

**VEGETATION MANAGEMENT PLAN
'ST JOSEPHS MOUNT'
34 BUSBY ST,
SOUTH BATHURST**

PREPARED FOR INTERNATIONAL ORDER OF
SISTERS OF MERCY

C/- WESTERN PROJECT SERVICES

28TH JUNE 2022



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1 SUMMARY

The purpose of this Vegetation Management Plan (VMP) is to provide direction for the management of vegetation on the grounds surrounding St Josephs Mount and located within the Heritage Conservation Area. This VMP applies to the area included in the original Lot 22 DP 1033481, at 34 Busby Street, South Bathurst, and forming the proposed Lots 23, 24, and 25 in DP 1033481.

This VMP has been informed by the St Josephs Mount Conservation Management Plan (CMP) (High Ground Consulting, 2021), Bathurst Regional Council's Vegetation Management Plan draft report (Molino Stewart, 2018), Bathurst Development Control Plan 2015 for requirements for the preparation of a 'vegetation screen', and *AS4970-2009 Protection of trees on development sites*. As such, it endorses the CMP and aims to comply with the recommendations in it. The VMP should be read in conjunction with the CMP.

The aim of this report is to provide a VMP that has flexibility for implementation. Guiding principles for the development included:

- Retain as much of the existing vegetation as possible
- Provide simple, cost effective management actions and recommendations
- Identify areas where there is a number of management options
- Identify trees that need to be removed because they are dangerous
- Identify trees and shrubs that are weed species and need to be removed
- Provide recommended species lists for replacement planting
- Identify areas for supplementary planting and provide recommended species lists
- Identify areas or species with low/medium/high heritage conservation value
- Identify areas or species with low/medium/high ecological conservation value
- Provide management recommendations for these areas
- Provide recommendations for exclusion areas for excavation for utilities (tree protection zones)
- Provide recommendations for construction of fencing to separate the two lots

2 PROJECT BACKGROUND

Western Project Services has commissioned a Vegetation Management Plan on behalf of The Institute of Sisters of Mercy (SoM) for the proposed subdivision of (Lot 22, DP 1033481) 34 Busby Street, South Bathurst into three lots (Lots 23, 24, and 25 in DP 1033481). Lot 223 will consist of an existing residential property with a area of 550m² and fronting onto Busby St. Lot 225 will include an area of 2.28ha in the lower portion of the property. Lot 224 includes 2.3ha of land to be retained with the existing buildings and includes the vegetated screening barrier between the two lots (Figure 1).

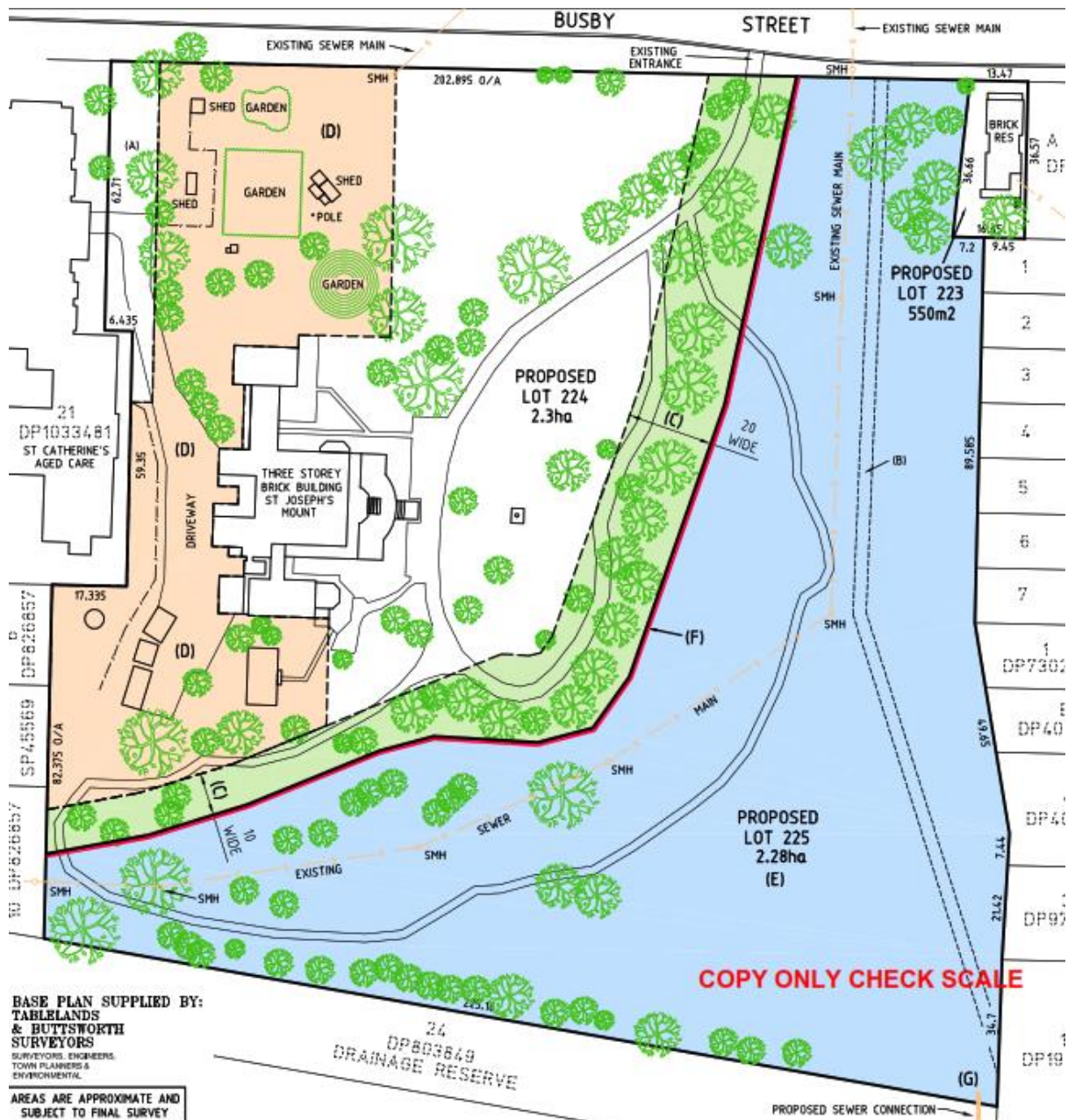


Figure 1 Layout of proposed new lots following subdivision (extracted from Subdivision Management Plan, Anthony Daintith Town Planning, 2021)

2.1 Project context

The Institute of Sisters of Mercy, Australia and Papua New Guinea engage in a wide range of apostolic works, including education, the care of the sick in their homes and in hospitals, the care of the aged and of orphans, and other forms of social service. The Sisters have operated in Australia since 1846.

The original homestead was built in 1878 by John Busby, son of George Busby, who was a surgeon. In 1909, it was purchased by the Hon John Meagher and gifted to the Sisters to be used as a Novitiate. Its name was changed to St Josephs Mount. It operated as an orphanage for girls from 1915 until 1975. The building has operated as a guest house since 2019 and is now known as Holmshurst.

The Institute of Sisters of Mercy (SoM) have engaged Western Project Services to bring the land at Lot 22, DP 1033481 (Attachment 1) into a 3 lot subdivision as per the approved Bathurst Regional Council DA/2020/50 (Attachment 2). The works will not include internal development of the lots. Lot 3 of this subdivision will then be divested by the property managers for the SOM, for future development by parties external to this package of works.

The main components of this project will be provisioning water and sewer to each newly created lot, minor kerb and gutter works, confirmation of existing suitable electricity and telecommunications provisioning or improvement to achieve the requirements of the DA for three lots, all of which is planned for execution over the next 6 to 12 months.

2.2 Requirements of the Vegetation Management Plan

This VMP has been prepared in accordance with specific direction given by Bathurst Regional Council in their letter to the client dated 15th June 2021. Condition 9 makes specific directions for the VMP as follows:

“A Vegetation Management Plan is to be prepared for the retention and preservation of “mature trees” on Lots 224 and 225. For the purpose of this condition, mature trees shall be taken to be:

- i) Trees located within the identified vegetation buffer zone between Lots 224 and 225; and*
- ii) Any other tree on Lots 224 and 225 that is greater than nine (9) metres in height.*

The Vegetation Management Plan should include:

- a) The identification of all existing mature trees within proposed lots 224 and 225 for the purposes of this condition;*
- b) A condition assessment of each of the trees identified in (a) by a suitably qualified arborist;*
- c) Recommendations for the retention or removal of each tree depending upon its condition assessment;*
- d) Recommendations for replacement plantings for those trees recommended to be removed;*
- e) A landscape plan for the maintenance and improvement of plantings within the vegetation buffer zone on proposed lot 224; and*
- f) Recommendations for the future protection of all retained and newly planted trees from subdivision and future building works within both lots 224 and 225.*

The Vegetation Management Plan is to be approved by Council and landscaping in accordance with part (e) of the Vegetation Management Plan is to be planted to the satisfaction of Council before the release of the subdivision certificate.”

Additional requirements from the client include:

The VMP will consist of a written report with an annotated site plan / aerial photograph at a sufficient scale to show the entire property including all development and environmental features covered by the conditions.

The VMP must relate to other onsite works (including earthworks), address the submission requirements of Bathurst Development Control Plan 2015 Part I2.1.5 and must include:

- a) A species inventory, identifying all species present within the restoration area, and whether native or exotic
- b) Assessment of condition of trees, using SULE (Safe Useful Life Expectancy)
- c) Assessment of condition of shrubs, including expected lifespan
- d) A detailed list of species suitable for replacing as plants become senescent or need to be removed for safety reasons, in keeping with the Heritage Conservation Plan for the site
- e) Other actions to maintain the integrity of the vegetated corridor, including management of the area immediately surrounding the plants

2.3 Bathurst Development Control Plan 2015

Under clause 13.3.2 (a) a Landscape Plan is required to be lodged with Council as part of the Development Application for the following types of development:

- iv) Subdivision of land which incorporates Agricultural Interfaces, Land Use buffers, Major Road buffers, Open Space, Environmental Protection Areas and/or **Vegetation Screens** as identified on any relevant DCP Map.

Clause 13.3.3 specifies the requirements of a vegetation screen, and this needs to be incorporated into the existing heritage landscape at St Josephs Mount (Table 1).

Table 1 Bathurst Regional DCP 2014 requirements for Vegetation Screens used in subdivisions

Bathurst Regional Development Control Plan 2014					
Landuse Control shown on the DCP Map	Applicable Development Control Plan Map	Dimensions and characteristics	Species Type/ Planting Characteristics	Planting Density	Timing of Planting
Vegetation screen	Map No. 8 – Gateway Enterprise Park.	- Screen width: minimum 20 metres. - Width of plantings: minimum 15m.	- Native trees. - Mature height of trees is to exceed 15m. - Existing mature trees to be retained where possible. - Planting is within the Vegetation Screen should include a mix of shrubs, medium and large trees. - The vegetation screen is to contain randomly placed plantings of tree, shrub and groundcover species with different growth habits and a maximum spacing of 5 metres.	- Trees to be planted in minimum of 3 rows. - Trees to be placed 4 - 5m apart.	Prior to issue of subdivision certificate.

The DCP further specifies referral to the Bathurst Vegetation Management Plan. Part B of the Bathurst VMP provides vegetation themes and management categories. Section 5.4 lists Theme Types, starting with 5.4.1 Heritage Conservation Areas. Also potentially relevant is 5.4.4 Exotic/Native mix.

Characteristics of the Heritage Conservation Area theme are as follows:

The vegetation in the Heritage Conservation Areas (HCAs) complements the cultural history of the area and is of an era that typifies early settlement in the Bathurst regional LGA. It is essentially exotic with autumn colours being a feature in the valley bound city, most notably in the main streets of Bathurst and the historic villages of Rockley, Perthville and Hill End.

Characteristics of the Exotic/Native Mix theme are as follows:

The vegetation has a blend of natives and exotics which may already be in existence in home gardens, the streetscape, parks and open space areas. The native vegetation in some instances are remnants of the Box-Gum Woodlands. The exotics include a wide spectrum of ornamental deciduous and evergreen trees, shrubs and groundcover species. The ratio of exotics to natives is variable, and the streetscapes, home gardens and parks tend to be informal in layout.

Appendix D of the Bathurst VMP provides a list of species suitable for planting, and also indicates species that are unsuitable, or unsuitable in some situations.

3 SITE CONTEXT

The subject site at 34 Busby St South Bathurst falls within the Bathurst & West Bathurst Heritage Conservation Area (Figure 2).

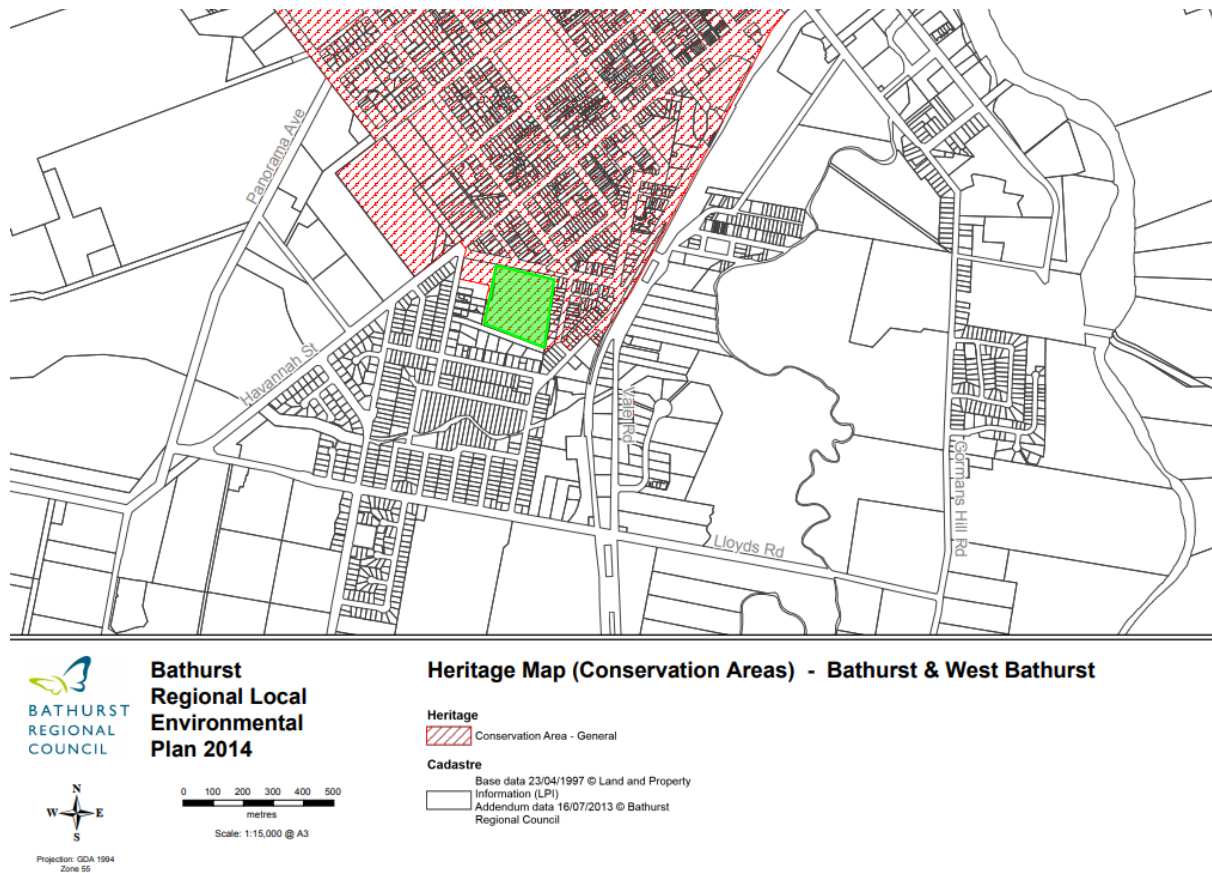


Figure 2 Extract from Heritage Map (Conservation Areas) Bathurst & West Bathurst (Bathurst Regional LEP 2014)

Ecologically, the area is highly disturbed through long term and ongoing urbanisation. The subject has a long history of disturbance associated with the various uses the property, including a family home/property, then the experimental farm, and more recently the home of the Bathurst congregation of the Sisters of Mercy. Over time the original holding has been reduced as subdivisions were created along Lewins St, Rose St and Prospect St, and the St Catherine's Aged Care Facility was constructed on the corner of Busby St and Prospect St (Figure 3).



