reserved areas to incorporate the Swamp Creek area.*

Continued weed management using a variety of methods will contribute to a number of the above objectives.

### **3.4 ACT Weed Strategy (2009-2019)**

The ACT Weeds Strategy (2009-2019) provides guidance for all land managers and the community to work strategically to control weeds. The Strategy has five principles:

- *weed management is essential for the sustainable management of natural resources and the environment and for social well-being, and requires an integrated, community-wide approach;*
- *prevention and early intervention are the most cost effective approaches that can be deployed against weeds;*
- *successful weed management requires a coordinated approach involving all levels of government in partnership with industry, landholders and the community;*
- *all land managers have a duty of care to manage weeds on their land; and*
- *community interests shall be protected from weeds by appropriate legislation.*

The ACT Strategy also contains goals, objectives and actions for achieving the desired outcomes.

### **3.5 NSW weed management.**

This WMP recognises the similarities of management requirements between the ACT and NSW for the most serious weed species. Therefore where the WMP goals and objectives refers to the ACT requirements they are equally applicable to NSW.

## 4 Weed Inventory

### 4.1 Weed survey

The weed survey was conducted by walking the area and observing the locations of the weeds. Most species are scattered and widespread, so the general areas of occurrence were mapped. Attempts to mark densities were not undertaken, but are referred to in the WMP for each species.

### 4.2 Weed inventory

There were 84 exotic species recorded on the study area (Mills June 2014 p4). Most of the species recorded are well established and ubiquitous in areas that have been intensively disturbed, especially in agricultural areas. In some cases (e.g. exotic pasture species) attempts to reduce the ground cover provided by these species through weed control would exacerbate the spread of the more significant weed species present. For this reason, the following table only records the significant weeds on the study area.

| Species                            | Common Name   | Comments  |
|------------------------------------|---|---|
| <i>Hypericum perforatum</i>        | St John's Wort  | From moderate density to scattered occurrences over a wide area of the land sloping to the river.   |
| <i>Eragrostis curvula</i>          | African Love Grass  | Large infestation of ALG in NE and scattered occurrences along river and partway up slopes. Re-infestation from the river is likely to continue.  |
| <i>Nassella trichotoma</i>         | Serrated Tussock (not of high concern but listed here as it can be managed as for ALG). | Only scattered individuals of Serrated Tussock. Management has obviously been undertaken in the past.   |
| <i>Rubus fruticosus</i> (sp. agg.) | Blackberry  | Obvious evidence of previous management programs. Common as small plants across the sloping land. Past management efforts obvious across the site. Very occasional mature patches missed. Regenerating small plants growing as undershrubs through grasses. |
| <i>Rosa rubiginosa</i>             | Briar Rose  | Very scattered but obvious signs of previous management efforts. Not prolific but some scattered small plants observed.   |
| <i>Salix</i> sp.                   | Willows   | Very scattered on drainage lines and planted specimens near current residences.   |
| <i>Crataegus monogyna</i>          | Hawthorn  | Treatment as for Willows.   |
| <i>Pyracantha</i> sp.              | Firethorn   | Only 2 plants noted Source plants from cultivated specimens at Strathnairn.   |

The above species were selected for attention as they are regarded as being those that most urgently need attention. While it is possible to eliminate some species (Willow, Crataegus, Firethorn) others will unfortunately remain as inhabitants on the site. They may be better managed, but are unlikely to be eliminated.

There appeared to be little need or even desirability to locate the usual ubiquitous (and mostly benign) weeds within the flatter, intensively used parts of the site. In these areas, the existing management regime should continue until such time as the area is required for the proposed urban development. This should keep the weed species in easily managed numbers, as they appear to have been over past years. Weeds were only noted and mapped in these areas where they were in dense infestations that required specific management action. The focus

was on the area designated as the WBCC. Maps showing the location of the significant weeds of the area are incorporated in the individual WMP's.

## 5. Land Management Goals

The land management goals of this WMP are to:

- manage the flatter parts of the area under the current landuse(s) which appear to keep the significant weed species at very low numbers.
- recommend the utilisation of the best weed management methods to manage the current significant weed issues within the proposed conservation corridor while increasing the ecological values of the site.

The main threats to achieving these goals are:

- the possible occurrence of new weed species currently not present on the site. Incursions of new species may occur in future when the proposed new urban areas are established.
- that some species are present and will need continual management as it is not feasible to eradicate them.

## **6 Weed management methods**

### **6.1 Herbicides**

The application of herbicides can be used in a variety of ways from broadacre boom spraying, focused spot spraying to frilling and injection. Applications at the recommended season(s) and suitable weed growth stages has near immediate impacts on the size of weed infestations, but is an impractical methodology where the terrain and sheer area of infestation are major obstacles to achieving appropriate herbicide coverage. This is the case in considerable areas of the proposed WBCC.

Focused herbicide use on low density weed occurrences established over wide areas, or reduction of dense, local infestations where natural assets require protection are suitable situations for this method of application. Herbicides are often the primary means of attacking isolated or disjunct infestations by means of working from the perimeters to the core infestation. The use of broader-scale spraying techniques for small, moderately dense but isolated infestations in suitable terrain is also often useful.

Herbicides are a costly option but highly effective in appropriate circumstances. Due to the nature of herbicides and legal requirements of their use, qualified persons must be employed where herbicides are used.

### **6.2 Biological control**

Biological control is the use of legislatively approved predators and pathogens that impair a weed's natural cycles and therefore assist in reducing the weeds impact(s). It is a cost-effective method if bio-agents are available (and which can then be successfully established), but by their very nature they will not completely eradicate the host species. Bio-control agents may be effective if they are able to be established in less accessible areas and areas of environmental sensitivity where herbicide use may be undesirable. Such less accessible areas also provide a source for bio-agents to spread to new occurrences of the weed species as they arise. There are many inaccessible areas of, for example, St John's Wort over extensive areas of the site. A project to introduce and monitor bio-agents for SJW that have been successful in the local region would be highly desirable for the Riverview site.

### **6.3 Grazing/pasture management**

Grazing and maintaining the density of native and introduced pastures are effective weed management tools, or a disaster waiting to happen through overgrazing. Overgrazed pastures provide the space(s) for the weed species being managed (or other species) to establish new infestations. The uses of grazing to reduce weed biomass at suitable times in the weeds lifecycle, and when combined with spraying or biocontrols, may lead to the stabilisation and gradual reduction of the weed infestation and an increase in competitive groundcover species. Isolation of pastures from grazing use is also an option while weed management is undertaken using other methods (e.g. herbicide).

Grazing has been a feature of the management of area zoned "river corridor". It almost certainly has assisted in stabilising the SJW infestations and will need to be continued. An example of grazing effects on St John's Wort is available on p27 of this WMP.

#### **6.4 Land ploughing/fallowing**

Preparation of land for cropping or establishment of perennial pastures provides opportunities for wide area weed management, in the short term by destruction of infestations and follow-up action (e.g. herbicide or re-fallowing) to destroy new germinants. This appears to have been the case for the established pasture and cropping paddocks on the urban-suitable land at Riverview. It remains the most suitable landuse method for this part of the site. Extensive land disturbance is not a suitable methodology for weed management in the proposed WBCC.

#### **6.5 Mechanical/physical removal**

This can include the use of mechanised slashing to prevent seed set or weed removal by other machinery, to physical removal of individual weeds by hand-pulling or with hand tools. This method can be very useful as a preliminary arrangement (e.g. slashing to stop seed set) prior to more permanent management arrangements, or removing small numbers of plants from “clean” areas to prevent a wider infestation. It may have some application in parts of the WBCC and the intensively used lands where small numbers of plants are involved.

#### **6.6 Fire**

Fire can be useful in some circumstances in the promotion of native species (where they are present), but equally can promote some weed species where they can regenerate faster than the desired species.

Any fire used on the site should be in accordance with environmental considerations being taken into account.

#### **6.7 Vegetation management**

Vegetation management can refer to the planting of vegetation, the maintenance of a competitive cover against weeds (e.g. pastures) and encouraging native vegetation (or other desired species) to regenerate, though there may be other mandated management goals or fuel management requirements that limit planting or regeneration. For example, rural landscapes are an intrinsic feature as indicated in some of the broad objectives of the MRCMP:

- *to provide for recreational activities appropriate to rural and natural river settings;*
- *to conserve natural landforms and the valley's scenery;*
- *to conserve the cultural heritage landscapes, areas and sites; and*
- *to maintain a corridor of open rural and natural land on the western edge of Canberra, and to give clear definition to the transition from the urban landscape to the rugged forested landscape of the mountainous skyline to the west of the city. (Dept. Urban Services 1998).*

It is desirable for the area to remain a grazing lease at least for the foreseeable future. It should not, however, prevent some vegetation restoration as part of the weed management actions.

#### **6.8 Hygiene**

Hygiene is primarily taking actions to limit the spread of weed species by contaminated machinery, other vehicles or stock. Machinery clean-down procedures are strongly recommended and sometimes specified in weed management contracts. The reality is that many hygiene measures are highly inconvenient or impractical to implement so are not done, and are not even undertaken by experienced people. This does not preclude hygiene being one of the first and most feasible ways of preventing weed spread.

## **6.9 Integrated weed management**

On sites where any particular weed is widespread (e.g. St John's Wort at West Belconnen) a combination of management methods may be desirable to manage the weed. This is known as integrated weed management (IWM). The primary objectives of IWM are to maintain weed densities at manageable levels (at worst) or to contain or eradicate a weed species (at best).

The general principle behind IWM is that it reduces the weeds potential to adapt to a single management practice (e.g. herbicide resistance). Weeds are less able to adapt when managed by using (together or in an alternating fashion) different control practices. The main weed management methods used in IWM are:

- land fallowing/ploughing
- grazing/pasture maintenance
- herbicides, and
- biological control(s).

All the above methods are suited in combination to various parts of the Riverview site.