Figure 3 Site context for St Josephs Mount showing areas of urbanisation adjoining the property (sixmaps)

No natural areas have been retained on the site. Almost all of the mature trees are introduced species, and the few mature native trees present have been planted. In recent years there has been some planting of native trees and shrubs in clusters around the midslope section of the property, and in a very narrow band along the eastern and southern boundaries.

A drainage easement runs along the southern boundary and consists of a formalised grassed swale with a series of rock gabion berms to moderate the flow of stormwater through the area. This is not a mapped drainage line and does not normally have baseflow or standing water in ponds along the channel.

3.1 Conservation Management Plan

A Conservation Management Plan (CMP) was prepared for the site by Ray Christison from High Ground Consulting, dated 15.3.2021. This includes several sections that are relevant to the preparation of the VMP for the site. These are reviewed in sections 3.2 and 3.3 of this VMP.

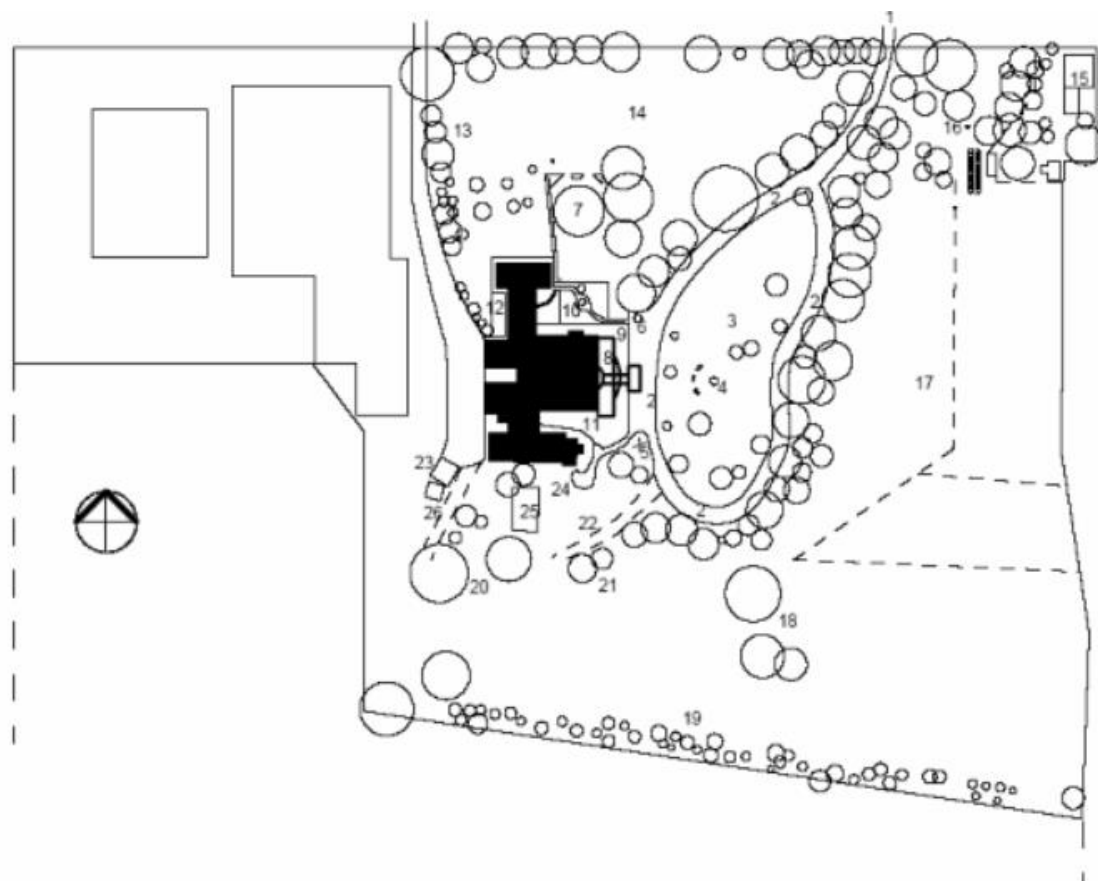
3.2 Physical evidence - Landscape

Section 3 of the CMP describes the existing condition of the site, based on physical evidence. Subsection 3.1.7 describes aspects of the exterior landscape within a heritage conservation context. The property landscape is described as follows:

The site generally slopes towards the south and the east, affording views across the township of Bathurst to the distant horizon. Three boundaries have residential development and an aged care

facility on land that previously formed part of the property. The northern boundary fronts Busby Street and has mature plantings along it, obscuring views into the site from the street. Within the site there are distinct areas, contrasting the continuous bands of substantial vegetation creating shade with the broad open swathes. Ornamental and utility garden areas contribute to the landscape that wraps full around three sides of the building complex. The main landscape features are identified in Figure 4.

Many of the landscape features described in this section are built features and formal gardens, utilitarian areas and commemorative religious items which are largely outside the scope of this VMP. Many of these contribute to the heritage values of the site and need to be managed in a manner that promotes their ongoing conservation.



KEY

1	Busby Street boundary + plantings	14	Northern open area
2	Driveway + mature plantings	15	Gatekeeper's cottage (28 Busby St)
3	The Oval	16	Glade
4	Statue of St Joseph	17	Eastern open area with u/g services
5	Calvary	18	Specimen trees
6	Statue of Christ	19	South boundary mixed plantings
7	Labyrinth	20	Mature trees
8	Parterre	21	Materials storage
9	Terraced garden	22	Site access
10	Ornamental garden 'Memorial Garden'	23	Sheds & utility storage
11	Chapel garden	24	Grotto
12	Kitchen garden	25	McAuley House
13	Western boundary plantings	26	Site of former stables

Figure 4 Extract from CMP: Figure 3.5: Plan of the grounds with a list of plants and features (Roseanne Paskin 2007), p. 87

Tree groupings and open areas are the most relevant for this VMP (Figure 5).

3.1.7.8 Tree groupings and open areas

Other than the distinctive row plantings along the driveways and the northern street boundary, there are other notable tree plantings. A large Elm tree (*Ulmus glabra*) and two Canary Island Pines (*Pinus canariensis*) form an imposing group in an otherwise unplanted section of the property. Other large pine tree specimens dominate a well-spaced group planting to the south west of the Chapel and McAuley House, adjacent to the garage shed. The southern boundary, adjacent to a fenced easement has been more recently planted with a double row of mixed, mostly native, species. This planting and easement provide a buffer to the adjoining residential development that has been built on land that previously formed part of the property.

Figure 5 Extract from Conservation Management Plan, p. 95

One of the Canary Island Pines has since died, and the Elms are an ongoing potential reservoirs for infection with the Elm Beetle which has been causing considerable damage to planted heritage Elms around Bathurst. These will be located on the separable Lot 224. Other features of the lower part of the original lot are described below (Figure 6). Disturbance associated with installation of utilities will be focused in this area.

Nearly one-half of the area of the property is composed of broad open areas. From the rear boundary of the gatekeeper's cottage in the north eastern corner the remainder of the eastern third of the property is open. It has a moderate even slope to the eastern boundary, generally draining towards the north east with the southern part draining towards the south eastern corner. It is traversed by a network of sewer drainage pipes that connect to the properties to the east and south of the property; several inspection points are also installed.

Figure 6 Extract from Conservation Management Plan, p. 95

The CMP identifies the age of the landscape elements as around 1880s, or about 140 years old (Figure 7). Many of the trees are much younger than that but help to define the character of the site today (Figure 8).

The fabric of the landscape elements mostly dates from the establishment of the property as a grand home in the later part of the nineteenth century. An early photo of Logan Brae taken about 1880 shows the two storey mansion with a sweeping kerbed gravel carriageway leading to its front entry; some substantial shrub planting lines the edge of the driveway.

Figure 7 Extract from Conservation Management Plan, p. 95

The now-mature coniferous plantings that edge the outer perimeter of the driveway superseded these shrubs and are in a mature to over-mature state with some showing loss of vigour; they are a major component of the landscape within the site.

Other main plantings include the mature plantings along the north and western boundaries. Most of them are showing signs of deterioration likely due to poor soil conditions and to the prolonged period of continuous dry seasons. These boundary plantings, together, with the driveway avenue trees, create a wide encircling embrace around the main building complex and its adjacent gardens and graded open swathe.

Figure 8 Extract from Conservation Management Plan, p. 96

3.3 Conservation Policies for a Sustainable Landscape

Section 7 describes conservation policies and guidelines that apply to the proposed subdivision site, with section 7.3 providing Policies for a Sustainable Landscape, including design rules and landscape practices. Central to this is the following (section 7.3.1.1, p.126):

- A 20 metre buffer zone must be established within Lot 224 along its boundary with Lot 225. This zone must be reserved for planting of large trees and understorey to reinforce existing plantings within Lots 224 and 225 and create a visual barrier between St Joseph's Mount and the adjoining property.
- Establish a vegetation management plan to ensure the ongoing sustainability of large tree plantings within Lot 224 (this plan).
- Boundary fencing must reflect the rural character of the existing boundary fences of St Joseph's Mount. Fencing may be post and rail or post and wire. Wire mesh may be used to contain animals.

Other key policies relate to:

- **Minimise disruption to the landform and existing drainage patterns** (section 7.3.1.2). This has been achieved by retaining trees and other vegetation as a priority, unless there are safety reasons for removal, or the species are considered weedy in the region.
- **Minimise disruption to the existing vegetation** (section 7.3.1.3). Potential disturbance may occur during the removal of unsafe trees or weedy shrubs/trees. As long as the removal is conducted in a manner that minimises impacts on surrounding vegetation, any impacts will be minimised.
- **Minimise effects on neighbouring areas** (section 7.3.1.4). Retention of trees and vegetation, and replacement or supplementing where appropriate, will help minimise impacts on surrounding areas and visual amenity of these.
- **Maximising the role of plants in the landscape** (section 7.3.1.5). This policy includes recommendations for using plantings to reduce impacts of the ambient climatic conditions, selecting species suitable for a range of microclimate conditions and creating the vegetation screen. This plan aims to minimise changes to the overall character of St Josephs Mount following subdivision, including retaining the circular driveway at the front of the Mount, retaining the open space areas, while establishing the required vegetation 'green' screen along the subdivision boundary. Species selection is guided by species that are on site – to retain the existing character, and supplemented with species that are typical of heritage properties and locations and/or suitable for public access spaces. The recommended species list is further informed by Bathurst Regional Council's Vegetation Management Plan (Molino Stewart 2018)
- **Minimise lawn** (section 7.3.1.6). This is a generalised recommendation based on the maintenance requirements, however, consultation with representatives from Sisters of Mercy and the new tenants for St Josephs Mount revealed the preference to retain as much of the existing lawn open space as possible.
- **Detaining and reusing stormwater** (section 7.3.1.7). The CMP recommends to "Slow down flow rates where possible to reduce possible erosion and to utilise the water. This means less reliance on supplementary watering and irrigation". Mechanisms recommended to manage stormwater on site include vegetated filter strips, drainage swales and filter strips, and soak areas. There are established drainage systems on the existing Mount property and these will continue to function following subdivision. The existing drainage swales and

vegetated strips will be located on the newly created lot and were designed to be fed by the rainwater tanks which collected water from the main house, with another swale fed by grey water from the laundry. Neither of these systems appear to have been properly designed and sized, and neither are currently functioning because of changes to the availability of source water. Supplementary water can be channelled into the main set of drainage swales from the mains water system, however, this is costly and negates the purpose of the swales.

- **Efficient irrigation** (section 7.3.1.8). The CMP recommends “Only install irrigation systems if it is needed.” New plantings will need establishment phase watering but should not be reliant on ongoing irrigation, therefore an irrigation system is unlikely to be required
- **Repair or prevent ongoing problems** (section 7.3.1.9). In the context of this VMP this involves removal of unsafe trees and inappropriate (weedy) species
- **Lifestyle of the occupants** (section 7.3.1.10). The property owners and the new tenants for Lot 224 (the Mount) were consulted during the preparation of the VMP.

Section 7.3.2 provides recommendations for Landscape Practices, including:

- Soil preparation
- Pre-planting
- Planting, including stock selection and planting techniques
- Ongoing plant care, including maintenance period, watering, weed removal, moderating plant growth, removing tree stakes
- Mulching
- Long term maintenance regimes
- Other items

Appendix Two of this VMP provides information about best practice actions for weed control and Appendix Three provides information about best practice actions for revegetation planting and maintenance.

4 METHODOLOGY

4.1 Site surveys

The site was assessed from two viewpoints. An arborist assessed the condition of all of the trees (as per the definition provided by Bathurst Regional Council, see Section 3.2). An ecologist assessed the vegetation structure and composition of the remaining vegetated areas. Site visits were undertaken on 20th October and 5th, 8th, 12th, 15th November 2021. This included meeting with Sister Patricia from the Sisters of Mercy to gain an understanding of the development of various components of the vegetation on site, and with the new tenant of property that is now called 'Logan Brae'. A caretaker lives on site and he was consulted during the process.

4.2 Strategies for vegetation management

Consultation with representatives from the Sisters of Mercy provided background to the development of the various formalised sections of the property. Gaining an understanding of the intent for each section helped to inform the direction for management of vegetation into the future. Consultation with the new tenant provided information about the general capacity to manage the site and preferences for outcomes for the future. Consultation with the caretaker/groundskeeper helped to identify problem areas or potential problem areas that would need management in the future. From this, a set of strategic approaches were developed, in keeping with stakeholder preferences and directions provided by Bathurst Regional Council:

- Retain all vegetation as a preference
- Remove all invasive species (predominantly woody weeds)
- Remove all dangerous trees (includes trees likely to become dangerous during the lifetime of this VMP)
- Reduce the presence of high maintenance trees, such as Elms which require annual treatment for the prevention of Elm Beetle infestation
- Supplement existing plantings in the area designated as the 'green screen/green corridor'
- Continue to manage vegetable gardens, orchard areas and open spaces
- Continue to manage formal gardens around the buildings

Site surveys were used to underpin the development of a species list for revegetation, and includes a mix of native species and exotic species that are already present on the site

5 SITE MANAGEMENT – MANAGEMENT SECTIONS

The subject site is quite large and has had a number of different vegetation strategies applied over the years. Each of these contribute to the existing character of the property. These have been identified through consultation with the Sisters of Mercy (Sister Patricia) and the new leaseholders for Logan Brae, and management actions have been developed individually for each section.

5.1 Lot 224 (St Josephs Mount)

The following management areas are identified for the proposed Lot 224 (Figure 9):

- 1) Western boundary tree plantings (arborist)
- 2) Vegetable gardens, nursery, labyrinth, orchard plantings, grassed open space

- 3) Lower entrance trees (arborist)
- 4) Lower entrance screening plantings (ecologist)
- 5) Driveway screening trees (upper section; arborist)
- 6) Driveway screening trees (lower section; arborist)
- 7) Driveway screening plantings (lower section, ecologist)
- 8) Southern screening plantings (Christ on the Cross garden)
- 9) Southern screening plantings (grey water wetland)
- 10) Oval trees (arborist)
- 11) McAuley Cottage trees (arborist)
- 12) Southern boundary trees (arborist)
- 13) Western boundary trees near tanks and sheds (arborist)

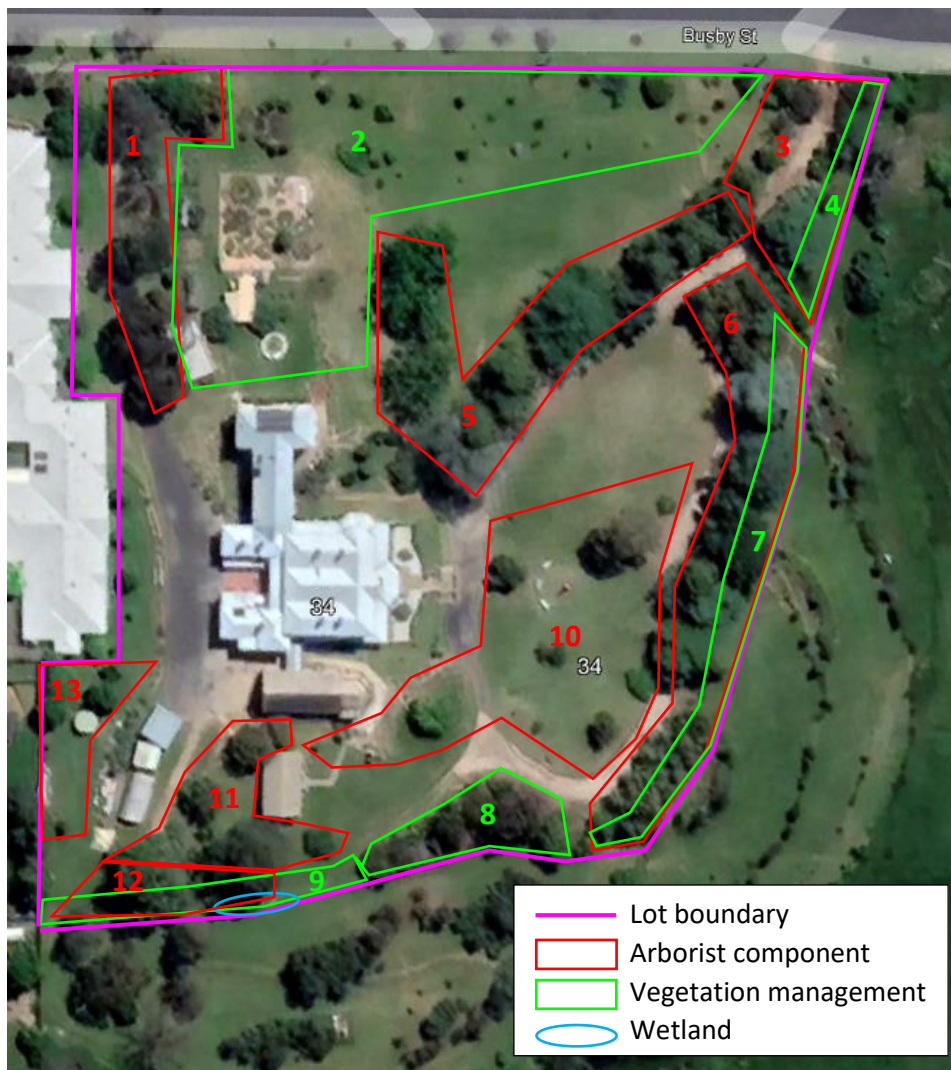


Figure 9 Vegetation management areas for Lot 224

Management actions for each of the identified management areas are provided in Section 6.2 of this plan.

5.2 Lot 225 (Separable lot for development)

The following management areas are identified for the proposed Lot 225 (Figure 10):

- 1) Northeast corner trees (arborist)

- 2) Northeast corner general ecology (ecologist)
- 3) Planted native gardens on contours (ecologist)
- 4) Wetland gardens (ecologist)
- 5) Southern boundary tree plantings (arborist/ecologist)
- 6) Mature trees (arborist)



Figure 10 Vegetation management areas for Lot 225

Management actions for each of the identified management areas are provided in Section 7.2 of this plan.

6 MANAGEMENT ACTIONS (THE VMP)

All the trees within the lots were numbered during surveys. Where appropriate these were grouped, and management actions prepared for the group as a whole. Individual trees requiring specific actions (eg. removal, pruning etc) were treated separately but within the group.

Revegetation is recommended for a number of management areas. Species lists additional screening and for replacement plantings in various locations are provided in section 6.5 of this VMP.

6.1 GENERAL MANAGEMENT OF TREES

Most issues affecting tree health can be avoided with the protection of the tree's Structural Root Zone (SRZ) and consideration of other activities within the Tree Protection Zone (TPZ).

If the TPZ has been encroached, then compensational areas can be allowed, and the tree will maintain its vitality and vigor. Where the SRZ has been encroached then additional actions may need to be undertaken to ensure the stability of the tree, such as monitoring on a regular basis.

This VMP has recorded trees that may be of concern and therefore require monitoring as a minimum.

Standard tree management can be largely done with the use of arborist mulch and an appropriate water regime. Arborist mulch must be from a known source to limit the possibility of introducing diseases or pests. Hardwood mulch is preferred and laid to a depth of 150mm with the area near the trunk free from mulch. This should cover the SRZ which is determined from the tree diameter 1.2m from ground. This diameter is then put into the following formula to determine the radius of the SRZ.

$$(d \times 50)^{.42} \times 64 = SRZ$$

Over watering is as harmful as under watering and the soil moisture at the root zone should determine the amount and timing of watering.

Most damage to trees and reduced life is attributed to long term inappropriate pruning. Canopy lifting to accommodate mechanized mowing is a management action that should be part of the formative stage of a tree's development, not in later life.

6.1.1 Elms and management of Elm leaf beetles

Many of the mature Elms on site show dieback or death of the mature stems, with regrowth sprouting from the base. As well, the wetland ponds have become weed beds for elm saplings. All elms should be removed unless they are deemed worthy of treatment for elm leaf beetle. Management of Elm leaf beetle reservoirs is vital to preventing further loss of mature/heritage listed Elm trees across the City of Bathurst

Arborist mulch

What is arborist mulch? Arborist wood chips are the best for mulching trees and shrubs. Arborist wood chips are ground up when older trees are pruned or removed. They include both green parts (leaves) and brown (woody) parts. They have some large and some small pieces.

In areas where trees are a dominant feature of the landscape, arborist woodchip is one of the better mulch choices for trees and shrubs. Studies have found arborist woodchip to be one of the best performers in terms of water infiltration, moisture retention, temperature moderation, inhibiting weed growth and stimulating microorganism activity, to name just a few.



Early treatment is essential and can include trunk injection with Imidacloprid® which is the most effective and environmentally sound option. The insecticide is injected directly into the trunk of the tree. Cost for a single tree can range from \$150 – \$280 +GST and is required every three years if other elms are removed. The removal of other elm saplings should precede any treatment for elms remaining. Trunk injection is safe around children, pets and riparian situations.

6.2 LOT 224 (St Josephs Mount/Logan Brae)

Key management principles:

- Retain and maintain all trees within this lot, unless otherwise directed by arborist
- Retain and maintain all formal gardens within this lot in current or better condition
- Maintain all vegetable gardens and fruit trees within this lot as appropriate for future use

6.2.1 Western boundary tree plantings (includes Arborist Group 6)

This group consists of seven trees, of which one tree (tree 134) will require removal. This tree has numerous trunk wounds possibly from wood borers and the almost nonexistent canopy cannot sustain the tree through this insect attack.

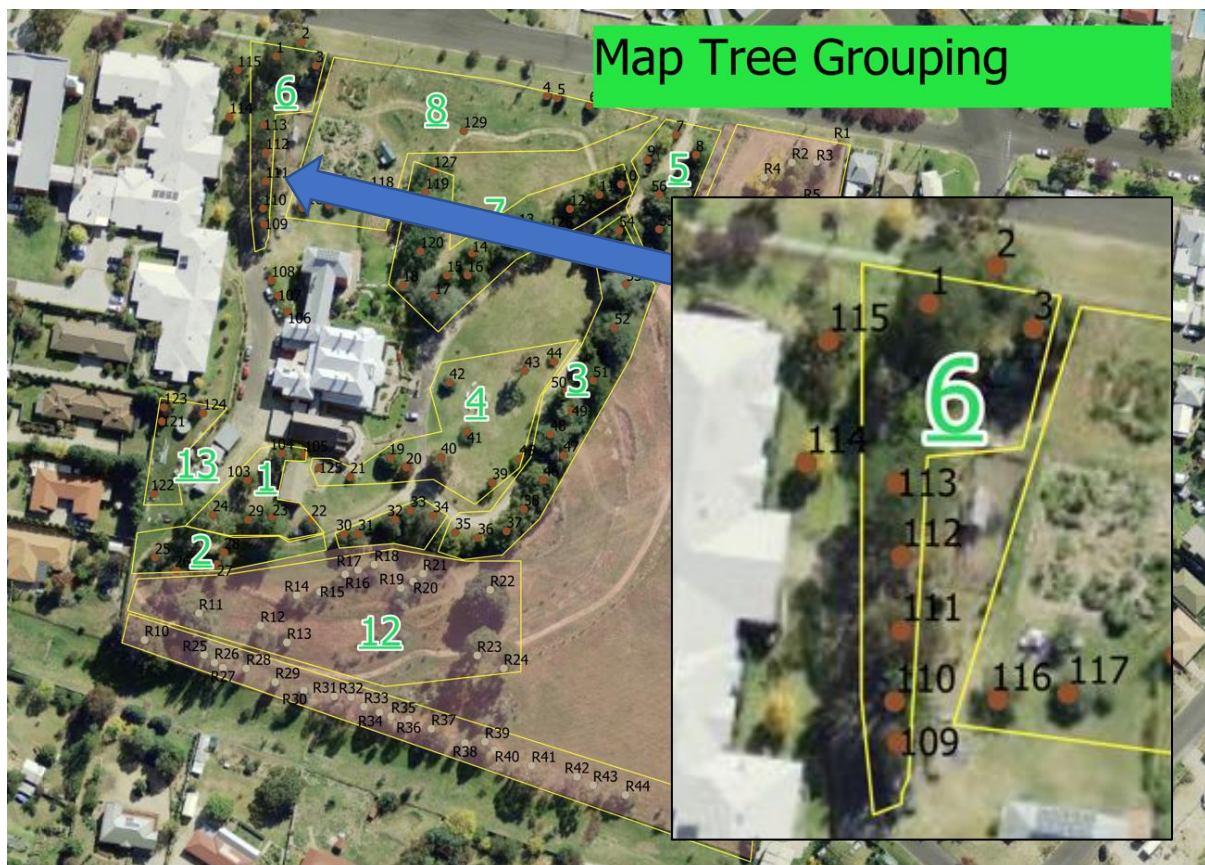


Figure 11 Location of Arborist tree grouping #6 on the western boundary entrance

The Chinese Elm (tree 3) also is showing signs of stress. This area would greatly benefit from a mulch layer and removal of lawn. The changed hydrology due to recent water redirection may have also affected the trees.



Figure 12 Tree 134 has numerous trunk wounds possibly from wood borers, while Tree 3 is also showing signs of stress

Southern Blue Gums (*Eucalyptus bicostata*) were a common choice for ‘native revegetation’ in the past, mainly due to their fast growth. However, they can be problematic in urban areas. They have not been pruned to prevent multiple stems and will require risk assessment and potentially should have exclusion zones in high winds. Although tall they are still showing a young sapling form that is prone to branch drop in winds. They are a valuable habitat tree and worth the effort to retain.



Figure 13 *Eucalyptus bicostata* trees along the western entrance need to be pruned and monitored

Table 2 Management actions for Western boundary tree plantings

TREE #	ACTIONS
Tree 1	Remove
Tree 3	Remove lawn from around base and apply arborist mulch; monitor
Trees 109-113	Selective pruning to reduce potential for branch drop, monitor

6.2.2 Vegetable gardens, nursery, labyrinth, orchard plantings, grassed open space (includes Arborist Group 8)

From the CMP:

“A large gardening complex has been developed between the Novitiate Wing and Busby Street frontage. This complex includes a potting shed, green houses, an outdoor shelter with wood fired pizza oven and extensive vegetable beds.”

Generally, these areas should continue to be managed as they have been in the past. Vegetable gardens and nursery areas were established as community/permaculture gardens, with the orchard plantings aiming to supplement the gardens as a source of seasonal fruit and vegetables. Ongoing community involvement is considered an integral part of the management of this section.

“A contemplative labyrinth is located on a terrace to the east of this complex. The labyrinth, recorded in its original form in 2007, has been reconstructed with white bricks. The labyrinth is based on the design of one on the floor at Chartres Cathedral and is another element within the grounds that allows for personal contemplation and insight”

Ongoing maintenance for the labyrinth includes mowing the lawns and maintaining the brickwork.



Figure 14 Location of Arborist tree grouping #8 on the western boundary entrance

General maintenance of the trees 4-6 lining the Busby St fence is required. The remainder of the trees noted for this area do not meet Council’s definition (9m minimum height).

Consultation with Sister Patricia flagged a couple of items:

- Some grape vines were planted by Sister Kathleen Williams from her grandfather's property in Wellington.
- A small Eucalypt (tree 129) with a pink tree guard was planted for Bill Allen Snr by the Wiradjuri elders as a memorial to his life.



Figure 15 Location of commemorative planting for Bill Allen Snr, Wiradjuri elder

Table 3 Management actions for vegetable gardens, nursery, labyrinth, orchard plantings, grassed open space

LOCATION	ACTIONS
Vegetable gardens	Continue to manage as community based permaculture gardens
Nursery	Continue to manage as part of the community vegetable gardens
Orchard	Continue to manage fruit trees, including monitoring for diseases, pests etc and treat accordingly
Labyrinth	Continue to manage lawns and brickwork
Between gardens and orchard	Remove Cotoneaster shrubs

6.2.3 Lower entrance trees (includes Arborist group 5)



Figure 16 Location of Arborist tree grouping #5 on the eastern driveway entrance

These trees line the original entrance to the property. The trees are exotics and in poor health. The replacement of these trees in the short-term is recommended. They have many faults largely due to inappropriate pruning. There are numerous basal epicormic growths and evidence of root rot.



Figure 17 Trees at the entrance to the lower driveway have many faults including poor canopy and significant basal epicormic growth



Figure 18 Scarring by lawn mowers has resulted in root rot

Tree 56 was over pruned as a low branching large tree and has since died. This needs to be removed.

Table 4 Management actions for lower entrance trees (arborist)

TREE/LOCATION	ACTIONS
Trees 7-9, 56	Remove existing trees, replace with appropriate species from planting list as per revegetation diagram
Tree 55	Application of adequate water and arborist mulch

6.2.4 Lower entrance screening plantings (ecologist advice)

Removal of trees 7, 8 and 9 will create space for planting screening plants.