## 7 Weed management principles, objectives and actions

The principles, objectives and actions of weed management for Riverview are:

| <b>Principal</b>            | <b>Objective</b>   | <b>Action</b>   |
|-----------------------------|--|---|
| Raising awareness           | To raise awareness of what weed species are present and the potential weed species within the local region.  | Gaining knowledge of the identification of current and potential weed species.                              |
| Prevention                  | Prevention refers to keeping “clean” areas free of particular weed species. With the current inventory of weed species, prevention is not relevant, and will mainly apply to the potential spread of new weed species when the proposed new urban zone is established.   | Undertaking management actions that reduce the chance of new infestations.                                  |
| Early detection/eradication | Eradication is only achieved through the complete removal of all live individual weeds and the depletion of the seed bank from the site. Eradication of some weed species from the site (e.g. willows and Firethorn) is possible in the immediate instance, but the proximity of other infestations (willows on the immediate river edge and near human habitation on the site and Strathnairn plantings of Firethorn) and the pathways of spread means eradication is unlikely. However, it would not be unreasonable to remove these species from the site and monitor for new occurrences, especially if actions are taken on the species in the close proximity. | Eradicate new incursions or infestations.   |
| Suppression                 | Suppression is undertaking management actions that preventing existing weed infestations from spreading and increasing in density. Actions can include such actions as preventing flowering and seeding, grazing to reduce densities and revegetation to change environmental conditions.  | Apply suitable weed suppression measures and actions.   |
| Containment                 | Containment is preventing the movement of an infestation of a pest plant species beyond a defined area. Prolific producers of propagules with multiple vectors are difficult to contain. Containing widespread infestations of well-established weed species is often not feasible   | Contain and suppress weed species by suitable management actions such that they do not spread to new areas. |

|  |   |  |
|--|---|--|
|  | or realistic. Containment may simply mean reducing the spread of a species, and containment can refer to small units such as paddocks to individual properties, catchments or regions.  |  |
| Asset protection                         | This involves protecting assets (economic, environmental or social) from the effects of any particular weed species. Asset protection uses the available resources by focussing efforts where they will have the greatest protective benefits. This can include keeping weeds from encroaching on the particular asset to identifying the asset and taking management actions to eradicate the weed from the proximity of the asset. Asset protection usually involves ongoing management activity. In the case of infestations over widespread areas it is often the only alternative. | Apply resources and management actions to prevent weeds from increasing or spreading into areas of environmental significance. |
| Planning                                 | To formulate a viable and feasible plan of action for weed species.   | Prepare a weed management plan(s).   |
| Increase competition                     | Encouragement of competition from desirable species. Restoration of vegetation where applicable.  | Appropriate stocking levels; planting where appropriate.   |
| Integrated weed management               | Use of various management methods in combination to avoid weed resilience.  | Prepare IWMP for individual weed species.  |
| Use methods of minimal disturbance       | Avoiding soil disturbance or unnecessary removal of vegetation.   | Spot use of herbicides; pack soil after disturbance; groundcover maintenance; mulching.  |
| Maintain high priority native vegetation | Remove weeds.   | Remove from lowest density to areas of highest density; remove outliers.   |
| Manage seedbank                          | Preventing seed set; restrict weed germination; removal of weeds.   | Manage before seeding; consider soil seed bank viability.  |
| Land Manager responsibilities            | Raise awareness of land manager's legal and moral responsibilities.   | Co-operative projects with land managers; maintain access to site.   |
| Long term commitment                     | Raise understanding a need for annual long term need for action.  | Preparation of WMP.  |
| Legislation                              | Preparation of appropriate legislation.   | Preparedness to use legislation to achieve appropriate management.   |

## 8 Priorities for weed management

### 8.1 assessing weed species priorities.

The weed species priorities for management have been set using the following criteria:

- the current extent of the infestation on or near the site;
- the current and potential impacts of the infestation on natural assets;
- the value of the habitats that the species infests or may infest; and
- the difficulty of management.

### 8.2 Weed infestation priorities

| Species            | Basis for Setting Priority   | Level of Invasiveness | Potential for Management | Priority |
|--------------------|--|-----------------------|--------------------------|----------|
| St John's Wort     | <p><i>Extent</i><br/>Widely distributed over slopes falling to the river. Infestations are of varying densities.</p> <p><i>Impacts</i><br/>Potential to displace native vegetation and prevent regeneration. Forms near monocultures if unmanaged on natural and disturbed sites.</p> <p><i>Value of assets</i><br/>Occurs in areas of high conservation value.</p> <p><i>Management difficulties</i><br/>The extent of the infestations. Ten year viability of seed bank. Access to some sites.</p>           | Highly invasive       | Moderate                 | High     |
| African Love Grass | <p><i>Extent</i><br/>Established in various densities over the lower slopes falling to the river. Large infestation in NE part of site.</p> <p><i>Impacts</i><br/>Displaces native vegetation and prevents regeneration. Readily forming monocultures on natural and disturbed sites.</p> <p><i>Value of assets</i><br/>Occurs in areas of high conservation value.</p> <p><i>Management difficulties</i><br/>Reinvasion from river corridor is likely to continue. Seventeen year viability of seed bank.</p> | Highly invasive.      | Moderate                 | High     |
| Blackberry         | <p><i>Extent</i><br/>Intermittent occurrences on slopes falling to river. Evidence observed of substantial management programs in recent past.</p> <p><i>Impacts</i><br/>Displaces native vegetation and prevents regeneration. Readily forming monocultures on natural and disturbed sites. Harbour for feral pests.</p>  | Highly invasive.      | Moderate.                | High.    |

|            |   |                                 |       |      |
|------------|---|---------------------------------|-------|------|
|            | <p><i>Value of assets</i><br/>Occurs in areas of high conservation value.</p> <p><i>Management difficulties</i><br/>Many occurrences are very low and creeping through understorey, thus being difficult to see. Large underground crowns. Access to some sites.</p>  |                                 |       |      |
| Willows    | <p><i>Extent</i><br/>Limited to a small number of trees on drainage lines and cultivated trees at the head of drainage lines.</p> <p><i>Impacts</i><br/>Displaces native vegetation and prevents regeneration. Readily forming monocultures.</p> <p><i>Value of assets</i><br/>Occurs in areas of high conservation value.</p> <p><i>Management difficulties</i><br/>Readily eliminated but trees at top of drainage lines must also be treated. Potential for reinvasion from river.</p> | Highly invasive in moist areas. | High  | High |
| Briar Rose | <p><i>Extent</i><br/>Only very scattered small plants. Evidence of previous control efforts observed.</p> <p><i>Impacts</i><br/>Readily forming infestations on natural and disturbed sites.</p> <p><i>Value of assets</i><br/>Occurs in areas of high conservation value.</p> <p><i>Management difficulties</i><br/>Access to some sites.</p>  | Invasive.                       | High. | High |
| Firethorn  | <p><i>Extent</i><br/>Small number of scattered plants.</p> <p><i>Impacts</i><br/>Displaces native vegetation and prevents regeneration.</p> <p><i>Value of assets</i><br/>Occurs in areas of high conservation value.</p> <p><i>Management difficulties</i><br/>Readily managed. Potential for reinvasion from cultivated plantings at Strathnairn.</p>   | Moderately invasive             | High  | High |

## 9 Weed Management Actions

### 9.1 Weed Management Actions

| Species            | Action(s)  | Who   |
|--------------------|--|---|
| St John's Wort     | <p>Continue grazing regime.</p> <p>Survey existing area for biocontrols (beetle &amp; mite).</p> <p>If biocontrols not present, undertake introduction to site.</p> <p>Monitor biocontrols and move around site.</p> <p>Herbicide control in high conservation sites with lower densities of infestation (e.g. woodlands, working from outliers to core infestations).</p> <p>Consider revegetation in suitable areas.</p> | Riverview is proposing a stewardship by a conservation management trust funded by the ACT government and developer contribution funds. This is a very acceptable way of undertaking weed management on the site (see 10) Resourcing the plan p 23). |
| African Love Grass | <p>Spot spraying of small infestations on lower slopes.</p> <p>Broad scale spraying of NE infestation (some of which is on public roadsides).</p> <p>Continue grazing regime.</p>  | As above.   |
| Blackberry         | Continue what has obviously been a successful spraying regime on remaining infestations.   | As above.   |
| Willows            | Frilling and herbicide on standing trees, including those at head of drainage lines.   | As above.   |
| Briar Rose         | Continue what has obviously been a successful spraying regime on remaining infestations  | As above.   |
| Firethorn          | <p>Cut and dab on plants when observed.</p> <p>Removal of cultivated plants at Strathnairn.</p>  | <p>As above.</p> <p>Strathnairn.</p>  |

### 9.2 Weed management calendar

#### *St John's Wort*

| Summer   | Autumn   | Winter   | Spring   |
|--|--|--|--|
| Hand pull/chip/grub/dig out small infestations |
|  |  | Grazing  | Grazing  |
| Maintain competitive                           | Maintain competitive                           | Maintain competitive                           | Maintain competitive                           |

|   |  |  |   |
|---|--|--|---|
| <p><b>pasture (75% ground cover) by rotational grazing to reduce seedling establishment</b></p> <p><b>Spray (numerous choices)</b></p> <p><b>Biological</b></p> | <p><b>pasture (75% ground cover) by rotational grazing to reduce seedling establishment</b></p> <p><b>Biological</b></p> | <p><b>pasture (75% ground cover) by rotational grazing to reduce seedling establishment</b></p> <p><b>Spray (numerous choices)</b></p> | <p><b>pasture (75% ground cover) by rotational grazing to reduce seedling establishment</b></p> <p><b>Spray (numerous choices)</b></p> <p><b>Biological</b></p> |
|---|--|--|---|

*African Love Grass*

| <b>Summer</b>   | <b>Autumn</b>  | <b>Winter</b>  | <b>Spring</b>   |
|---|--|--|---|
| <p>Hand pull/chip/grub/dig out small infestations</p> <p>Maintain competitive pasture (75% ground cover) by rotational grazing to reduce seedling establishment</p> <p>Spray (Glyphosate/Fluproponat)</p> | <p>Handpull/chip/grub/dig out small infestations</p> <p>Maintain competitive pasture (75% ground cover) by rotational grazing to reduce seedling establishment</p> | <p>Hand pull/chip/grub/dig out small infestations</p> <p>Maintain competitive pasture (75% ground cover) by rotational grazing to reduce seedling establishment</p> <p>Spray (Glyphosate/Fluproponate)</p> | <p>Hand pull/chip/grub/dig out small infestations</p> <p>Maintain competitive pasture (75% ground cover) by rotational grazing to reduce seedling establishment</p> <p>Grazing</p> <p>Spray (Glyphosate/Fluproponate)</p> |

*Blackberry*

| <b>Summer</b>  | <b>Autumn</b>  | <b>Winter</b>  | <b>Spring</b>  |
|--|--|--|--|
| <p>Hand pull/chip/grub/dig out small infestations</p> <p>Grazing</p> <p>Maintain competitive pasture (75% ground cover) by rotational grazing to reduce seedling establishment</p> <p>Spray (numerous choices)</p> | <p>Hand pull/chip/grub/dig out small infestations</p> <p>Grazing</p> <p>Maintain competitive pasture (75% ground cover) by rotational grazing to reduce seedling establishment</p> <p>Spray (numerous choices)</p> | <p>Hand pull/chip/grub/dig out small infestations</p> <p>Grazing</p> <p>Maintain competitive pasture (75% ground cover) by rotational grazing to reduce seedling establishment</p> | <p>Hand pull/chip/grub/dig out small infestations</p> <p>Grazing</p> <p>Maintain competitive pasture (75% ground cover) by rotational grazing to reduce seedling establishment</p> <p>Spray (numerous choices)</p> |

*Willows*

| <b>Summer</b>   | <b>Autumn</b>   | <b>Winter</b> | <b>Spring</b>   |
|---|---|---------------|---|
| <p>Cut/paint (Glyphosate)</p> <p>Drill/frill (Glyphosate)</p> <p>Spray (Glyphosate)</p> | <p>Cut/paint (Glyphosate)</p> <p>Drill/frill (Glyphosate)</p> <p>Spray (Glyphosate)</p> |               | <p>Cut/paint (Glyphosate)</p> <p>Drill/frill (Glyphosate)</p> <p>Spray (Glyphosate)</p> |

*Briar Rose*

| <b>Summer</b>  | <b>Autumn</b>   | <b>Winter</b>   | <b>Spring</b>   |
|--|---|---|---|
| <p>Hand pull/chip/grub/dig out small infestations</p> <p>spray(numerous choices)</p> | <p>Hand pull/chip/grub/dig out small infestations</p> <p>Cut/dab (Glyphosate)</p> | <p>Hand pull/chip/grub/dig out small infestations</p> | <p>Hand pull/chip/grub/dig out small infestations</p> <p>Spray (numerous choices)</p> <p>Cut/dab (Glyphosate)</p> |

*Firethorn*

| <b>Summer</b>                                  | <b>Autumn</b>                                  | <b>Winter</b>                                  | <b>Spring</b>                                  |
|--|--|--|--|
| Hand pull/chip/grub/dig out small infestations |
| Cut/dab (Glyphosate)                           | Cut/dab (Glyphosate)                           |  | Cut/dab (Glyphosate)                           |

## 10 Resourcing the plan

The management of Woodstock NR and river corridor in the past appears to have been a cooperative effort between the lessee and Parks, Conservation and Lands. Grazing has probably been a significant factor in keeping SJW to its current densities, as it has the potential to become a monoculture. This cooperative arrangement should be maintained. There was also obvious evidence of effort put into managing Blackberry and Briar Rose.