- Plant using large shrubs/small trees with dense foliage according to revegetation planting diagram
- Create mulch beds using arborist mulch to reduce maintenance over time
- Undertake regular maintenance of plantings including weed removal from planting beds
- Mow around planting beds on a regular basis to reduce the presence of seeding grasses and weeds

6.2.5 Driveway screening trees (upper section; includes Arborist group 7)

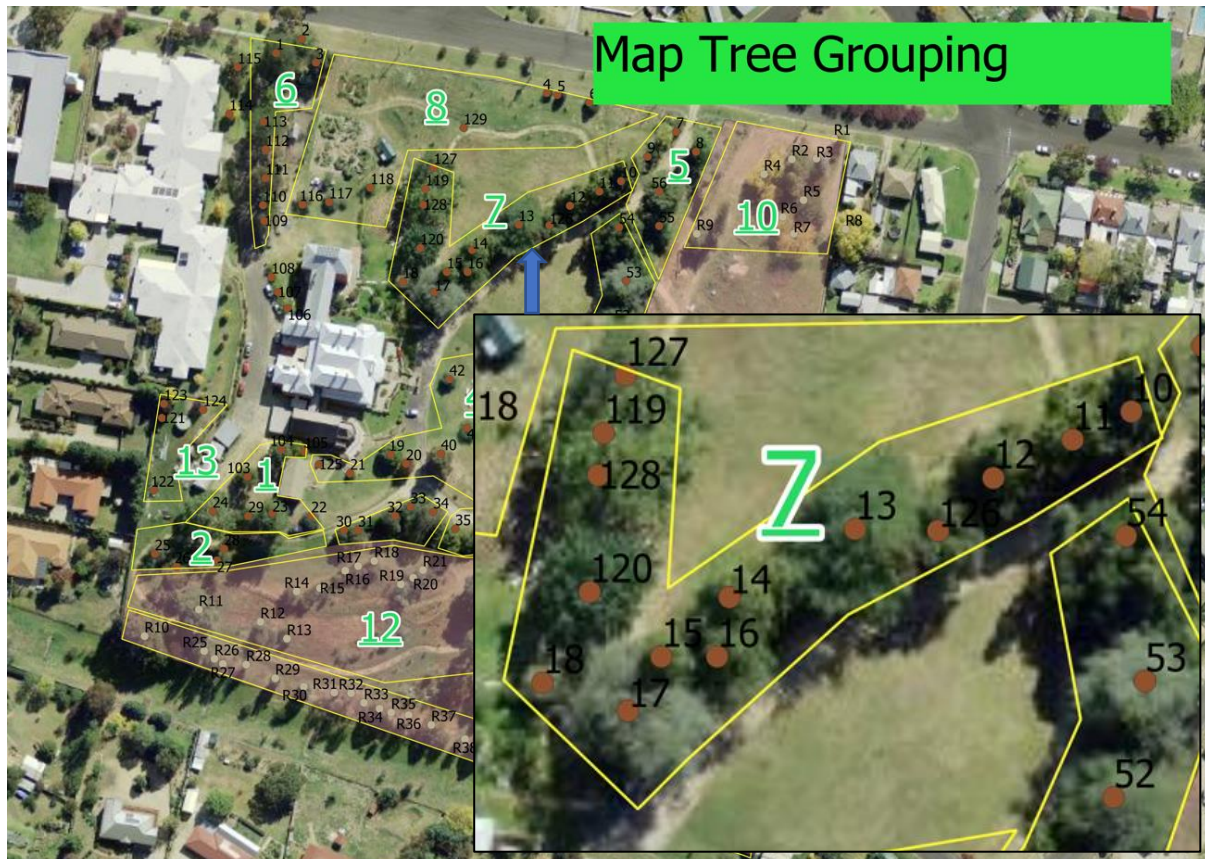


Figure 19 Location of Arborist group #7, on the upper (western) side of the formal sweeping drive to the front entrance

This part of the property contains some of the more spectacular trees for the Bathurst area. An avenue of four Oaks is planted in a north south direction (trees 127, 119, 128, 120; Figure 20).



Figure 20 An avenue of four oak trees has been planted to separate the formal front area from the vegetable gardens and informal communal areas

The selection of exotic trees planted on the north side of the sweeping driveway to the formal front entrance form an avenue (Figure 21). Again, crown lifting by inappropriate pruning has caused extensive trunk damage. This will need to be assessed for effect on tree stability.



Figure 21 Cedars form an avenue of trees along the sweeping driveway to the formal front entrance

A self-sown olive tree (tree 126) is in poor health and should be removed.



Figure 22 A self-sown olive tree is in poor health and should be removed

Table 5 Management actions for driveway screening trees, upper section

TREES	ACTIONS
Tree 126	Remove (Olive tree)
Trees 10-17	Monitor for disease and structural damage following inappropriate pruning
Throughout	Infill driveway planting should be undertaken from the list of species provided in section 7.4

6.2.6 Driveway screening trees (lower section; includes Arborist group 3)

This includes trees 35-38, and trees 46-54.



Figure 23 Location of Arborist group #3 on the lower side of the formal front driveway

Thirteen mixed conifer species on the south side of main driveway currently provide most of the vegetative screening between Lots 224 and 225. They are the main feature to be observed from the surrounding area and form an important part of the heritage value for the property's green space.



Figure 24 Thirteen trees on the south side of the driveway currently provide most of the vegetative screening between Lots 224 and 225

All trees are exotic and were planted by the novices when they resided at the grounds from 1907. In 1906 Mr John Meagher MLC bought Logan Brae and donated it to the sisters of Mercy for use as a formation house and teacher training facility for young Mercy novices. Some trees have their own stories and as such are an intimate link to the people who lived there.

The Christmas of 1961 was a year the nuns requested to remove the top of a tall spruce tree (tree 53). Sister novice's mistress rightly denied them permission. However, God himself wanted that top removed. The tree was struck by lightning and the top fell out of the tree within a few days of the denied request. When comparing the two spruce trees (Tree 52 and 53) side by side the missing top is obvious (Figure 25).



Figure 25 (left) the two spruces – one without its top; (right) novitiates outside the chapel building



A Cork oak tree (Tree 54) at the beginning of the driveway is a particularly good specimen and deserves attention to preserve it (Figure 26). Cork oak trees (*Quercus suber*) are native to the Western Mediterranean region, and are still cultivated there for their bark. It is the primary source of cork for wine bottle stoppers and other uses, such as cork flooring and as the cores of cricket balls. These trees are slow-growing giants, eventually maturing to 70 feet (21 m.) or taller and equally wide.

Figure 26 The Cork oak tree (Tree 54) at the beginning of the driveway is a particularly good specimen

Table 6 Management actions for driveway screening trees, lower section

TREES	ACTIONS
Trees 35-38, 46-54	Water and apply arborist mulch, reduce lawn bulk around base of trees; monitor for signs of disease or major trunk damage following inappropriate pruning
	Remove dead stump from corridor Infill driveway planting should be undertaken from the list of species provided in section 7.4

6.2.7 Driveway screening plantings (lower section, ecologist advice)

Screening plantings need to be undertaken on the eastern side of the avenue of trees along the lower side of the front driveway. BRC's requirements are for a 20m wide strip, with minimum 15m planted trees and shrubs (Figure 27).

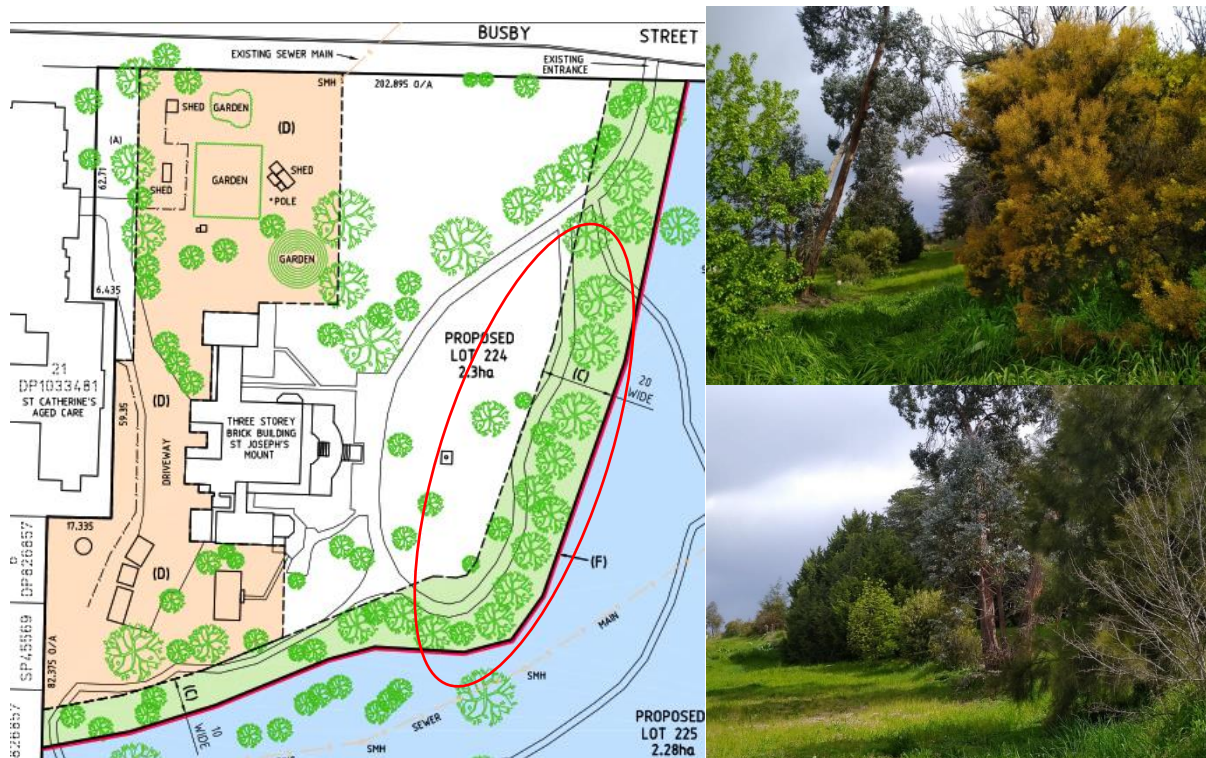


Figure 27 The vegetation screen needs to be about 20m wide in total through this area

In reality, the area indicated for the vegetated screen includes the driveway, reducing the available area for planting by 3 to 4m. Plantings should not be positioned within 2m of the boundary fence. Fencing should be completed before undertaking planting. Trees should be planted away from the fence to reduce impacts from branch fall. Dense shrub plantings need to be planted along the edge of the boundary fence.

Best species for planting are evergreen trees, although deciduous trees can provide better light penetration during winter months. Small trees and large shrubs should include predominantly evergreen species and preferably local native shrubs. Using a mix of predominantly local shrubs and small trees with a canopy of exotics dominated by conifers best suits the existing palette of plants on site. The challenge will be to establish plants under the shadow of the existing canopy trees.

6.2.8 Southern screening plantings (Christ on the Cross garden, includes trees #30-34)

This garden includes an overgrown rockery around the base of Christ on the Cross (Figure 28). Original vegetation included several Holly Oaks providing some shelter to the statue. Over time, woody weeds have become established, and are now smothering the statue. Weeds present include African Boxthorn, Cherry Laurel, Small-leaved Privet, Large-leaved Privet, Oleander, Blackberry, Vinca and others.

The rear section of this garden bed has been used as a stockpile area for green waste and other debris for considerable time. This may have provided a local source of weed seeds, and is definitely causing an impact by smothering the TPZs of the Holly Oaks.



Figure 28 (left) The original garden has become overgrown with woody weeds, (right) green wastes are stockpiled in the root zones of trees behind the garden

Table 7 Management actions for Southern screening plantings (Christ on the Cross garden)

TREE/SHRUB	ACTIONS
Rear of garden	Remove all stockpiled green waste and dispose of offsite
Throughout garden	Remove woody weeds by cut stump and paint, spot spray blackberry and Vinca
Holly Oaks	Apply arborist mulch and water as required
Vegetation screen	Infill plant using large shrubs/small trees Connect with screening vegetation plantings in the lower section of the driveway Establish garden bed using arborist mulch around the new plantings

6.2.9 Southern screening plantings (grey water wetland, ecologist advice)

As part of a transition to a more sustainable environment, the Sisters of Mercy installed a Greywater treatment reed bed around 10 years ago (Figure 29). This was designed to capture greywater from the laundry and treat it by passing it through a Cumbungi wetland, before piping it to the planted native gardens below (Figure 30). This is no longer functioning properly for several reasons. The inflow of water has been greatly reduced since the Sisters moved from the property, leaving the wetland reliant on rainwater to sustain its reeds. The pipe outlet structure is damaged, so that treated flows are no longer conveyed to the trees and shrubs below. Water that does reach the wetland is evaporated or infiltrated as subsurface flows. Low levels of input meant that there can only be low levels of output.

Woody weeds are present in the wetland, including Willows, *Prunus* sp and Poplar seedlings. These need to be removed, and some hydraulic processing reinstated.



Figure 29 A greywater treatment reed bed was installed around 2010 to treat laundry water



Figure 30 (left) greywater is treated in a Cumbungi wetland; (right) the pipe infrastructure needs maintenance if it is to function properly

Table 8 Management actions for Southern screening plantings around the Greywater Reed Bed

ACTIONS	RATIONALE
Reinstate inflows to the wetland	The wetland needs adequate inflows to sustain it through dry periods and prevent death of macrophytes
Remove woody weeds	Includes Willows, Prunus sp, and Poplar seedlings
Repair/replace outlet structure	This is necessary to ensure proper hydraulic functioning of the wetland, and to provide irrigation water to trees and shrubs nearby (note: these will be on a different lot)
Monitor water quality	This is to determine whether the wetland is functioning properly
Install fence	Ensures that fencing doesn't disturb roots of new plants
Vegetation screen	Infill plant using large shrubs/small trees Connect with adjoining screening plantings Establish garden bed using arborist mulch around the new plantings

6.2.10 Oval trees (includes Arborist group #4)

Includes trees #19-20, 39-44, and 125 located in front of Logan Brae house and the adjoining chapel (Figure 31). All except one tree are exotic species, and most do not meet the minimum 9m height criterion.

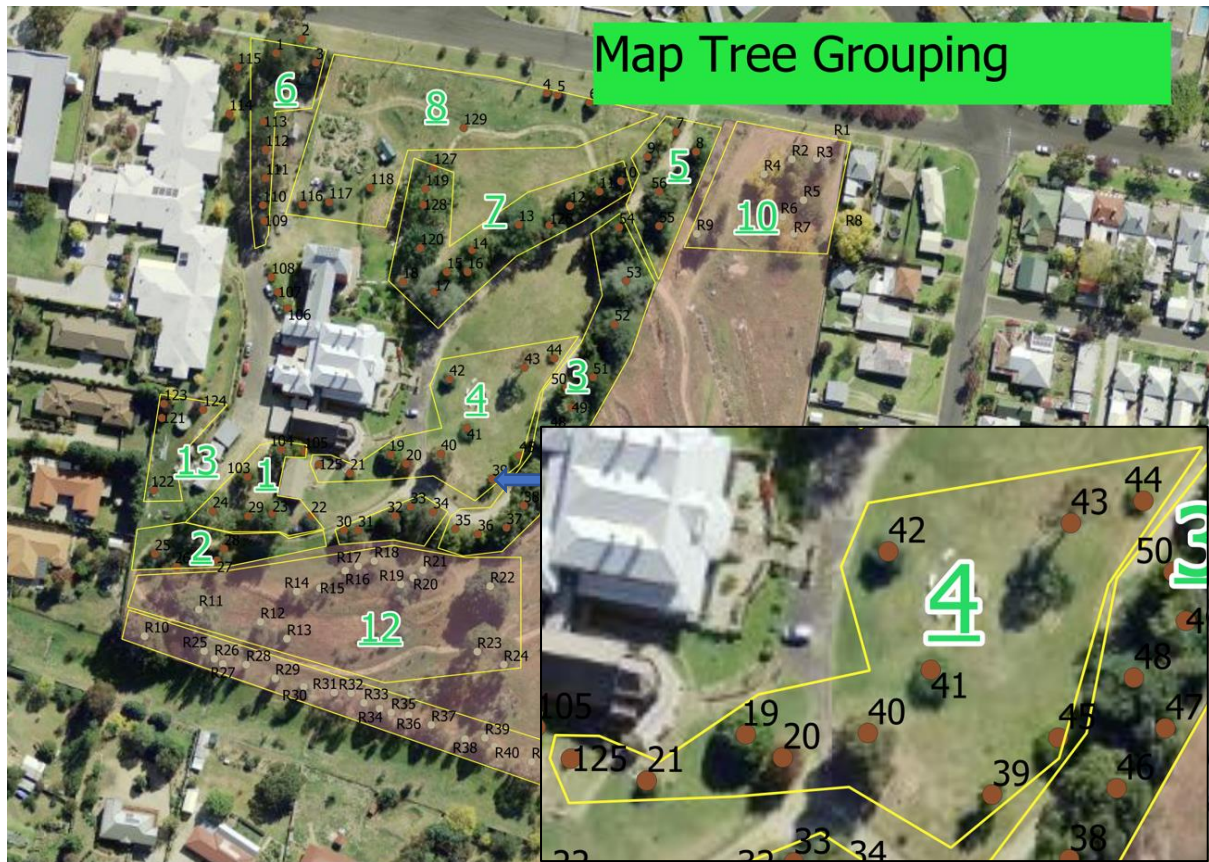


Figure 31 Location of Arborist group #4, on the oval outside the main house and the adjoining chapel

Tree 43 is a Eucalypt and has a name given to it by the nuns. A very large double-barreled Eucalypt stood where tree 43 stands. The original tree was struck by lightning. The caretaker at the time (Mr Van Borstenbosch) kept saplings that had sprouted when the original tree was eventually removed. He replanted the descendants of the original tree in its place. The nuns consequently called the tree Isaac after Abraham's son whose life was spared by God when Abraham was asked to sacrifice his son.



Figure 32 'Isaac' was planted after the original tree was struck by lightning

Tree 125 is a weeping spruce and is a tree worth preserving due to its unusual form. The nuns referred to it as the “upside down pine”.



Figure 33 The ‘Upside Down Pine’ outside the chapel

6.2.11 McAuley Cottage trees (includes Arborist group #1)
Includes trees #22-24, 29 and 103.

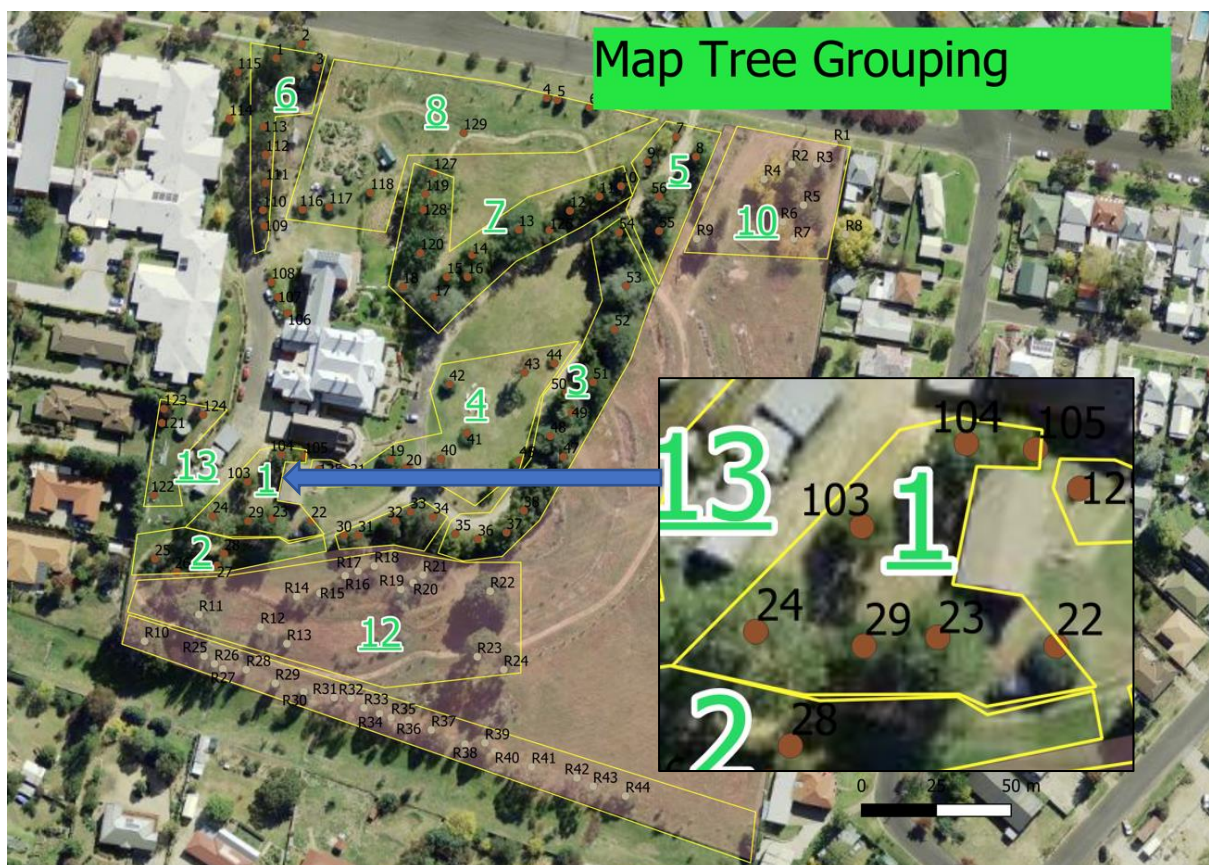


Figure 34 Location of Arborist group #1, located around the sides of McAuley Cottage

A mix of exotic trees and two Kurrajong trees with a total of 6 trees, and one cotoneaster (Tree 22). It is recommended that the cotoneaster be removed. One Kurrajong (Tree 104) has codominant trunks which show signs of separation. A large pine tree (Tree 24) is showing signs of deterioration possibly from altered drainage and digging for pipe laying undertaken within the SRZ. These two

trees should be monitored, and a full tree risk assessment done to determine the level of risk and the possible targets it would hit should it fail.



Figure 35 trees 24 (left) and 104 (right)



Figure 36 Cotoneasters need to be removed, and Tree 24 needs to be monitored as it is leaning

Table 9 Management actions for Group 1 trees and shrubs, around McAuley Cottage

TREE #	ACTIONS
Trees #24 and 104	Monitor for failure, undertake a full risk assessment
Tree 104	Consider pruning to lighten the load on the second trunk
Remove shrubbery	Remove Cotoneaster plant to prevent further invasion and establishment

6.2.12 Southern boundary trees (includes Arborist group 2)

Includes trees #25-28, located on the southern boundary of the new lot (Figure 37).

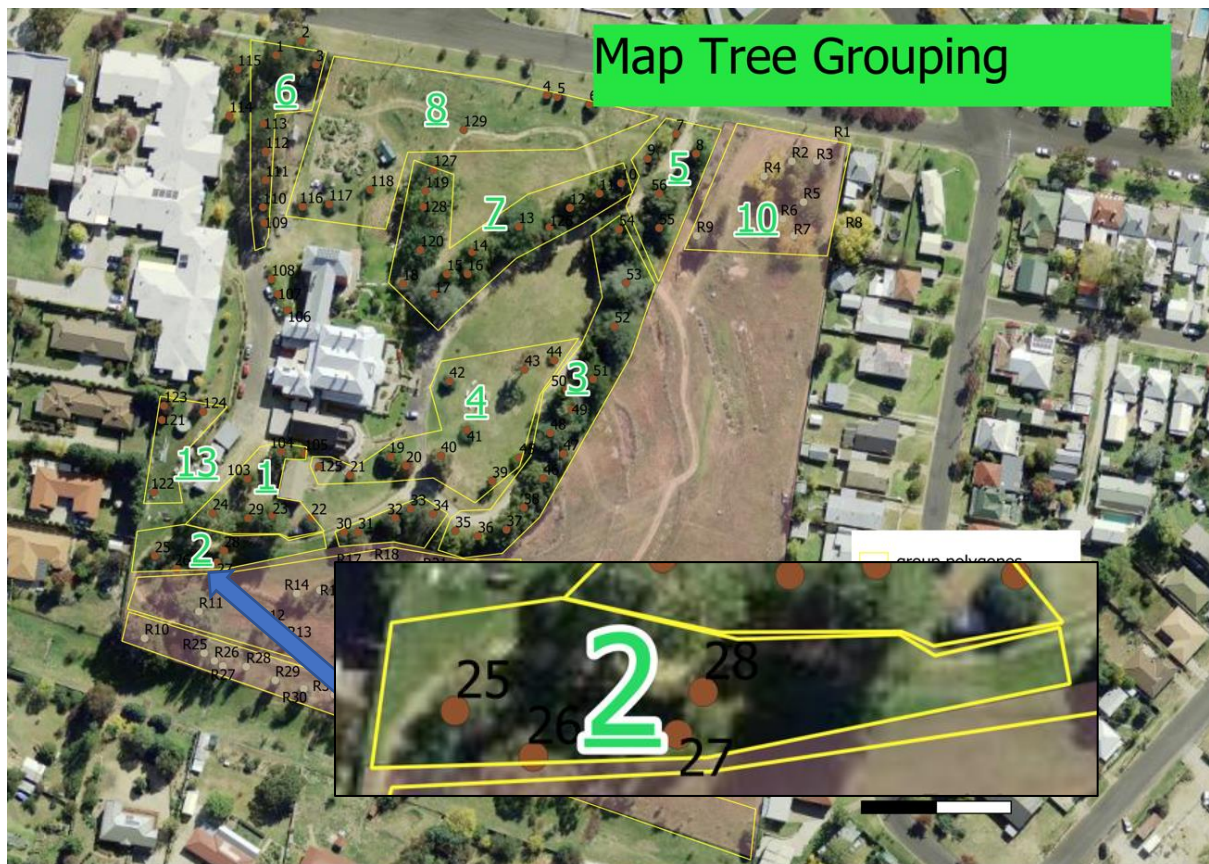


Figure 37 Location of Arborist group #2, located on the southern boundary of the new lot

Four planted eucalyptus small trees are part of 6 trees planted recently. The other two trees are in the area to be sectioned off from the original lot. In general, these four small trees are not in good health.



Figure 38 Trees #25 – 28 are Eucalyptus species that are generally of poor form

Table 10 Management actions for Southern boundary trees

TREE/SHRUB	ACTIONS
Trees #25-28	Monitor to verify ongoing health; apply arborist mulch and water as required
Vegetation screen	Infill plant using large shrubs/small trees Connect with screening plantings in adjoining areas on the southern boundary fence Establish garden bed using arborist mulch around the new plantings

6.2.13 Western boundary trees near tanks and sheds (includes Arborist group 13)

Includes trees # 121 to 124, located behind the water tanks and sheds (Figure 39). This group of four trees is at the rear of the site below St Catherine's Aged Care Facility. The three Fraxinus shrubs/trees and one Cotoneaster are of low value.



Figure 39 Includes trees # 121 to 124, located behind the water tanks and sheds



Figure 40 Tree 122 has trunk damage (left) and root damage, evidenced by the epicormic growth at the base of the tree

The Cotoneaster (tree 122) should be removed. The other three trees (123,124,121) have had inappropriate crown lifting and damage to exposed roots from lawn mowing activities. They will develop into dangerous trees and should be monitored as a minimum requirement now. Preferably these will be replaced too.

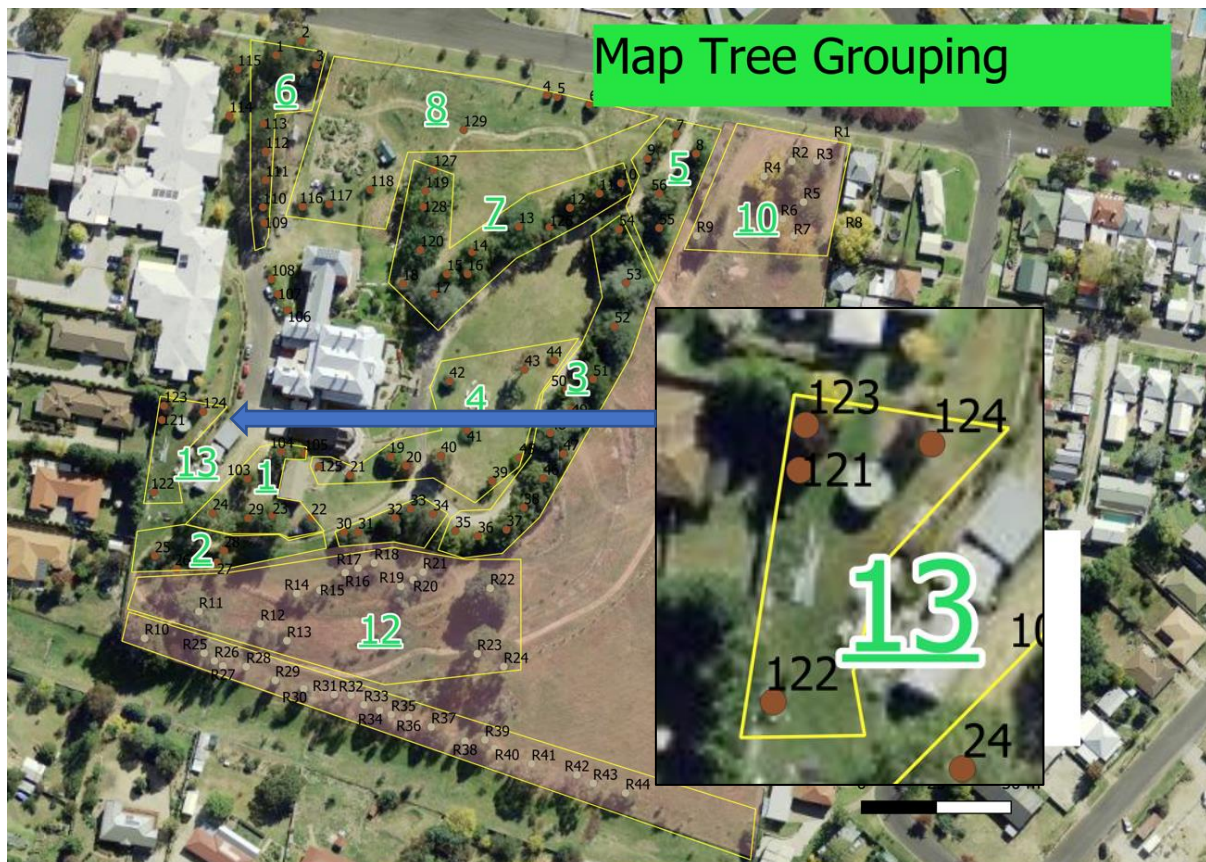


Figure 41 Location of Arborist group #13, located near the water tanks below St Catherine's

Table 11 Management actions for small trees on the western boundary fence

TREE	ACTION
Cotoneaster (tree 122)	Remove immediately
Fraxinus (trees 123-125)	Monitor, consider removing immediately, and replace with large shrub/small trees from the list provided in Section 6.5

6.3 Lot 225 (Separable lot for development)

The following table summarises requirements for tree management:

Table 12 Summary of arborist recommendations for management of trees and saplings on Lot 225