The weeds dealt with in this WMP are highly invasive to invasive. Achieving the WMP's management objectives depends on management efforts being sustained for many years. Regular monitoring of the site(s) containing high conservation values will need to be maintained.

The urban suitable land should continue to be managed under the current agricultural regime until it is withdrawn for urban development.

The continuation of a grazing regime if recommended, and if retained will need consideration about the resources that may be involved in moving stock to and from the site.

The intent of Riverview Group is that the WBCC as defined would be managed by a yet-to-be established Conservation Management Trust (CMT) under an official Plan of Management. The CMT is proposed to be funded in perpetuity through a combination of ACT Government and developer contribution funding. It is proposed the CMT employ 1-2 management staff (Riverview July 2014). Provided the

- hours of employment are such as to permit appropriate management of the site;
- resources are made available for appropriate levels of integrated weed management;
- training and/or experience of staff is appropriate for the skilled work needed;

this aspect of resourcing the plan is a very reasonable model which would provide an opportunity of managing and reducing the weed issues associated with the conservation area.

## 11 Guide to budget estimates

Financing weed management needs to be considered over the long term, and this can be difficult to estimate depending on the resources (human and financial) that are applied in the first few years of active management. Regular monitoring is required to review the plan, and it will be greatly dependant on seasonal conditions to review follow-up management. Any weed management plan needs to be subject to an adaptive management process.

The following table is only an indication for the first 3 years of management. The plan should be reviewed after the first three years of operation. It does not take into account the cost of chemicals, items such as secure and safe chemical storage, safety equipment and appropriate training (if required). Costings are calculated on a \$50/hr wage rate. Spraying tasks costing includes two people and spray trailer at \$135/hr, which is based on local contractual rates in 2013-14. The estimated costs refer solely to the area proposed as the final river corridor.

| <b>ESTIMATED COSTS FOR THE PROPOSED NEW AREA OF RIVER CORRIDOR, WEST BELCONNEN</b> |                                     |   |              |                  |
|--|-------------------------------------|---|--------------|------------------|
| <b>YEAR</b>  | <b>SPECIES</b>                      | <b>TASK</b>   | <b>TIME</b>  | <b>EST. COST</b> |
| Year 1   | St John's Wort                      | Location, collection and transferal of biological control organisms.    | 5 days       | \$2,000          |
|  |                                     | Commence control in asset areas (e.g. woodland, <i>Aprasia</i> habitat) | 15 days      | \$16,200         |
|  |                                     | Grazing management  | ongoing      | \$1,000          |
|  | African Love Grass/Serrated Tussock | Management on lower slopes of river corridor.                           | 5 days       | \$5,400          |
|  | Blackberry                          | Management of infestations across site                                  | 10 days      | \$10,800         |
|  | Briar Rose                          | Management when located   | 2 days       | \$800            |
|  | Willows/Hawthorn                    | Remove from site and source plantings                                   | 3 days       | \$1,200          |
|  | Firethorn                           | Remove from site and source plantings                                   | 3 days       | \$1,200          |
| <b>Estimated Cost Year 1</b>   |                                     |   |              | <b>\$36,600</b>  |
| Year 2   | St John's Wort                      | Monitor biological control  | 1 day        | \$400            |
|  |                                     | Control in asset areas (e.g. woodland, <i>Aprasia</i> habitat)          | 15 days      | \$16,200         |
|  |                                     | Grazing management  | ongoing      | \$1,000          |
|  | African Love Grass/Serrated Tussock | Management over corridor, especially lower slopes of river corridor     | 3 days       | \$3,240          |
|  | Blackberry                          | Management of infestations across site                                  | 5 days       | \$5,400          |
| <b>Estimated Cost Year 2</b>   |                                     |   |              | <b>\$26,240</b>  |
| Year 3   | St John's Wort                      | Control in asset areas (e.g. woodland, <i>Aprasia</i> habitat)          | 15 days      | \$16,200         |
|  |                                     | Grazing   | ongoing      | \$1,000          |
|  | African Love Grass/Serrated Tussock | Management over whole site, especially lower slopes of river corridor   | 3 days       | \$3,240          |
|  | Blackberry                          | Management of infestations across site                                  | 5 days       | \$5,400          |
|  | Briar Rose                          | Monitor for new infestations  | 1 day        | \$1,080          |
|  | Willows/Hawthorn                    | Monitor for new infestations  | 1 day        | \$1,080          |
|  | Firethorn                           | Monitor for new infestations  | 1 day        | \$1,080          |
| <b>Estimated Cost Year 3</b>   |                                     |   |              | <b>\$29,080</b>  |
| <b>Estimated Cost Years 1-3</b>  |                                     |   | <b>TOTAL</b> | <b>\$91,920</b>  |

If training is required (2 people) allow for 16 hrs totalling \$1,600.

Consideration should be given to preparing applications to various public and government funding sources for weed control.

## References

*ACT Weed Strategy 2009-2019*. ACT Dept. Environment, Climate Change, Energy & Water.

*Bushfire Operations Plan 2013-14*. Territory and Municipal Services Map 3  
[http://www.tams.act.gov.au/parks-recreation/bushfire\\_management/bushfire-operations-plan](http://www.tams.act.gov.au/parks-recreation/bushfire_management/bushfire-operations-plan)  
Accessed July 2014.

*Declaration of Woodstock Nature Reserve April 1991 ACT* – ACT Govt website.  
<http://www.legislation.act.gov.au/ni/1991-178/19910508-26122/pdf/1991-178.pdf>  
Accessed July 2014.

Dept. of Urban Services 1998. *Murrumbidgee River Corridor Management Plan*. ACT Government.

Mills 2009. *Preliminary Assessment, Land at West Molonglo and Ginninderra Creek, New South Wales, Australian Capital Territory*. Prepared for CB Richard Ellis Pty Limited, January.

Mills 2014. *Ecological Studies West Belconnen, Australian Capital Territory*. Prepared for Riverview Pty Ltd

PPAD 2009. *Pest Plants and Animals (Pest Plants) Declaration 2009 (No 1)*. ACT Govt.  
<http://www.legislation.act.gov.au/di/2009-67/current/pdf/2009-67.pdf>  
Accessed July 2014.

Riverview August 2014. Email from Riverview Group 1 Aug 2014 in answer to queries.

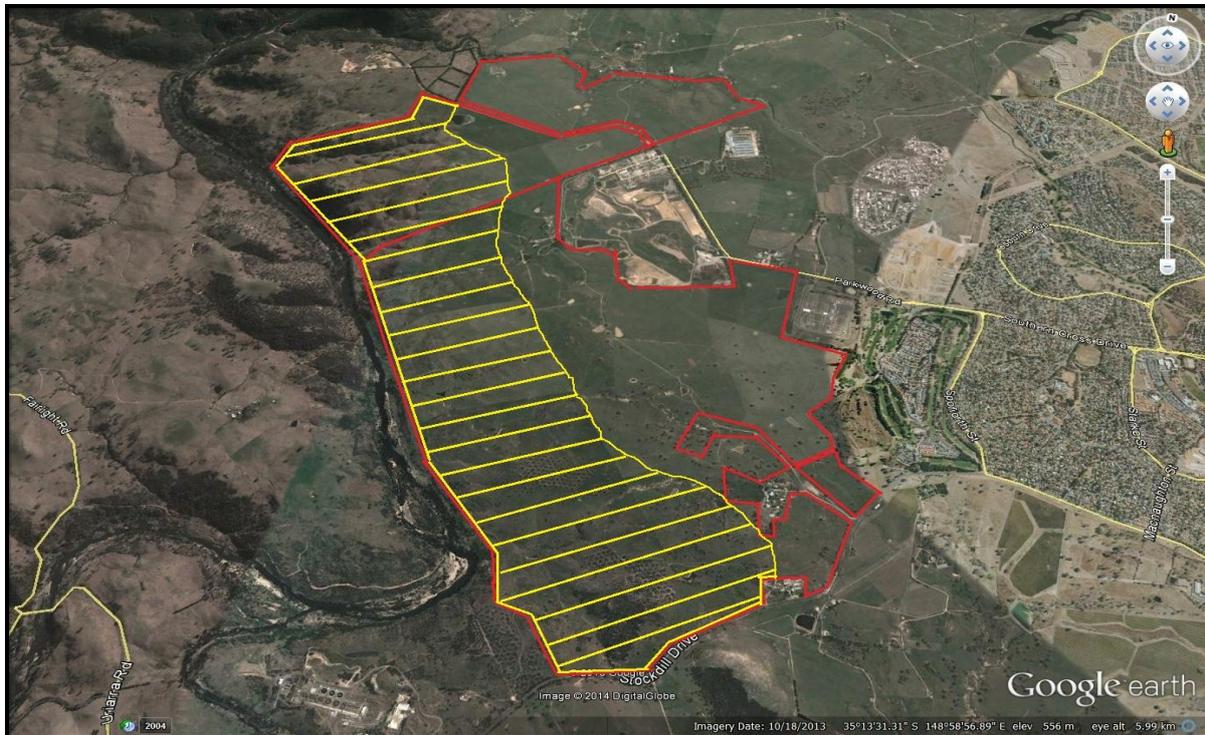
SSNPA 2014. Southern Slopes Noxious Plants Authority weeds listing.  
<http://www.ssnpa.com.au/weeds.php>  
Accessed July 2014.