TREE #	SPECIES	HEIGHT	ARBORIST GROUP	ACTIONS
R1	exotic	6m	10	poor form, remove
R2	exotic	4m	10	poor form, remove
R3	exotic	9m	10	poor form, remove
R4	argyle apple	15m	10	consider removal to facilitate development
R5	exotic	11m	10	retain
R6	exotic	7m	10	poor form, remove
R7	exotic	8m	10	poor form, remove
R9	exotic	7m	10	consider removal to facilitate development
R10	dead		11	remove
R11	elm	15m	12	treat for elm leaf beetle annually
R12	eucalypt sapling	6m	12	Immature planting with low retention value, consider removal to facilitate development
R13	casuarina	5m	12	Immature planting with low retention value, consider removal to facilitate development
R14	Blakely's Red Gum	8m	12	Immature planting with low retention value, consider removal to facilitate development
R15	Yellow Box	8m	12	Immature planting with low retention value, consider removal to facilitate development
R16	Long-leaved Box	9m	12	Immature planting with low retention value, consider removal to facilitate development
R17	casuarina	6m	12	Immature planting with low retention value, consider removal to facilitate development
R18	Black Wattle	6m	12	Immature planting with low retention value, consider removal to facilitate development
R19	eucalypt species	6m	12	Immature planting with low retention value, consider removal to facilitate development
R20	eucalypt species	7m	12	Immature planting with low retention value, consider removal to facilitate development
R21	eucalypt species	8m	12	Immature planting with low retention value, consider removal to facilitate development
R22	dead			remove
R23	sugar pine	15m	12	consider removal to facilitate development

TREE #	SPECIES	HEIGHT	ARBORIST GROUP	ACTIONS
R24	dead			remove
R25	exotic	9m	11	retain as boundary plantings
R26	exotic	9m	11	retain as boundary plantings
R27	exotic	7m	11	retain as boundary plantings
R28	conifer	6m	11	retain as boundary plantings
R29	white poplar x2	12m	11	retain as boundary plantings
R29a	white poplar x10 young stems on fenceline	8-9m	11	retain as boundary plantings
R30	eucalypt sapling	5m	11	retain as boundary plantings
R31	Blakely's Red Gum	10m	11	retain as boundary plantings
R32	white poplar	9m	11	retain as boundary plantings
R33	white poplar	9m	11	retain as boundary plantings
R34	conifer	9m	11	retain as boundary plantings
R35	conifer	9m	11	retain as boundary plantings
R36	eucalypt species	12m	11	retain as boundary plantings
R37	eucalypt species	12m	11	retain as boundary plantings
R38	eucalypt species	12m	11	retain as boundary plantings
R39	eucalypt species	12m	11	retain as boundary plantings
R40	eucalypt species	10m	11	retain as boundary plantings
R41	eucalypt species	10m	11	retain as boundary plantings
R42	eucalypt species	8m	11	retain as boundary plantings
R43	eucalypt species	8m	11	retain as boundary plantings
R44	eucalypt species	8m	11	retain as boundary plantings

6.3.1 Northeast corner trees (Arborist group 10)

Includes trees # R1-R7, R9 (Figure 42). This area will be the main entrance to the block from Busby St. These are a group of conifers that have limited heritage value, and are surrounded by woody weed species that do not warrant any consideration for retention.

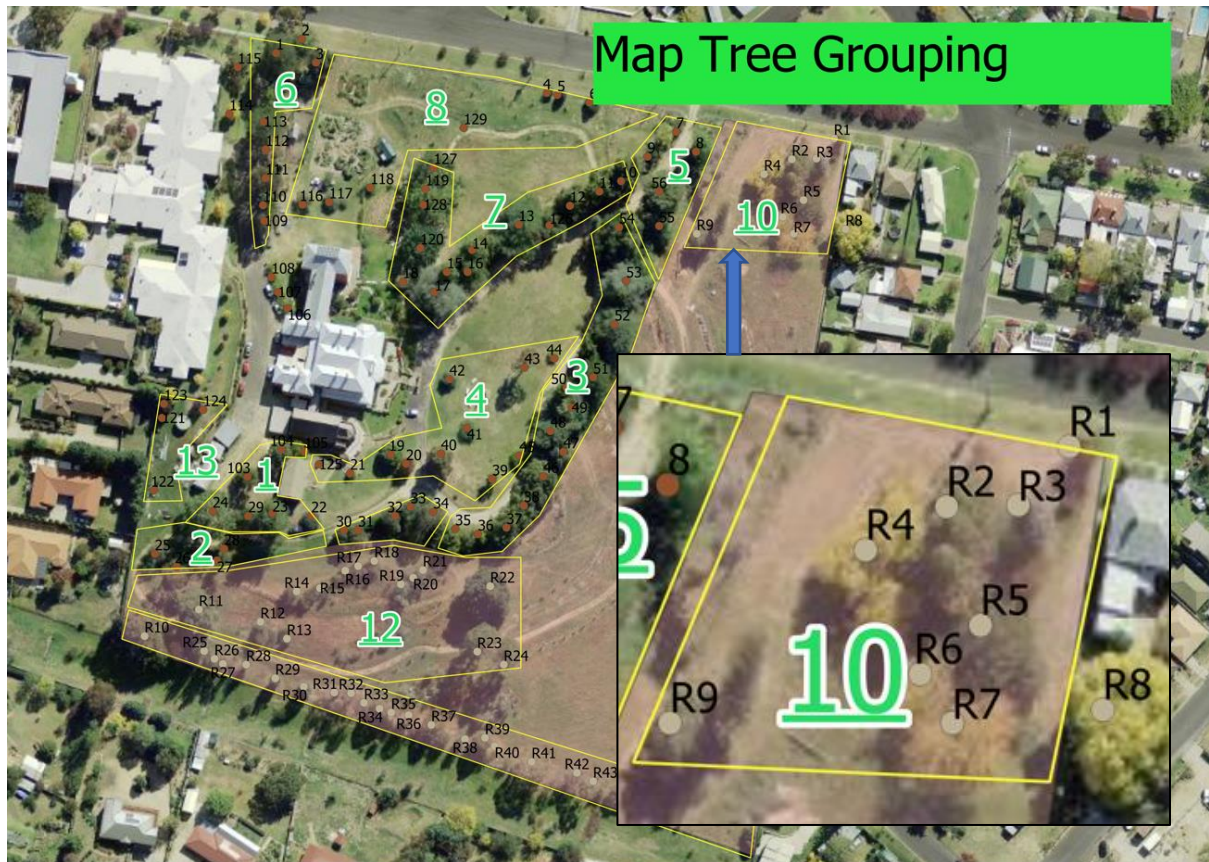


Figure 42 Location of management group 10 at the Busby St access for Lot 225

At some point there would have been mature Elms in this location, but these appear to have been infested with Elm leaf beetles, and the main trunks have died back, and now the trees are coppicing from the trunk base (Figure 43).

Tree R4 is a local native species, Argyle Apple (*Eucalyptus cinerea*) approaching maturity (Figure 44). Unfortunately, it developed multiple stems in early life, some with poor attachment, and there is evidence of loss of at least one trunk with ongoing branch drop. This tree normally forms a dense crown with good spread and is common in local parks and streetscapes. Tree R4 is likely to be very close to the boundary fence and subdivision access, and on this basis may warrant removal as it is in poor condition and could fall.



Figure 43 Mature Elms have died back, and now the trees are resprouting from the trunk base



Figure 44 Tree R4 is an Argyle Apple (*Eucalyptus cinerea*) with multiple trunks and evidence of branch and trunk drop

Table 13 Management actions for trees in the northeast corner

TREE #	ACTION
Tree R1 – R7	Remove trees as required to provide site access
Tree R4	Consider early removal to prevent damage to the subdivision boundary fence and blocking of site access
Tree R9	Remove compost bins from base of group of trees



Tree R9 is actually a group of 6 young conifers. These are in good condition, although may be affected by the compost bins located at the base of the tree at the southern end of the row. If the group is to be retained the bins should be removed and no further materials stored within the TPZ of the group. The trees have no heritage value due to their young age, and may need to be removed to provide good access to the proposed subdivision. The subdivision boundary is immediately west of this group of trees.

Figure 45 Tree R9 is actually a group of 6 young conifers with a row of compost bins located at the base

6.3.2 Northeast corner general ecology (ecologist advice)

There are numerous woody weeds in this area, including Large-leaved Privet, Common Hawthorn, Vinca, Golden Locust, Prunus sp, etc. These and other trees in poor health or with poor form should be removed as part of the creation of site access.

Consider screening planting on the western boundary as part of the vegetation screen to increase the width of the overall vegetation screening.

Table 14 Management actions for general ecology in the northeastern corner

ACTION	RATIONALE
Remove woody weeds	Comply with management requirements for priority control species; reduce seed sources on site
Plant trees and shrubs	Allocate space along the western boundary for additional vegetation screening plantings

6.3.3 Planted native gardens on contours (ecologist)

These consist of mixed local native plantings, including eucalyptus species and acacia species (Figure 46). Retain these if they can be integrated into the proposed subdivision development on the newly created lot. They have no heritage value and have limited ecological value. However, in 20 to 30 years they will provide stepping stone habitat within the urban environment. If these are located near the lot boundary they will provide good supplementary vegetation for the necessary green screen. On this basis they are worthy of retention.



Figure 46 Examples of the mixed local native plantings in garden beds on contours, with immature eucalypts and maturing acacias

Table 15 Management actions for general ecology in the planted native gardens on contours

ACTION	RATIONALE
Remove woody weeds	Comply with management requirements for priority control species; reduce seed sources on site
Remove Elm saplings	Consider retaining for additional vegetation screening

6.3.4 Wetland gardens (ecologist)

Several wetlands have been constructed in the area to become Lot 225. These are roughly aligned on the contour, and were designed as shallow detention basins that were filled via a piped network from rainwater tanks fed from the roof of Logan Brae, and then released via a pumped and piped network to water the then newly planted trees and shrubs along the eastern and southern boundaries and in garden beds in between.

While the wetlands were fed at least partially by gravity, they predominantly relied on a pump to ensure that adequate water was provided to the wetlands. Over time, the piped network has alternately been overused or not used to feed the wetlands. As a result, they are in poor condition. Woody weeds have invaded and the water levels are greatly reduced. Some of the wetlands have become places to dump unwanted materials, including cards from beehives (Figure 48).

The wetlands have limited ecological value, especially in their current condition. Given the aim is to develop Lot 225 for housing they are likely to be decommissioned. Their best ecological potential is likely to be reached if the water level is maintained. This can provide water for frogs, for birds and animals to drink and bathe, and continue to be available for watering through infiltration. It is not feasible, however, that they continue to be fed via the piped network from water tanks on Lot 224.



Figure 47 Location of shallow wetlands on the proposed Lot 225



Figure 48 The shallow wetlands on contour banks are in poor condition with weeds and dumped material from beehives etc

Table 16 Management actions for general ecology in the wetland gardens

ACTION	RATIONALE
Remove woody weeds	Comply with management requirements for priority control species; reduce seed sources on site
Remove dumped rubbish	Improve wetland condition
Reinstate water level management	Maintain suitable conditions for wetlands to survive and provide habitat resources

6.3.5 Southern boundary tree plantings (Arborist group 11/ecologist)

Includes trees # R10, R25-44. Trees in this area are predominantly immature eucalypts, with a mix of shrubs interspersed throughout. Towards the southwestern corner there are several Elms and Poplars in a group. Many of these have died, or died down, and are resprouting from the base of the trunk. Unmanaged Elms are likely to become reservoirs for Elm leaf beetles and are best removed if they are not able to be managed properly.

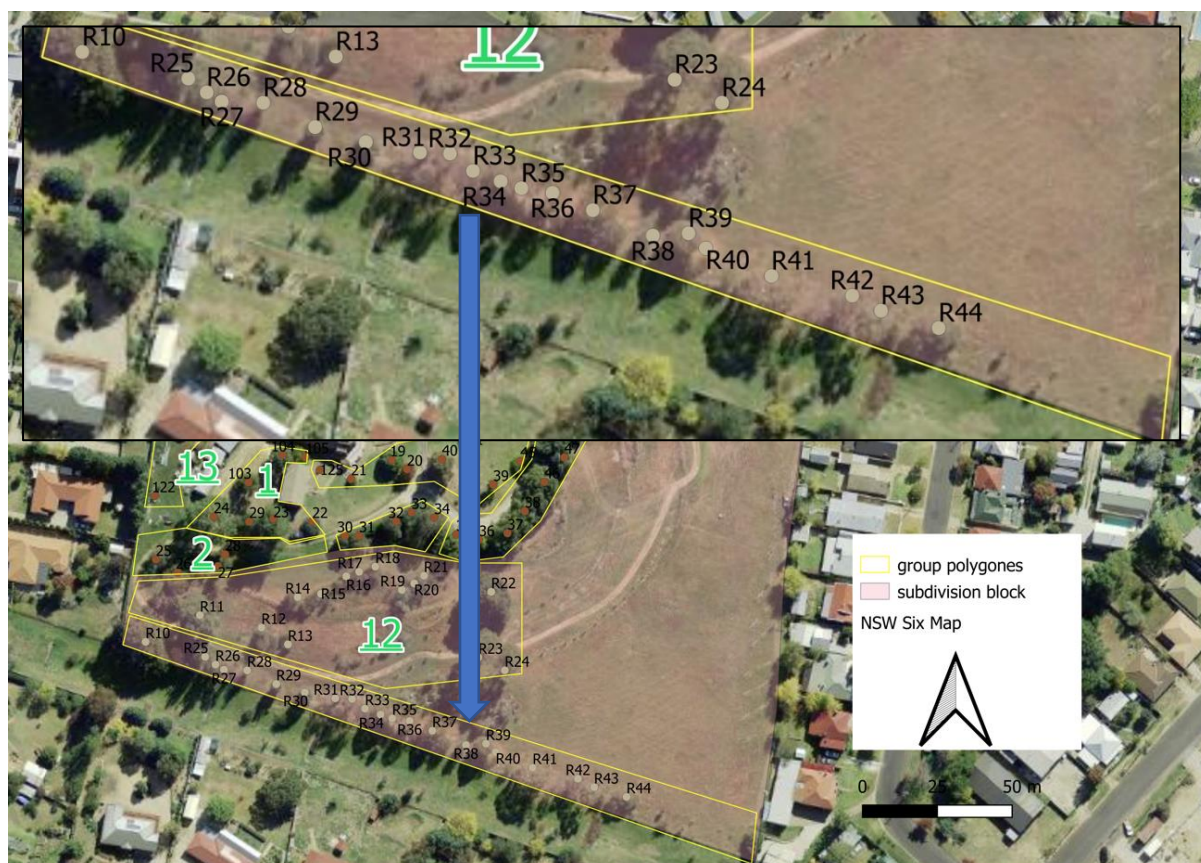


Figure 49 Location of trees in group 11 along the southern boundary fence

Table 17 Management actions for general ecology on the southern boundary

ACTION	RATIONALE
Remove woody weeds	Comply with management requirements for priority control species; reduce seed sources on site
Plant trees and shrubs	Allocate space along the space boundary for additional vegetation screening plantings to maintain the existing habitat corridor resources along the drainage reserve adjoining the property and maintain privacy screening for adjoining landholders nearby



Figure 50 A series of plantings along the southern boundary appear to be close to 10 years old

6.3.6 New plantings (Arborist group 12)

Includes immature trees R11-R24. These have no heritage value and limited ecological value at their current level of development. Consider removal to facilitate developing the new Lot 225. If they are to be retained, or until the site is developed, these garden beds should be weeded to remove woody weeds and Elm seedlings.



Figure 51 Location of trees and garden beds included in group 12



Figure 52 Group 12 includes new plantings arranged predominantly in garden beds

Table 18 Management actions for general ecology on the southern boundary

ACTION	RATIONALE
Remove woody weeds, Elm seedlings	Comply with management requirements for priority control species; reduce seed sources on site, remove potential reservoirs for Elm leaf beetles

6.4 SUMMARY OF SULE RATINGS

Figure 53 shows the SULE rating for all relevant trees on site. The supporting data is provided in Appendix One.