## **WEED MANAGEMENT PLANS.**

Following are Appendices 1-6, being individual weed management plans for the significant pest plants on the Riverview site. Appendices 1-3 are full plans, as they deal with the species that the most troublesome species on the site. Appendices 4-6 are maps and basic notes on those species that, while significant, are in minor and easily managed numbers on the site.

## APPENDIX 1

### WMP FOR ST JOHN’S WORT, RIVERVIEW



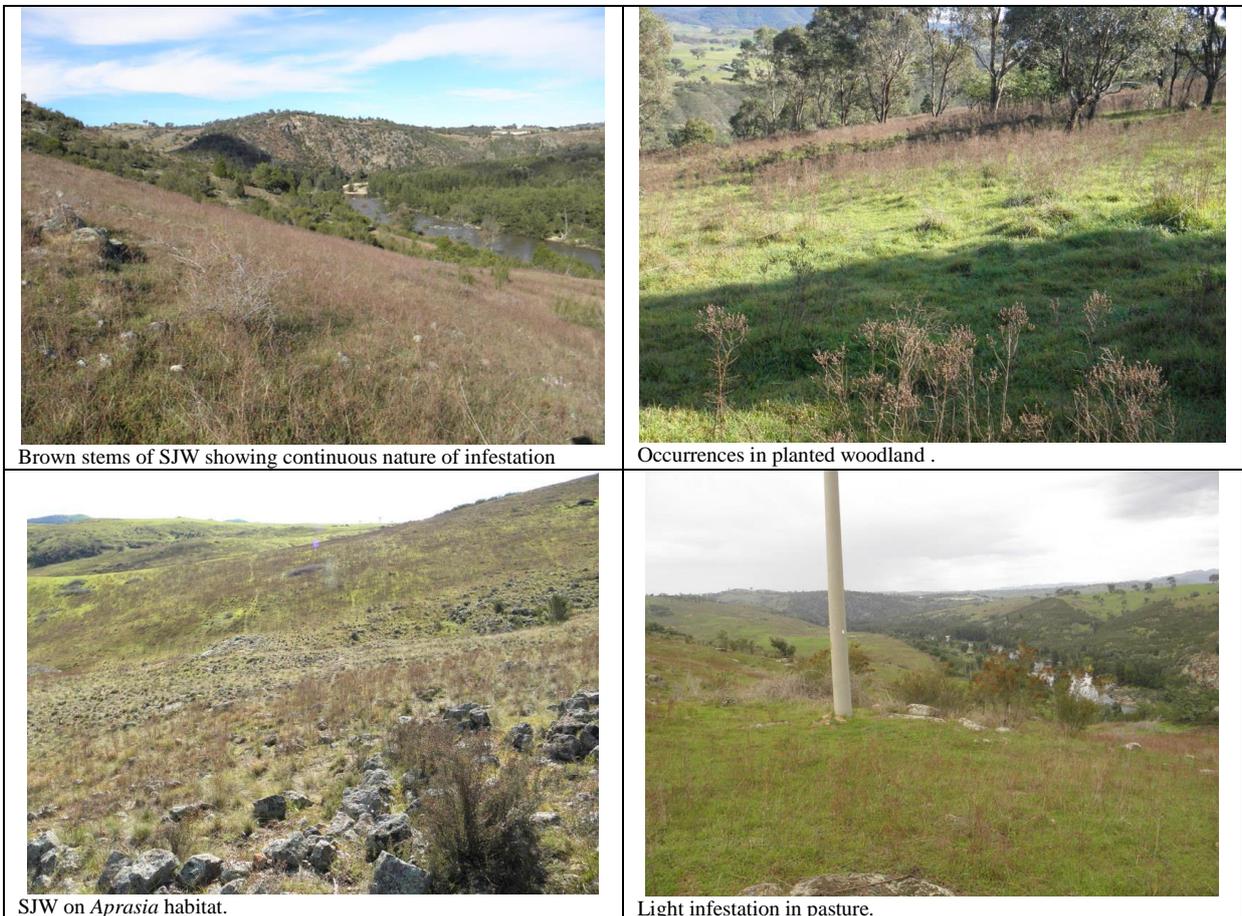
*Approximate distribution of St John's Wort at Riverview*

## WMP FOR ST JOHN’S WORT

### 1) Introduction

A WMP would usually include details on a species description, the history of introduction, current distribution, means of spread and preferred habitats. However there are numerous sources of information on St John’s Wort (*Hypericum perforatum*) through Australian internet sites. This WMP has a tighter focus on weed management issues.

St John’s Wort (SJW) is a widespread weed in the ACT and NSW, as it is in many other jurisdictions in Australia. The complete eradication of large infestations of SJW is not feasible. Even under a concerted and integrated weed management program, the best that might be achieved is containment and a reduction in overall densities. The economic and environmental impacts of SJW are well established, and efforts required to manage its environmental impacts in natural areas are justifiable.



This WMP has drawn heavily on existing high quality information on the species. The references used are listed at the rear of this plan.

### 2) Legal status of St John’s Wort

SJW is a declared weed under legislation in both NSW and the ACT.

### *2.1 New South Wales*

SJW is a declared noxious plant in many local government areas in New South Wales. In Yass Shire it is a Class 4 noxious weed i.e. *“a plant that poses a serious threat to primary production, the environment or human health, and which is widely distributed in an area and is likely to spread in the area or to another area. The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its reproduction. It may not be sold, propagated or knowingly distributed”* (SSNWA 2014).

### *2.2 ACT*

SJW is a declared Class 3 pest plant in the ACT that must be contained (PPAD 2009). In fact this means that the management responsibility remains at containing the infestation(s) to its current site. This is in recognition of the widespread occurrences and difficulties in managing this species.

## **3) The Potential Threats**

### *3.1 Impact on agriculture*

SJW is a major weed of pastures because it contains hypericin (a toxin which causes photosensitisation to stock), and its ability to compete with desirable pasture species. Stock skin damage associated with hypericin leads to weight loss, reduced productivity and, in extreme cases, death. SJW also adds vegetable fault to wool. SJW competes with useful plants in pastures, and large infestations reduce property values. The full economic impacts of SJW are difficult to calculate.

### *3.2 Impact on native ecosystems*

Eighty percent (80%) of current infestations occur in areas of indigenous vegetation, particularly open Eucalyptus woodlands. It is considered a threat to indigenous plants on private property, in national parks, state forests and other reserves. SJW is a common weed of water catchment and conservation areas and therefore poses a threat to natural ecosystems. SJW is found in grasslands, open Eucalyptus and Callitris woodlands, and along riverbanks, as well as in cleared pasture lands and forest plantation areas. It is common on less intensively managed lands such as travelling stock reserves, commons, roadsides, power line easements and railway verges many of which have conservation value.

### *3.3 Impact in urban areas*

The impact within the urban areas of Canberra may be of another nuisance weed, but the urban areas can be a significant source of infestations spreading into reserves and other natural areas in our region.

## **4) Control Methods**

The management of SJW will be assisted by an integrated weed management program involving:

### *4.1 Prevention*

Preventing invasion of SJW is the cheapest and most effective way of controlling the species. While this weed is widespread within the WBCC, regular checking for new infestations in October or November should be undertaken when new infestations are likely to be seen. If found, act immediately to eradicate them.

Domestic stock is a vector in the movement (spread) of SJW. The weed management principle for moving livestock from areas infested with SJW to “clean” areas, is to retain stock in a holding paddock for four-five weeks. This is to “cleanse” the stock by allowing time for seed inside the animal to be passed. Stock movements between infested and clean paddocks should be minimised, and vehicles traversing infested areas should be cleaned before entering clean paddocks. Native fauna and naturalised exotic fauna are also vectors where movement between infested and clean areas is unavoidable.

SJW has been moved about the region through fodder transport. Fodder feeding is used at Riverview, and appears confined to limited areas. These sites are a restricted imported fodder feeding area on a flat, arable site which enables regular checks of the feeding areas and to make arrangements to any new infestations of any weed species that may arise. If fodder feeding is to continue, the same method should be continued.

Once SJW is widely established, as it is on Riverview, it is unlikely to be eradicated, and management actions will need to be ongoing. While it may seem that prevention is a bit late or irrelevant given the extensive, almost continuous infestation on Riverview, adherence to early control of new infestations will be beneficial in not exacerbating the problem.

#### *4.2 Physical/Mechanical*

Mechanical and physical control is the removal of the plant and roots by digging, chipping or slashing and cultivation machinery.

Physical removal of SJW is only feasible at Riverview if isolated or small numbers of plants are noted in un-infested areas. All parts of the plant, especially the flowers and rhizomatous stems, should be bagged and destroyed appropriately. Slashing is not a feasible means of management at Riverview.

#### *4.3 Chemical*

Spot spraying and slightly broader application of herbicides registered for the control of SJW include fluroxypyr (e.g. Starane Advanced®), triclopyr + picloram (e.g. Grazon DS®) and glyphosate (e.g. Roundup®). Applied during flowering, fluroxypyr will selectively remove SJW while minimising damage to grasses or clover, triclopyr + picloram will kill all legumes, and glyphosate will kill or severely damage all species growing with the weed. All these chemicals have a use in managing SJW.

Spot-spraying (by thoroughly wetting the foliage) of SJW is an appropriate action on isolated infestations or environmental assets (e.g. woodland and *Aprasia* habitat). Spot-spraying is best carried out when the SJW is in flower (November to January), because it is easily seen and at its most sensitive time to herbicides. Spray the SJW when 50% of the flowers are open. Spraying can continue until 50% of seeds capsules reach the green stage, and it will have little effect after this time.

The same chemicals can be used in boom sprays and rotary wiping machinery. The terrain that most of the infestations occur on at Riverview does not permit the access and easy use of this type of machinery.

#### *4.4 Biological*

Twelve biological agents have been released as control agents for SJW. These bio-agents can be especially useful in inaccessible areas where other forms of management are not possible

or desirable. Some have become established in Australia, though there has been varied success in establishment and effects on SJW in some regional areas. A foliage-feeding beetle (*Chrysolina hyperici*) and a mite (*Aculus hyperici*) have been released in the Region. The establishment of the mite was successful and its activity as a control agent has been widespread. These agents can assist in reducing the spread and density of SJW infestations. It is likely that multiple bio-agents may need to be used to achieve a good level of control. The bio-agents can be redistributed from active populations to unaffected infestations.

#### *St John's Beetle (Chrysolina hypericin)*

This is a small beetle 5 to 6 mm long. The low winter growth is eaten by the larvae, and the adult beetles feed on the foliage of the erect spring stems. The establishment of the beetles is better on SJW infestations in open situations, such as those that exist at Riverview. The beetles are not as effective in timbered country. If established, the beetles can grow into large populations which defoliate the plants which in turn suppresses flowers and seed production.

As these beetles have poor mobility, their establishment is assisted by translocating infested stems to new infestations of SJW.

Where beetles are established, the effect of herbicide use may be diminished due to less leaf absorption area.

#### *St John's Wort mite (Aculus hyperici)*

This mite feed on the growing tips of SJW stunting the growth of leaves and flowering stems, ultimately reducing vigour and flower/seed production. If the infestation remains high plants can be weakened to a point where they die, though this may take some years.

#### *4.5 Fire*

Fire is generally not recommended in any program to manage SJW. Low intensity fire does not kill the plant crowns which can reshoot after being burnt, and may also produce sucker growth from rhizomes. Hot fire may result in the death of plant crowns. Autumn fire may result in an expansion in density as its seed bank may germinate and establish when it is too cold for other desirable species to compete. Germinated seedlings however, would be destroyed. Spring fire may favour species that can compete with SJW in warmer weather.

Fire can also be detrimental to established areas containing bio-agents.

If planned or unplanned fire eventuates, the burnt area would need to be monitored for follow-up if there is renewed vigour or density of SJW.

#### *4.6 Pasture competition*

The competition provided by perennial pastures is obvious at Riverview. SJW seed germinates in autumn, and competition for space, moisture, nutrients and light prevents the germination and establishment of SJW seedlings. The better pasture areas and cropped areas are relatively free of SJW, while thinner pastures have been heavily infested.

The “improvement” of pastures in the WBCC is not desirable, but the maintenance of pasture and any cropping activity conducted on the urban-suitable land will assist in keeping the species in check.

#### *4.7 Grazing management*

Grazing management of SJW offers a cost-effective, long-term management method in areas which are less accessible for herbicide use. Grazing over winter is especially successful. However, grazing must be undertaken with care due to the potential for livestock photosensitisation from taking in hypericin. Some animals are more sensitive than others.

Merino sheep with adequate wool growth (to limit the effects of hypericin) graze closely and are effective grazers of SJW. Cattle are less effective grazers, but can be used in conjunction with sheep. Black and red cattle are more tolerant of hypericin, and can be used to diminish large infestations of SJW prior to sheep being used for a closer grazing level. Cattle can graze SJW pastures for longer than sheep.

Intensive grazing with high stocking rates from July to September will remove many small, soft, green low-growing shoots which are low in hypericin, suppressing the weed's ability to regenerate and inhibiting the growth of the flower stems. Livestock should not be permitted to graze SJW when the basal shoots reach 100mm.



SJW occurrences at Kama. On the left is Kama Nature Reserve which is not grazed, and on the right is a grazed rural lease. The effects of grazing are clear. Photo: S Taylor, Parks, Conservation & Lands.

Grazing must be carried out annually to achieve long-term continuing control.

#### 4.8 Vegetation restoration

The shade provided by trees will affect the growth of SJW and may also provide some shade to prevent the photo-sensitisation of livestock. It also has the advantage of diversifying and restoring an impacted ecosystem.

## 5 Weed Management Requirements

Under the ACT Pest Plant and Animals Act 2005 (PPAA) SJW is a declared a Class 3 pest plant species which must be contained. Containment is preventing the movement of an infestation of a pest plant species beyond a defined area, be it a paddock or a catchment, so containment (or the degrees of it) may vary from site to site. Containment can actually mean little or no management program to diminish or suppress the pest species, provided it does

not escape the pre-determined boundary(s). Complete containment is a little unrealistic when the SJW infestation is so extensive. In recognition of this, containment will usually involve some forms of management to reduce the potential for spread.

In Yass Shire in NSW, SJW is a declared Class 4 noxious plant, i.e. “*a plant that poses a serious threat to primary production, the environment or human health, and which is widely distributed in an area and is likely to spread in the area or to another area. The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its reproduction. It may not be sold, propagated or knowingly distributed*”

The expectations of the management actions for the NSW Class 4 weeds are appropriate.

On the Riverview site, the infestation of SJW is very extensive. There is no quick fix for such infestations. This WMP for SJW at Riverview has been prepared having had regard to the threat and practicality of control of the species. The management methods listed above, when integrated, will assist in containing the infestation, and may gradually diminish numbers and density over time, in accord with jurisdictional requirements.

## 6 References

*Best Practice Management Guide 7 – St John’s Wort (Hypericum perforatum)*. CRC for Australian Weed Management.

[http://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0010/347995/bpmg-stjohn-wort.pdf](http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0010/347995/bpmg-stjohn-wort.pdf)

Accessed July 2014.

*Noxious Weed Fact Sheet – St John’s Wort (Hypericum perforatum)*. Sutherland Shire Council.

[http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDEQFjAB&url=http%3A%2F%2Fwww.sutherlandshire.nsw.gov.au%2Ffiles%2F7f6a9545-4471-4998-92e8-a20300c3ba8b%2FStJohnsWort.pdf&ei=ZK1xU8DxMMWikwW-5IDoCA&usg=AFQjCNGWhYs6h4orA\\_vdSpFU6m1INrRWig](http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDEQFjAB&url=http%3A%2F%2Fwww.sutherlandshire.nsw.gov.au%2Ffiles%2F7f6a9545-4471-4998-92e8-a20300c3ba8b%2FStJohnsWort.pdf&ei=ZK1xU8DxMMWikwW-5IDoCA&usg=AFQjCNGWhYs6h4orA_vdSpFU6m1INrRWig)

Accessed July 2014.

*St John’s Wort Fact Sheet*. NSW Dept. of Agriculture

<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/st-johns-wort>

Accessed July 2014.

St John’s Wort Fact Sheet. Department of Agriculture, Fisheries and Forestry - Biosecurity Queensland

[http://www.daff.qld.gov.au/\\_data/assets/pdf\\_file/0006/153951/ipa-st-johns-wort.pdf](http://www.daff.qld.gov.au/_data/assets/pdf_file/0006/153951/ipa-st-johns-wort.pdf)

Accessed July 2014.

St John’s Wort Weed Fact Sheet. Molonglo Catchment Group.

<http://www.molonglocatchment.com.au/Weeds/Documents/Factsheets/StJohnsWort.pdf>

Accessed July 2014.

Southern Slopes Noxious Plants Authority weeds listing.

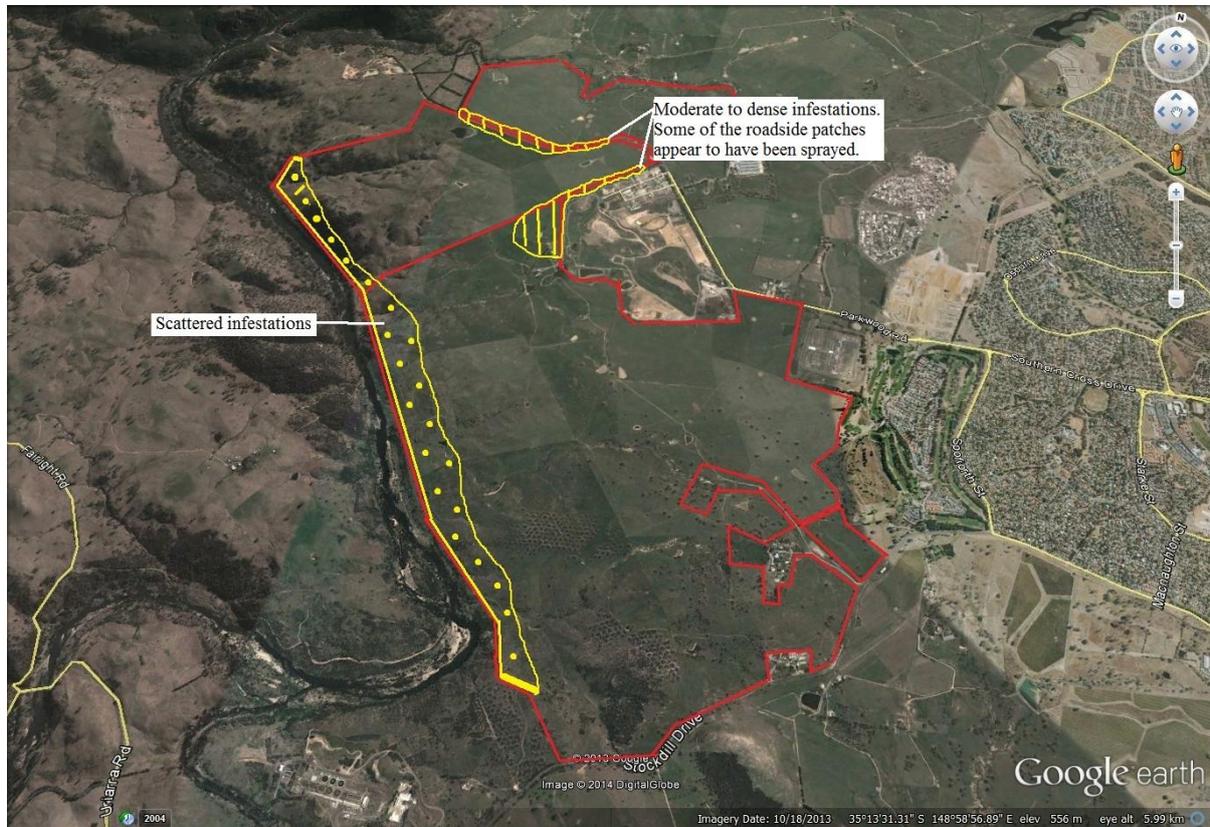
<http://www.ssnpa.com.au/weeds.php>

Accessed July 2014.

PPAD 2009. *Pest Plants and Animals (Pest Plants) Declaration 2009 (No 1)*. ACT Govt.  
<http://www.legislation.act.gov.au/di/2009-67/current/pdf/2009-67.pdf>  
Accessed July 2014.

## APPENDIX 2

### WMP FOR AFRICAN LOVE GRASS, RIVERVIEW



*Approximate distribution of African Love Grass at Riverview*

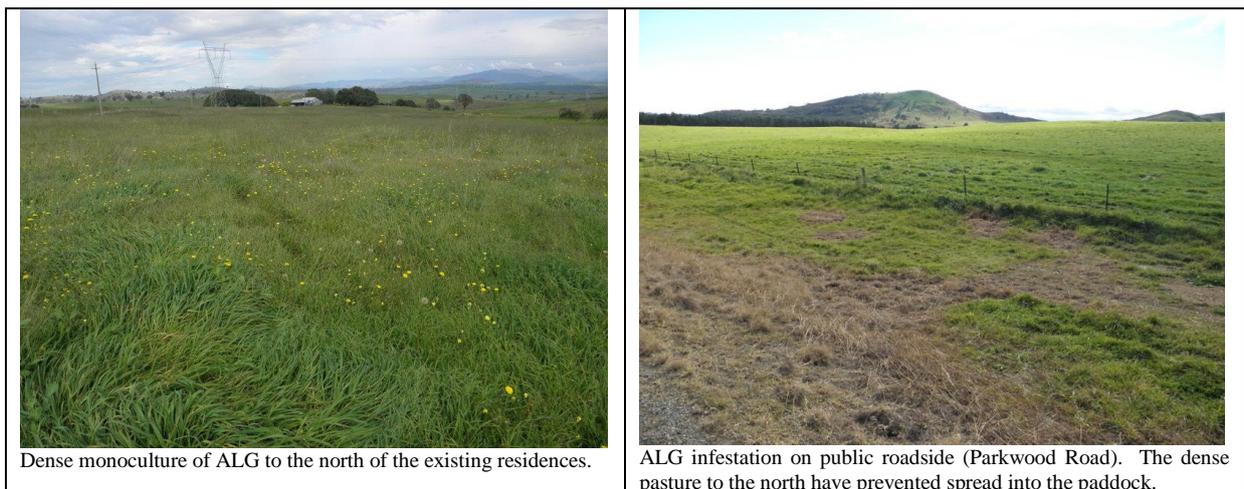
## WMP FOR AFRICAN LOVE GRASS

### 1) Introduction

A complete WMP would include a species description, history of introduction, current distribution, means of spread and preferred habitats. However there are numerous sources of information on African Love Grass (*Eragrostis curvula*) through Australian internet sites. This WMP has a tighter focus on weed management issues.