Ratings used range from LOW to VHIGH (very high) for ULE (Useful Life Expectancy). LSV (Landscape Value) ratings summarise values in one of three categories:

- Heritage value
- Ecological value
- Aesthetic value

Within each of these categories the tree can have low/medium/high retention value, for example, AHIGH has high aesthetic value, HMEDIUM has medium heritage value, etc. Several trees have value in more than one of the relevant categories.

The final SULE rating therefore takes into account the tree's ULE and its Landscape Value, and is categorised as LOW/MEDIUM/HIGH or REMOVE. Trees (and some shrubs) to be removed include dead/dangerous trees or trees that are priority control weeds or problem environmental weeds.

Some trees are recommended for removal, generally because they are diseased or dying, or because they are considered weed species (Figure 54). Others have a low SULE rating and can be removed with minimal impact on site values (Figure 55).

Of the trees to be retained, some will require additional attention to ensure ongoing good health into the future (Figure 56). These include low levels of infestation by Syrex wasps, or minor damage from lawnmowing, or with limbs that are damaged or dying, etc.

Figure 57 shows the Tree Protection Zones for all the relevant trees on site. This identifies areas where excavation should be avoided. If excavation in these areas is required then an arborist should be consulted to determine the most suitable method, and any remedial works that may be required.

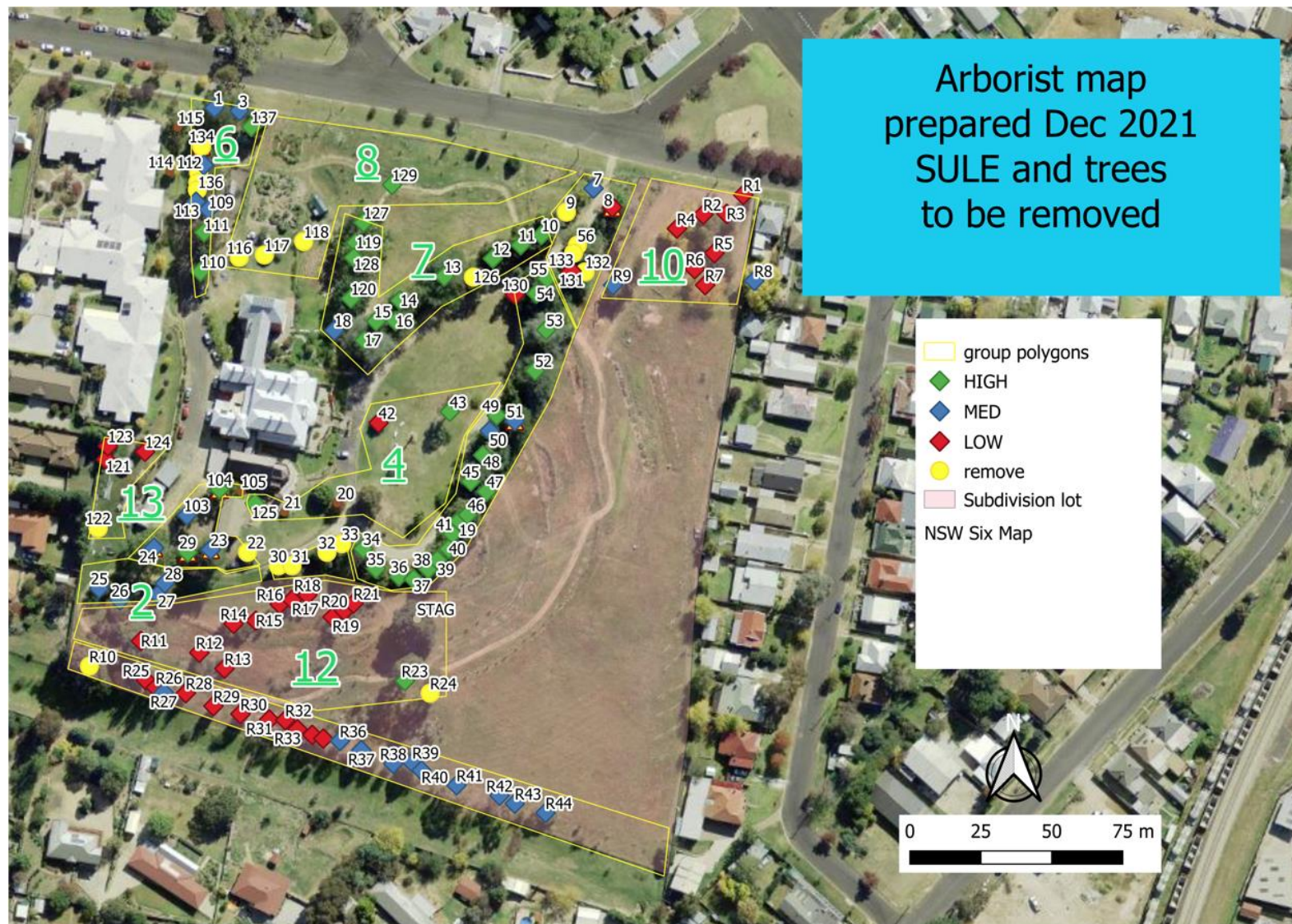


Figure 53 SULE ratings for trees with retention value, and trees to be removed

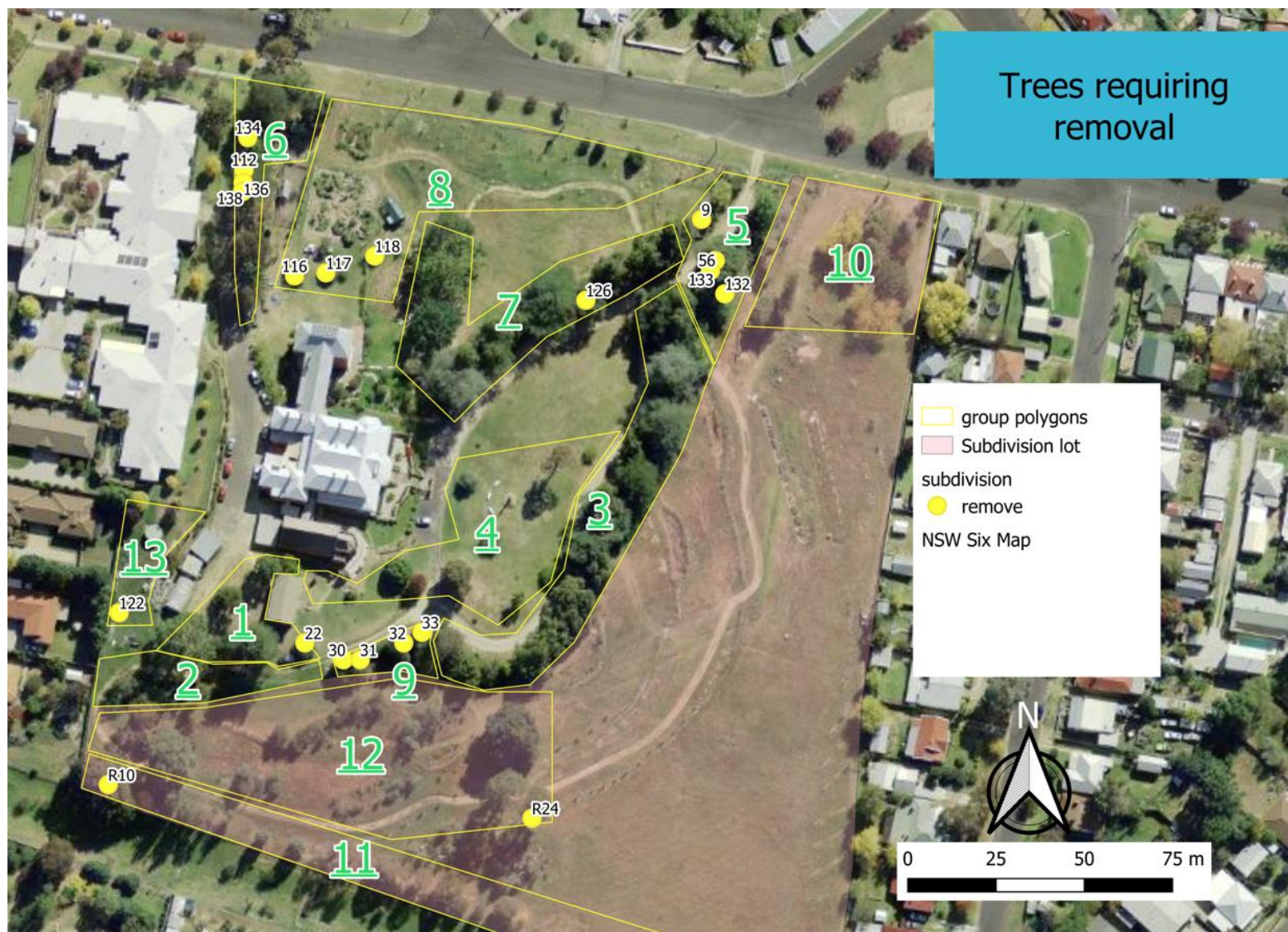


Figure 54 Trees that are recommended for removal

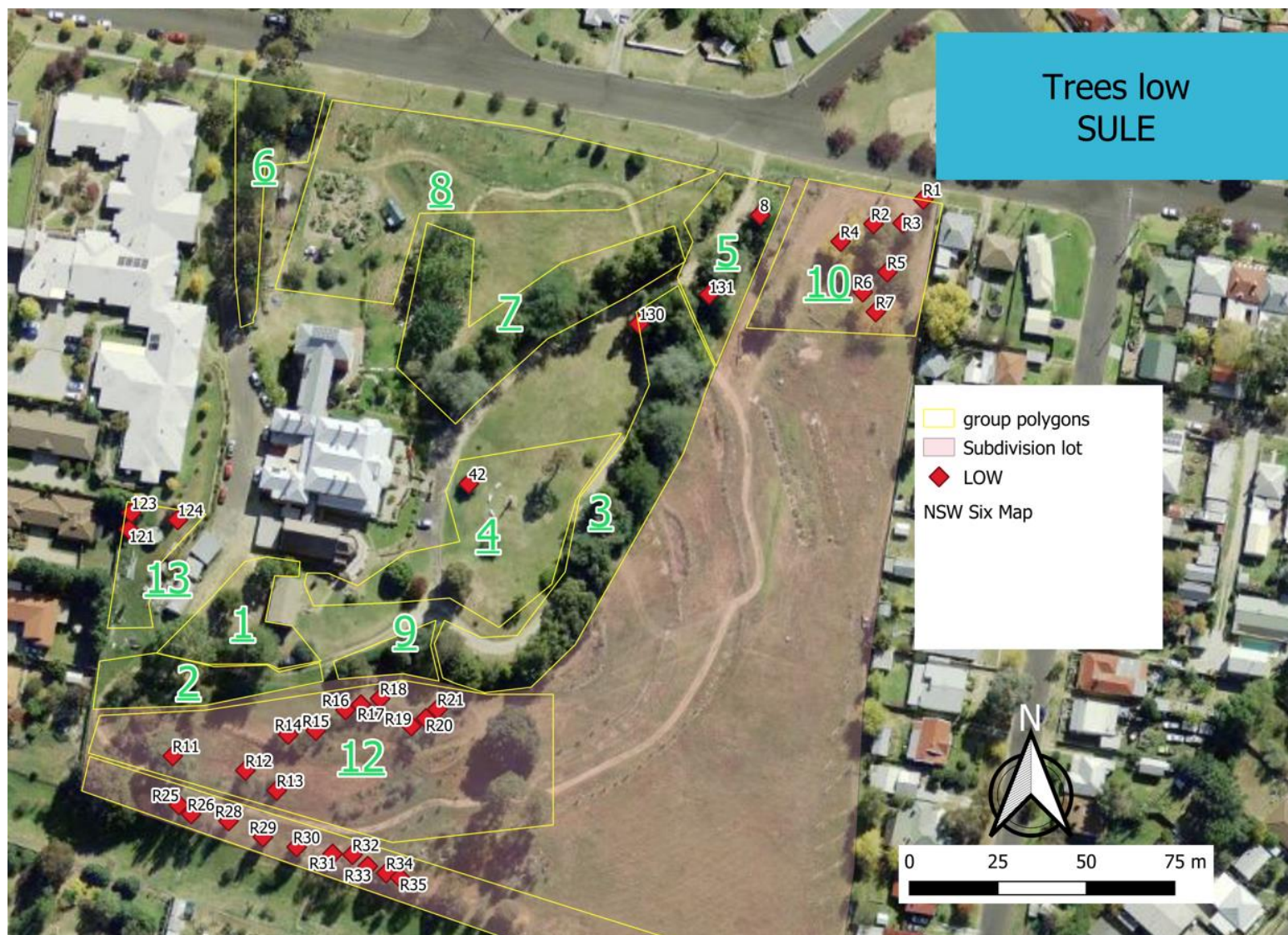


Figure 55 Trees with a low SULE rating that can be removed with minimal impact

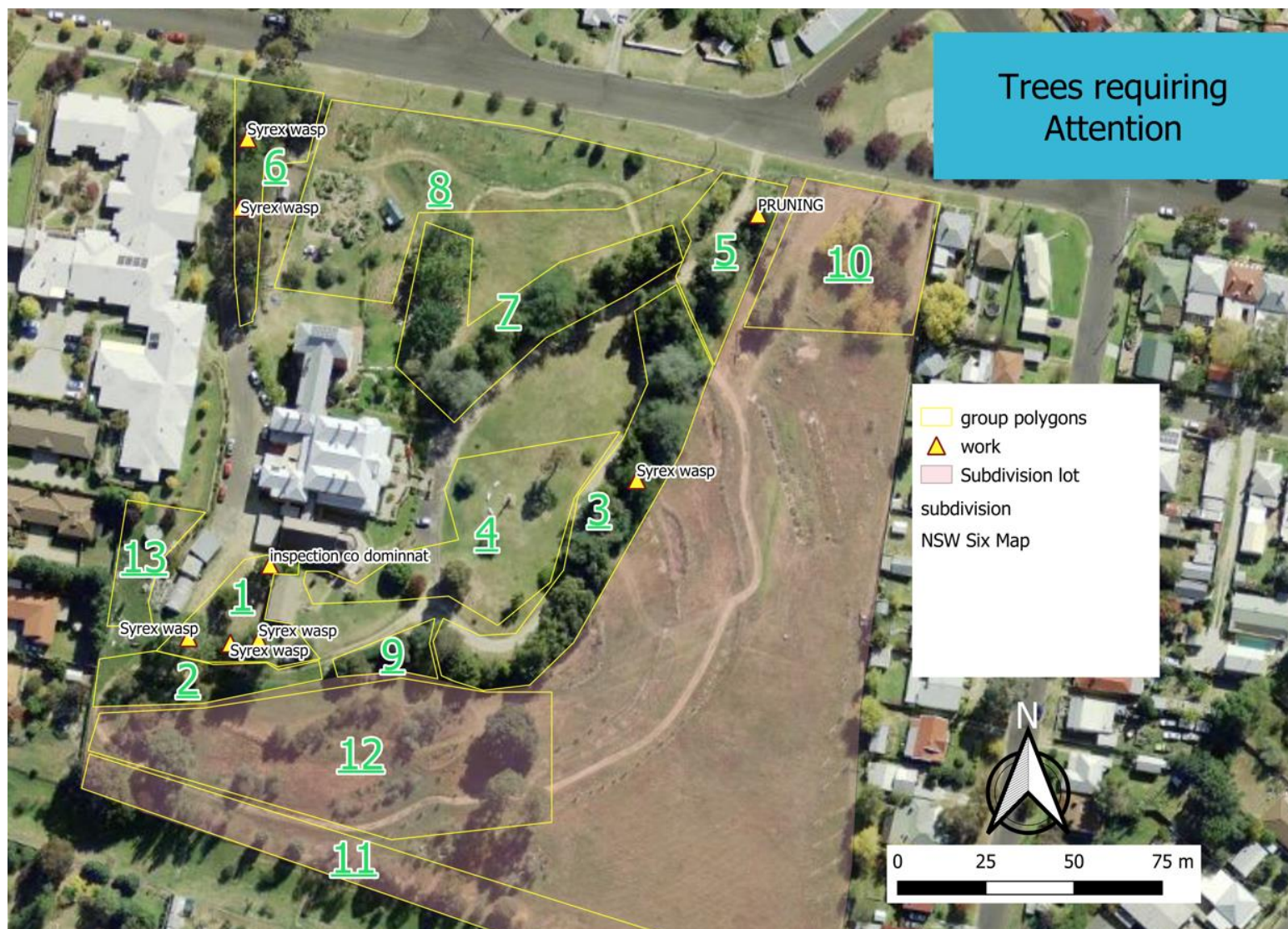


Figure 56 Trees that need attention to ensure ongoing good health

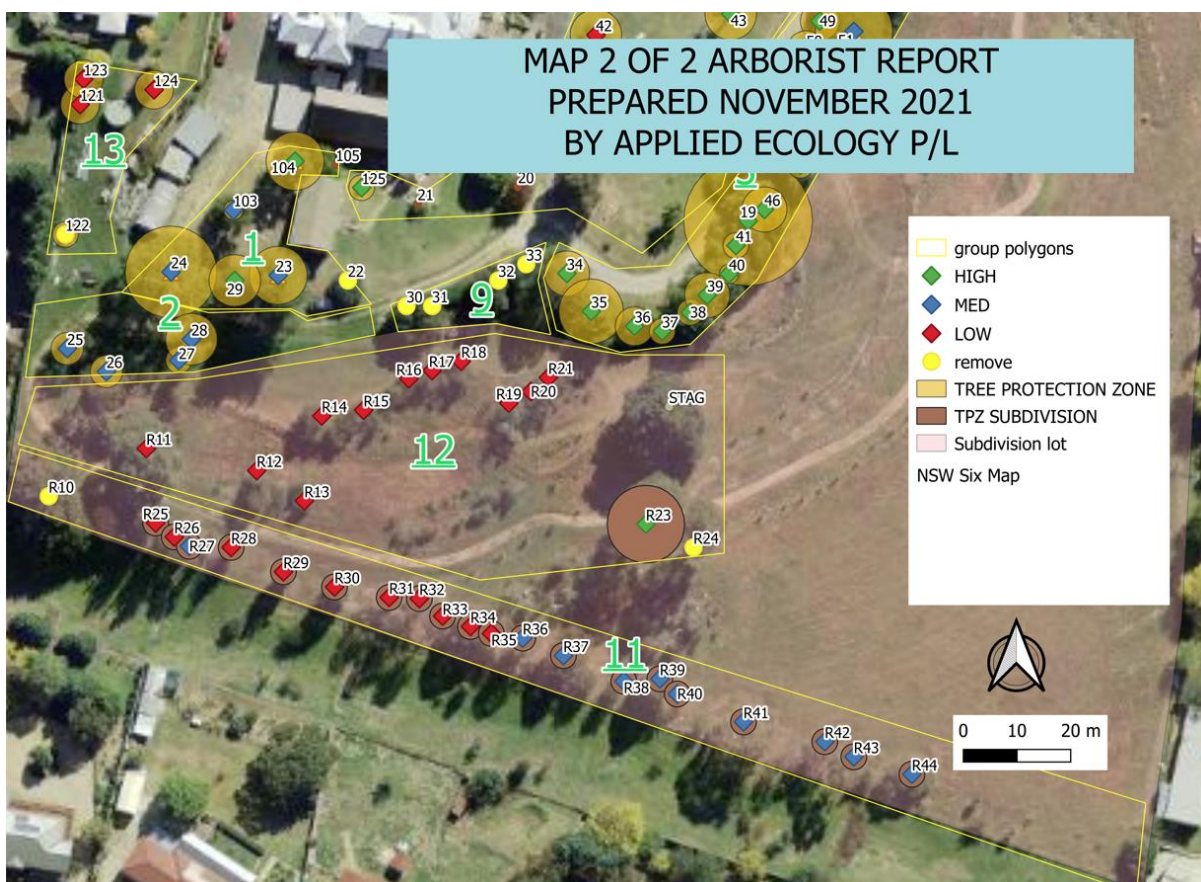
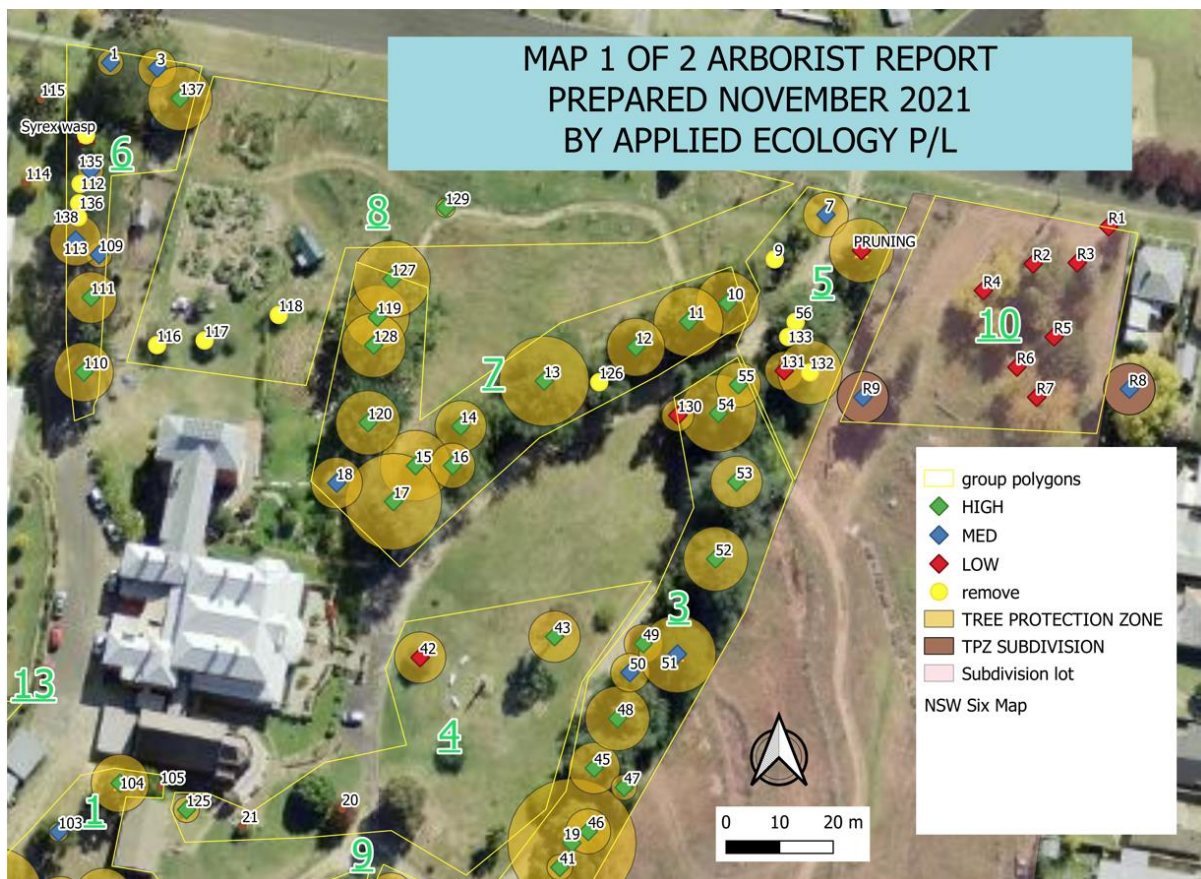


Figure 57 Tree Protection Zones for trees on Lots 224 and 225

6.5 SPECIES FOR SCREENING AND REPLACEMENT PLANTING

The following species list is extracted from Bathurst Regional Council's Vegetation Management Plan (draft report prepared by Molino Stewart, 2018).

Table 19 Species recommended for screening and replacement planting

SPECIES NAME	COMMON NAME	FEATURES/ REQUIREMENTS	SUGGESTED PLANTING LOCATIONS
Many genera including <i>Cedrus</i> , <i>Picea</i> , <i>Larix</i> , <i>Abies</i> , <i>Pinus</i> , <i>Pseudotsuga</i>	Cedars, Spruce, Larch, Fir, pines	Evergreen. Many colours and forms.	Parks, windbreaks, Heritage Conservation Area
<i>Alnus incana</i>	Grey Alder (15-20 m) Cold wet areas and poor soils. Recreational parks and street trees on floodplain soils.	(15-20 m) Cold wet areas and poor soils.	Recreational parks and street trees on floodplain soils.
<i>Castanea sativa</i>	Spanish Chestnut (15-25 m) Yellow autumn colouring, edible fruits. Parks, street tree, Conservation Area	(15-25 m) Yellow autumn colouring, edible fruits.	Parks, street tree, Conservation Area
<i>Liriodendron tulipifera</i>	Tulip Tree	(50 m) Fertile, well drained soil.	Parks, street tree
<i>Plantanus orientalis</i>	Oriental Plane	(20-30 m) Yellow brown autumn foliage.	Can be directionally pruned around wires. Parks, tree for wide streets, Conservation Area
<i>Quercus ilex</i>	Holly Oak/Holm Oak	(25 m) Slow growth in early stages, dense shade. Can be directionally pruned around wires. Parks, canopy too dense for street tree planting.	(25 m) Slow growth in early stages, dense shade. Can be directionally pruned around wires. Parks, canopy too dense for street tree planting.
<i>Acer buergeranum</i>	Trident Maple	(6-10 m) Keep wind protected to avoid leaf damage.	Fertile and friable soil. Street tree
<i>Acer campestre</i>	English Maple	(6-10 m) Yellow autumn colouring	Parks, street tree, Conservation Area
<i>Acer saccharum</i>	Sugar Maple	(12-15 m) yellow/orange/scarlet autumn colouring.	Street tree, Conservation Area
<i>Alnus cordata</i>	Italian Alder	(12 m) Moist soil, yellow autumn colouring.	Suburban street tree where nature strip watered, Conservation Area
<i>Celtis australis</i>	Nettle Tree	(12-15 m) Pale yellow autumn foliage.	Parks, street tree and Conservation Area

SPECIES NAME	COMMON NAME	FEATURES/ REQUIREMENTS	SUGGESTED PLANTING LOCATIONS
<i>Cercis siliouastrum</i>	Judas Tree	(5-10 m) Prune to central leader if multi-branching.	Street tree, parks
<i>Quercus robur</i>	'Fastigiata'	(12 m) Upright, columnar form of dense habit. Yellow brown autumn foliage.	Parks, large scale street trees on more fertile soils, floodplain, Conservation Area.
<i>Sorbus domestica</i>	Service Tree	(10-15 m) Yellow to orange autumn foliage.	Street tree, Conservation Area