There is considerable variation within the varieties of African Love Grass (ALG). Four varieties of ALG have successfully naturalised in Australia. The main naturalised variety is the “short chloromela”, which is a low growing, vigorous, tufted perennial form, usually to ca. 30cm tall with a blue-green appearance. The leaf apices are usually dead and curled.

ALG (short chloromela and a tall variety) is a widespread weed in the ACT and NSW, as it is in many other jurisdictions in Australia. The complete eradication of large infestations of ALG is not feasible. Even under a concerted and integrated weed management program, the best that might be achieved is containment and a reduction in overall densities. The economic and environmental impacts of ALG are well established, and efforts required to manage its impacts on natural areas are justifiable.



This WMP has drawn heavily on existing high quality information on the species. The references used are listed at the rear of this plan. Some patches of this species appear to have been sprayed.

### 2) Legal status of African Love Grass

ALG is a declared weed under legislation in NSW and the ACT.

#### 2.1 New South Wales

ALG is a declared noxious plant in many local government areas in New South Wales. In Yass Shire it is a Class 4 noxious weed i.e. “a plant that poses a serious threat to primary production, the environment or human health, and which is widely distributed in an area and is likely to spread in the area or to another area. The growth of the plant must be managed

*in a manner that reduces its numbers, spread and incidence and continuously inhibits its reproduction. It may not be sold, propagated or knowingly distributed” (SSNPA 2014).*

### 2.2 ACT

ALG is a declared Class 3 pest plant in the ACT that must be contained (PPAD 2009). In fact this means that the management responsibility remains at containing the infestation(s) to its current site. This is recognition of the difficulty in managing this species.

### 2.3 Nationally

ALG is a declared Weed of National Significance (WoNS). A WoNS listing encourages a national approach to weed management, with consistent cross- jurisdictional management on high priority weed species.

## 3) The Potential Threats

ALG forms dense swards of tussocks, often to the exclusion of all other species. ALG is able to survive drought, low nutrient regimes and fire and grows extremely well under a wide range of climatic conditions.

### 3.1 Impact on agriculture

ALG has been described as a “perplexing” pasture species as it is regarded by authorities in some areas of Australia as useful for animal production and soil stabilisation but in other areas as a serious weed. Some publications, mainly those dealing with agricultural production, refer to the environmental value of ALG as being a useful species that stops erosion in corridors, riverbanks or wasteland where it is no problem. ALG is said to prefer disturbed areas and is an aggressive and highly invasive species with the potential to infest productive farmland where stock disturbance and grazing patterns can permit its entry. The main disadvantages of ALG for agriculture in the local region are:

- low palatability, leading to preferential overgrazing of desirable species and thus contributing to continued invasion by ALG;
- low digestibility, leading to lower levels of animal production;
- low crude protein levels, especially in cooler months when higher protein levels are needed;
- low tolerance to frost, reducing the availability of fresh pick;
- abundant seeding which results in the capacity to form very dense swards, leading to the invasion of pasturelands;
- seedlings which establish readily on disturbed and relatively undisturbed sites and outcompete more desirable species;
- seed which is readily translocated by a variety of vectors and activities, and which can spread extensively and rapidly after disturbance, natural drought events and during floods;
- vigorous growth rates over the warmer months, leading to further displacement of desirable native and introduced pasture species;
- difficulty of control;
- cost of control; and
- providing fuel for fire.(GB&A 1998)

### 3.2 Impact on native ecosystems

ALG is recognised as a serious environmental weed, despite the lack of references to ALG's consequences on the natural environment. It has also been highly invasive of stable vegetation in areas reserved for environmental conservation, especially grasslands and similar open, sunny sites. It encroaches into natural areas, particularly after disturbances such as fire and disturbed or bare soil areas. It forms dense infestations in "natural" environments, especially grasslands and other open situations, to the exclusion of indigenous species.

### *3.3 Impact in urban areas*

The impact within the urban areas of Canberra may be of another nuisance weed, but urban areas are a significant source of infestations spreading into reserves and other natural areas in our region.

## **4) Control Methods**

There are a number of basic principles associated with any integrated weed management program that are vital to ensuring success.

### *4.1 Prevention*

Prevention is a crucial action for management and preventing the further spread of ALG. Preventing invasion of ALG is also the cheapest and most effective way of controlling the species. Actions to prevent spread vary from ensuring seed obtained for cropping or pastures is not contaminated, any vehicles and machinery do not carry seed to un-infested sites and re-vegetating cleared or disturbed sites. While ALG is scattered but widespread within the WBCC, regular checking for new infestations should be undertaken. If found, act immediately to eradicate them.

Stock can move ALG very readily. Minimise stock movements from infested to clean paddocks, but if moving livestock from areas infested with ALG to "clean" areas, they should be contained in a holding paddock for two weeks to allow seed on or inside the animal to be released.

Have a restricted imported fodder feeding area on a flat, arable site. Regularly check the feeding areas and treat any new infestations of any weed species that may arise.

Once ALG is established, as it is on and around Riverview, it is unlikely to be eradicated, and the strategy for its management will need to be ongoing.

### *4.2 Physical/Mechanical*

Mechanical and physical control is the removal of the plant and roots by digging, chipping or slashing and cultivation machinery. This method is extremely cost effective, as well as an environmentally sound procedure. It is also resource effective, utilising available labour and minimum herbicide. Physical removal is only feasible at Riverview if isolated or small numbers of ALG plants are noted in un-infested areas. All parts of the plant, especially the flowering stems, should be bagged and destroyed appropriately. Mowing is not a feasible means of management at Riverview except for temporary removal of flowering stems within the infestation to the north of the current residences prior to taking other management actions.

### *4.3 Chemical*

Herbicides are useful for preventing seed set and killing plants, particularly in prevention, eradication and containment strategies.

The most effective herbicide to kill ALG is flupropanate (e.g. Taskforce®). Flupropanate is slow acting with a residual effect. It enters the plant through the leaves and roots but it may take some time to have a noticeable impact. Although effective at any time of the year it is best to spot spray in spring/summer, avoiding spraying in winter on the Tablelands. Glyphosate (e.g. Roundup®) can be added to the flupropanate as it assists in preventing seeding. Glyphosate can be used for spot spraying in a pasture or for broad acre spraying when cropping or establishing a new pasture and may be effective for the management of the infestation to the north of the residences. Spot-spraying ALG is an appropriate action on isolated infestations or smaller areas of prime habitat. For best results when spot-spraying, spray to thoroughly wet foliage.

As spraying dense infestations will leave extensive areas of bare ground, any subsequent germination of ALG seed needs to be treated.

The same chemicals can be used in boom sprays and rotary wiping machinery. The terrain in the river corridor where infestations occur at Riverview does not permit easy use of this type of machinery, though could be used on the northern infestations.

#### *4.4 Fire*

The use of fire is not recommended. Fire will only stimulate this species, harm other species and open up bare spaces for the germination of seed. Fire can be used to remove dead biomass in winter in preparation for further management work. Fire should only be used as part of an IWMP.

#### *4.5 Pasture competition*

ALG readily invades and dominates bare areas and degraded pastures, reducing their productivity. It grows vigorously from spring to autumn though its unpalatable nature means it is only selectively grazed when new growth is present.

The good management and sowing of introduced pastures are a viable alternative on suitable country and soil types. This would be an acceptable solution for the northern infestation near the existing residences and anywhere on the arable land on the east of the site.

While the open grasslands of the WBCC have been disturbed to varying degrees, the infestations of ALG are scattered and fairly small, though are the full length of the corridor. These infestations have almost certainly arrived down the river corridor. Further upstream on the Monaro and southern ACT ALG has moved off the corridor and established dense infestations. The outbreaks of Riverview are limited, but will get a lot larger and more difficult to manage unless action is taken in the near future.

#### *4.6 Grazing management*

Heavy rotational grazing is already used and accepted as a useful technique for managing ALG. It has been utilised in the MRC around Tharwa. Even on properties that are not heavily grazed, ALG infestations are generally less prolific. Heavy rotational grazing is a serious option for management of ALG on those parts of Riverview that are urban-suitable, but is not suitable within the WBCC for environmental reasons. However, grazing can be useful in lighter infestations where stock will continually graze any new growth, thus creating a temporary setback to the plants.

Grazing also has the potential to spread seed of ALG through faeces, with the seed retaining viability within the digestive tract believed to last for 14 days. After grazing ALG infestations under any rotational program, grazing stock should be held for 14 days on improved pasture areas which will assist in preventing the germination and establishment of ALG seedlings.

#### 4.7 Vegetation restoration

If large weed infestations of ALG are removed, it must be re-vegetated. Spot spraying within the WBCC will likely be replaced with nearby species, but complete removal of the northern infestation near the current residences will need replacement.

### 5) Pest Plant Management Requirements

Under the ACT Pest Plant and Animals Act 2005 (PPAA) ALG is a declared a Class 3 pest plant species which must be contained. Containment is preventing the movement of an infestation of a pest plant species beyond a defined area, be it a paddock or a catchment, so containment (or the degrees of it) may vary from site to site. Containment can actually mean little or no management program to diminish or suppress the pest species, provided it does not escape the pre-determined boundary(s). Complete containment is a little unrealistic when the ALG infestation is so extensive. In recognition of this, containment will usually involve some forms of management to reduce the potential for spread.

In Yass Shire in NSW, ALG is a declared Class 4 noxious plant, i.e. *“a plant that poses a serious threat to primary production, the environment or human health, and which is widely distributed in an area and is likely to spread in the area or to another area. The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its reproduction. It may not be sold, propagated or knowingly distributed”*

The expectations of the management actions for the NSW Class 4 weeds are appropriate.

On the Riverview site, the infestation of ALG is scattered, with smaller infestations on the lower slopes along the river corridor to a large and dense infestation in the northern portion of the property. It is growing in dense infestations along road reserves and near the landfill site. There is no quick fix for such infestations. This WMP for ALG at Riverview has been prepared having had regard to the threat and practicality of control of the species. The management methods listed above, when integrated, will assist in containing the infestation, and may gradually diminish numbers and density over time, in accord with jurisdictional requirements.

### 6) References

SSNPS 2014. *Southern Slopes Noxious Plants Authority Weed Listing*. Accessed July 2014. <http://www.ssnpa.com.au/weeds.php>

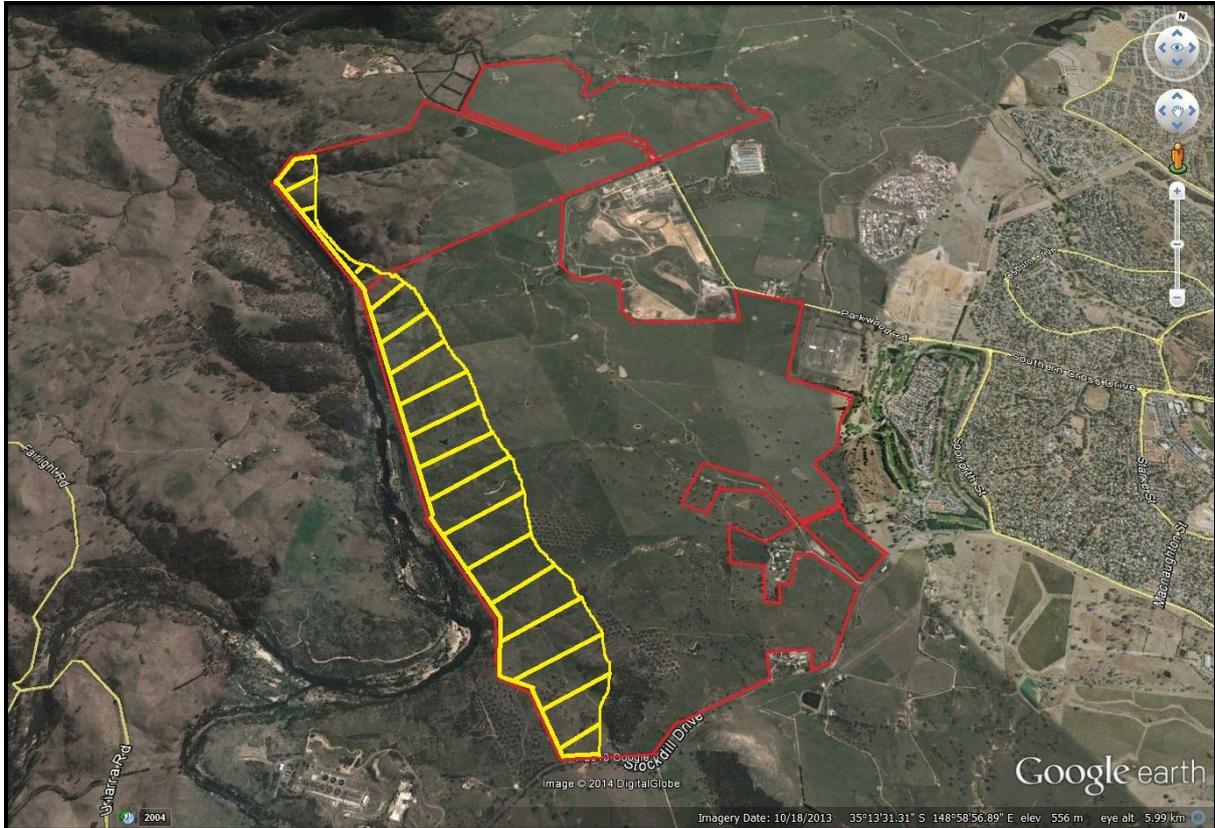
PPAD 2009. *Pest Plants and Animals (Pest Plants) Declaration 2009 (No 1)*. Disallowable instrument DI2009–67 made under the Pest Plants and Animals Act 2005, s 7 (Declaration of pest plant). Accessed July 2014. <http://www.legislation.act.gov.au/di/2009-67/current/pdf/2009-67.pdf>

GB&A 1998. *Strategy for the Management of African Love Grass (Eragrostis curvula) in the Murrumbidgee River Corridor*. Report to Parks & Conservation Service by Geoff Butler & Associates, November 1998.

African Love Grass Fact Sheet (no date). 3D Weed Management. Accessed July 2014.  
<http://k2c.org.au/files/algfactsheet-v25.pdf>

## APPENDIX 3

### WMP FOR BLACKBERRY AT RIVERVIEW



*Approximate distribution of Blackberry at Riverview*

## WMP FOR BLACKBERRY

### 1) Introduction

A complete WMP would include a species description, history of introduction, current distribution, means of spread and preferred habitats. However there are numerous sources of information on Blackberry (*Rubus fruticosus* sp. agg.) through Australian internet sites. This WMP has a tighter focus on weed management issues.

There are a number of species of Blackberry that have been introduced, but have been combined under the name *Rubus fruticosus* sp. agg. for convenience for this WMP.

The complete eradication of large infestations of Blackberry is not feasible. At Riverview, re-infestation is likely from other outbreaks in and around the river corridor. Even under a concerted and integrated weed management program, the best that might be achieved is containment and a reduction in overall densities (as has already been done at Riverview). The economic and environmental impacts of Blackberry are well established, and efforts required to manage its impacts on natural areas are justifiable.



Evidence of past Blackberry control was evident in dead thickets across the land sloping towards the river.



Small Blackberry plants were scattered across the site, some so small they difficult to see creeping through the grassy understorey.

This WMP has drawn heavily on existing high quality information on the species. The references used are listed at the rear of this plan.

### 2) Legal status of Blackberry

Blackberry is a declared weed under legislation in NSW, ACT and nationally.

#### 2.1 New South Wales

Blackberry is a declared noxious plant under the NSW Noxious Weeds Act 1993 in local government areas in New South Wales. In Yass Shire it is a Class 4 noxious weed i.e. “a plant that poses a serious threat to primary production, the environment or human health, and which is widely distributed in an area and is likely to spread in the area or to another area. The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its reproduction according to the measures specified in a management plan published by the local control authority. It may not be sold, propagated or knowingly distributed” (SSNPA 2014).

There are cultivars that are exempt from the legislation, these being ‘Black Satin’, ‘Chehalem’, ‘Chester Thornless’, ‘Dirksen Thornless’, ‘Loch Ness’, ‘Murrindindi’, ‘Silvan’, ‘Smoothstem’ and ‘Thornfree’.

### 2.2 ACT

Blackberry is a declared Class 3 and 4 pest plant in the ACT that must be contained and is a prohibited (PPAD 2009). This means that the management responsibility is to contain the infestation(s) to its current site and propagation and supply is prohibited in the Australian Capital Territory under the ACT Pest Plants and Animals Act 2005.

There are cultivars that are exempt from the legislation, these being the same cultivars as mentioned above.

### 2.3 Nationally

Blackberry is a declared Weed of National Significance (WoNS). A WoNS listing encourages a national approach to weed management, with consistent cross- jurisdictional management on high priority weed species. All of the species collectively grouped as *R. fruticosus* sp. agg. are banned from entry into Australia under the Commonwealth Quarantine Act 1908. A number of commercial species and cultivars are permitted entry.

## 3) The Potential Threats

Blackberry forms dense thickets that exclude native species, leading to its complete dominance of the understorey and eventually the canopy. The thickets impede access, alter fire regimes and dominate the landscape. It is regarded as one of the worst weeds in Australia having invaded the banks of watercourses, roadsides, pastures, orchards, plantations, forests and bushland throughout temperate Australia.

### 3.1 Impact on agriculture

In rural areas blackberries dominate and reduce pasture production and impede easy access to water and land. They also provide food and shelter for pest animals such as foxes and rabbits. Plantation forestry costs can be greatly increased during establishment, impeding access for manual operations.

### 3.2 Impact on native ecosystems

Blackberries dominate and displace native vegetation and increase fire hazards through the large amount of dead biomass in blackberry thickets. Blackberries reduce the natural values of bushland and conservation areas and hinder access for recreational activities. As for rural land, they provide a harbor for pest animals.

### 3.3 Impact in urban areas

Blackberry is a weed in urban areas for all the above reasons, and mainly occurs in disturbed sites.

## 4) Control Methods

There are a number of basic principles associated with any integrated weed management program that are vital to ensuring success.

### 4.1 Prevention

Prevention is a crucial action for management and preventing the further spread of Blackberry. Preventing invasion of Blackberry is also the cheapest and most effective way of controlling the species. Actions to prevent spread primarily means taking management action when infestations are noted.

Blackberry is widespread within the WBCC. Once Blackberry is established, as it is on and around Riverview, it is unlikely to be eradicated, and the strategy for its management will need to be ongoing. It was observed that the infestations have been managed in the past. There was ample evidence of dead thickets across the site. A few large plants were noted that had been missed, but the bulk of the current infestation is small plants running low to the ground. The current management regime should be continued.

#### *4.2 Physical/Mechanical*

Mechanical and physical control is the removal of the plant and roots by digging, chipping or slashing and cultivation machinery. This method is extremely cost effective, as well as an environmentally sound procedure. Small plants should be removed and bagged or removed to sites for proper disposal.

Slashing and cultivation are suitable actions where it is suitable terrain to use such machinery and provided pastures or replanting with native vegetation is undertaken. Slashing induces new growth which can then be treated through follow-up herbicide control two growing seasons later.

#### *4.3 Chemical*

Herbicides are the most effective means for managing Blackberry. Common application methods include foliar drenching, cut stump treatments and granular applications.

The best time to spray Blackberry is just prior to the flowering season through to autumn. Young Blackberry plants are readily managed with herbicide and should be treated as soon as they are observed. Established Blackberry thickets can contain a number of root crowns of varying ages. Large, old crowns are difficult to destroy.

When using foliar-absorbent herbicides, ensure the whole thicket is drenched when the plant is actively growing, as they will be less effective on plants under stress through dry conditions or high temperatures. Low temperatures can also limit absorption.

The recommended herbicides for Blackberry are:

*Picloram and triclopyr (e.g. Grazon DS®).*

This is the most reliable mixture of herbicides for the control of Blackberry and with correct application it will give the highest level of control.

*Metsulfuron-methyl (e.g. Brush-Off®)*

This herbicide is recommended for the initial treatment of large, dense infestations. Grass and sedge groundcovers quickly recover providing ground cover and competition.

*Glyphosate (e.g. Roundup®)*

Glyphosate is a non-selective herbicide recommended for small infestations where other herbicides cannot be used, such as in or near watercourses and in urban and peri-urban areas.

*Triclopyr (e.g. Garlon®)*

Recommended for initial treatment of large infestations

*Picloram (e.g. Tordon® granules)*

This herbicide is recommended where the use of pellet formulations is considered the most appropriate application technique.

*4.4 Biological control*

Blackberry leaf-rust fungus has been released as a bio-agent, but the results are patchy. The fungus will not destroy the plant, but defoliates, reducing the plant's aggressiveness and rate of spread. Effectiveness in our region has been limited.

*4.5 Fire*

The use of fire is more commonly used to clear thickets once they have been destroyed, but can be used to rejuvenate a thicket in preparation for spraying herbicide two growing seasons after burning.

*4.5 Pasture competition*

In agricultural areas the good management and sowing of introduced pastures are a viable alternative on suitable country and soil types.

While the open grasslands of the WBCC have been disturbed to varying degrees, the infestations of Blackberry are scattered and widespread, usually occurring as low plants creeping through the grass understorey. The population at Riverview is extensive, but past management appears to be keeping the species suppressed. However, follow-up will be required as current small plants develop.

## **5) Pest Plant Management Requirements**

Blackberry is a declared Class 3 and 4 pest plant in the ACT that must be contained and is a prohibited (PPAD 2009). Containment can actually mean little or no management program to diminish or suppress the pest species, provided it does not escape the pre-determined boundary(s). Complete containment is a little unrealistic when the Blackberry infestation is so extensive. In recognition of this, containment will usually involve some forms of management to reduce the potential for spread.

In Yass Shire in NSW, Blackberry is a declared Class 4 noxious plant, i.e. *“a plant that poses a serious threat to primary production, the environment or human health, and which is widely distributed in an area and is likely to spread in the area or to another area. The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its reproduction. It may not be sold, propagated or knowingly distributed”*

The expectations of the management actions for the NSW Class 4 weeds are appropriate.

On the Riverview site, the infestation of Blackberry is widespread and scattered, with infestations primarily on the lower slopes along the river corridor. There is no quick fix for such infestations. This WMP for Blackberry at Riverview has been prepared having had regard to the threat and practicality of control of the species. The management methods listed above, when integrated, will assist in containing the infestation, and may gradually diminish numbers and density over time, in accord with jurisdictional requirements.

## 6) References

*Blackberry Fact Sheet*. NSW Environment & Heritage

<http://www.environment.nsw.gov.au/pestsweeds/BlackberryFactsheet.htm>

Accessed July 2014.

*Blackberry Control Manual*. Weeds Australia

<http://www.weeds.org.au/WoNS/blackberry/docs/blackberry-control-manual-part-6.pdf>

Accessed July 2014.

*Blackberry Fact Sheet* Dept. Agriculture, Fisheries and Forestry - Biosecurity Queensland.

[http://www.daff.qld.gov.au/\\_data/assets/pdf\\_file/0003/55560/IPA-Blackberry-PP21.pdf](http://www.daff.qld.gov.au/_data/assets/pdf_file/0003/55560/IPA-Blackberry-PP21.pdf)

Accessed July 2014.

*Blackberry Fact Sheet*. Weeds of National Significance Weed management Guide

<http://www.environment.gov.au/biodiversity/invasive/weeds/publications/guidelines/wons/pubs/r-fruticosus.pdf>

Accessed July 2014.

SSNPS 2014. *Southern Slopes Noxious Plants Authority Weed Listing*.

<http://www.ssnpa.com.au/weeds.php>

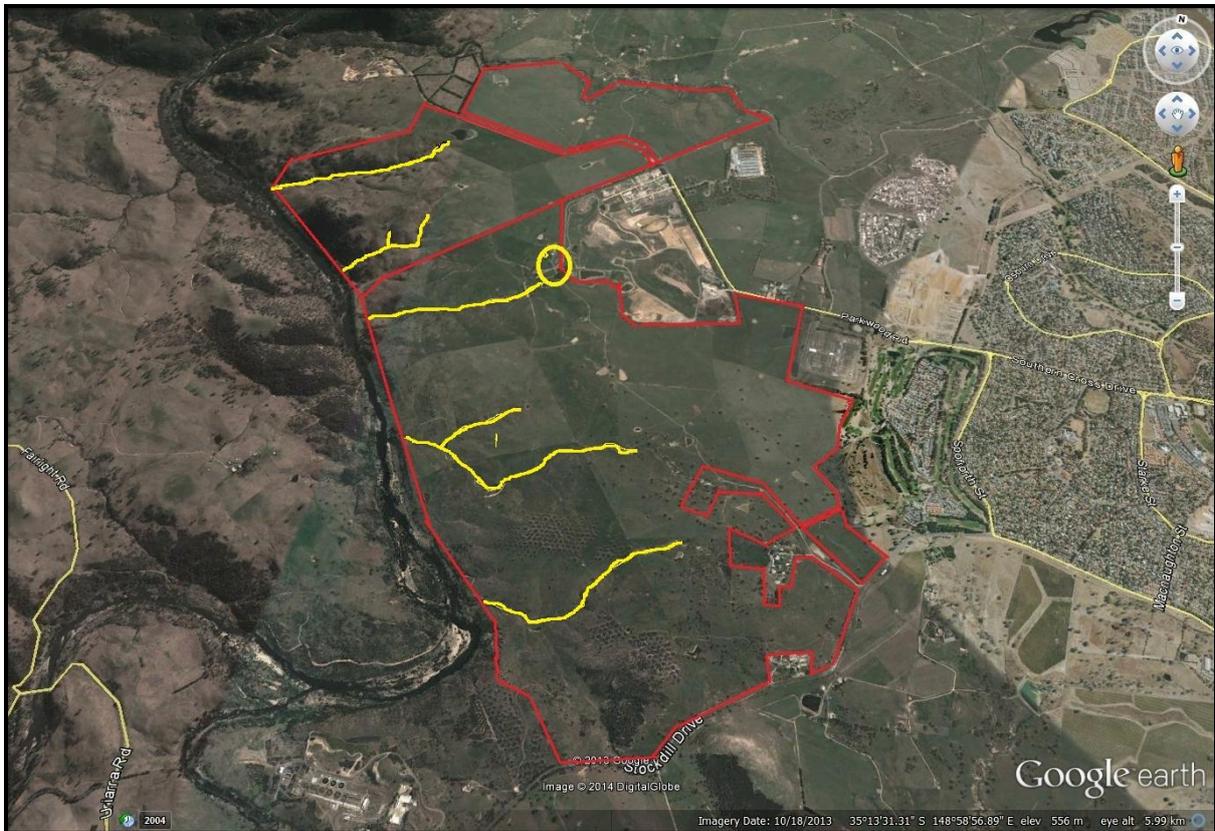
Accessed July 2014.

PPAD 2009. *Pest Plants and Animals (Pest Plants) Declaration 2009 (No 1)*. Disallowable instrument DI2009–67 made under the Pest Plants and Animals Act 2005, s 7 (Declaration of pest plant). Accessed July 2014.

<http://www.legislation.act.gov.au/di/2009-67/current/pdf/2009-67.pdf>

## APPENDIX 4

### WMP FOR WILLOWS AT RIVERVIEW



*Approximate distribution of Willows at Riverview*

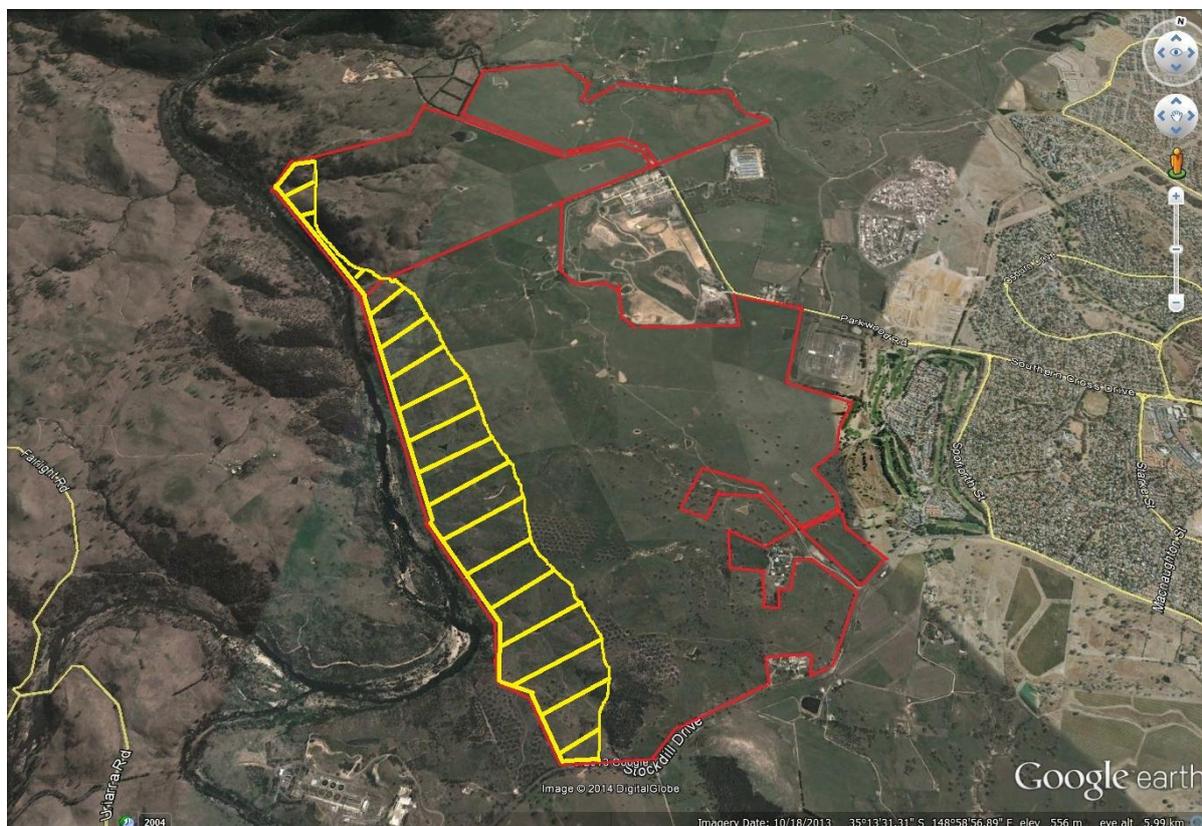
Willows are present on the site, but only on drainage lines and in very limited numbers. The map indicates the drainage lines, but occurrences are only very scattered on these drainage lines.

Some planted willows are present near the residences on the site, and are at the top of a main drainage line. To ensure that future spread is reduced, these planted specimens should also be removed.

Management is relatively easy, and plants should be frilled and treated with herbicide (glyphosate) as they stand.

## APPENDIX 5

### WMP FOR BRIAR ROSE



*Approximate distribution of Briar Rose at Riverview*

Briar Rose is present on the site, but only in very small numbers. There was evidence that they had been previously treated, and current occurrences are very small and newly recruited plants.

Management is relatively easy, and plants should be treated at the same time as African Love Grass is treated.

## APPENDIX 6

### WMP FOR FIRETHORN AT RIVERVIEW



*Approximate distribution of Firethorn at Riverview*

Two plants were located at Riverview, and hence it is not very significant at this stage. The main concern is the cultivated plants at Strathnairn property. These are highly likely the source of the plants located, and it is recommended that these be removed.

The plants should be cut at ground level and the stump treated with glyphosate.