<i>Sophora japonica</i>	Japanese Pagoda Tree	(10 m) Tolerant of temperature extremes. Can be directionally pruned around wires.	Parks, street tree, carparks
<i>Laurus nobilis</i>	Bay Laurel	(6-7 m). Evergreen, lateral branches low on trunk	Street tree, screening plant (shrub or tree form), parks and gardens.
<i>Malus spp</i>	Crab Apple	(4-8 m) Small tree, directionally prune to central leader.	Street tree, suitable for under power lines or small scale plantings.
<i>Angophora floribunda</i>	Rough-barked Apple	(12-22 m) Fibrous bark, twisting branches with dense crown	Parks, open spaces. Grows best on alluvial soils.
<i>Eucalyptus leucoxylon</i> <i>var macrocarpa</i>	Large Podded Yellow Gum	(8 m) Smooth barked gum	Street tree
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	(12 m) Smoothed barked gum, cream bark, open canopy.	
<i>Acacia buxifolia</i>	Box-leaf Wattle		
<i>Acacia dealbata</i>	Silver Wattle		
<i>Acacia implexa</i>	Hickory Wattle		
<i>Acacia mearnsii</i>	Black Wattle		
<i>Acacia melanoxylon</i>	Blackwood		
<i>Allocasuarina littoralis</i>	Black She-oak		
<i>Allocasuarina verticillata</i>	Drooping She-oak		
<i>Brachychiton populneus</i>	Kurrajong		
<i>Callitris glaucophylla</i>	White Cypress pine		

7 OTHER WORKS – WORKING NEAR TREES

If development is proposed that will impact on any tree protection zones (TPZ), as shown on the site plan prepared by Applied Ecology's arborecologist (see), then a tree protection plan will be required as per *AS4970-2009 Protection of trees on development sites*. This must be prepared by a level 5 arborist as per 1.4.4. of that standard.

Refer to *AS4970-2009* for information about the impacts of development on trees (section 1.2):

This Standard provides guidance for arborists, architects, builders, engineers, land managers, landscape architects and contractors, planners, building surveyors, those concerned with the care and protection of trees, and all others interested in integration between trees and construction.

Particular attention should be given to Appendix B which discusses potential damage to trees on development sites. If any of the following activities are likely to occur within the TPZ, as shown on the arborist map, then a level 5 arborist will be required to complete a Preliminary Tree Assessment or Arboricultural Impact statement (as per section 2.3.5 of *AS4970-2009*)

Activities generally excluded from the TPZ include but are not limited to—

- (a) machine excavation including trenching;
- (b) excavation for silt fencing;
- (c) cultivation;
- (d) storage;
- (e) preparation of chemicals, including preparation of cement products;
- (f) parking of vehicles and plant;
- (g) refuelling;
- (h) dumping of waste;
- (i) wash down and cleaning of equipment;
- (j) placement of fill;
- (k) lighting of fires;
- (l) soil level changes;
- (m) temporary or permanent installation of utilities and signs, and
- (n) physical damage to the tree.

Barrell Tree Consultancy has produced several site guidance notes for developers. Information on the following is free online [Technical Guidance » Barrell Tree Consultancy | UK Consultants and Expert Witness Services \(barrelltreecare.co.uk\)](https://www.barrelltreecare.co.uk/technical-guidance).

Information from relevant site guidance notes is provided in the following sections. Before implementing these actions it is strongly recommended that a Tree Protection Plan is prepared for the site.

7.1 EXCAVATION FOR WATER AND SEWER PIPES, UTILITIES

Excavation can adversely affect retained trees through direct damage to roots and destructively disturbing the rooting environment. However, some trees can tolerate limited amounts of

excavation if the work is carried out carefully and the disturbance is kept to a minimum. The amount of disturbance that an individual tree can tolerate depends on factors such as tree species, health, age, and the growing conditions. These are all matters that need to be assessed by an experienced and qualified arboriculturist.

7.1.1 Excavation in Tree Protection Zones

The following steps are to be undertaken when excavating in Tree Protection Zones:

- Cut exposed roots to be removed cleanly 10–20cm behind the final face of the excavation.
- Protect roots temporarily exposed, but to be retained, from direct sunlight, drying out, and extremes of temperature, by appropriate covering such as dampened hessian sacking and/or boards over the hole.
- If necessary, individual roots and clumps of less than 2.5cm width will be cut cleanly without consulting the supervising arboriculturist.
- Retain individual roots and clumps greater than 2.5cm in width where possible and only cut if agreed with the supervising arboriculturist.
- When back-filling, place an inert granular material mixed with topsoil or sharp sand around retained roots greater than 2.5cm in width before light compaction.

7.1.2 Installing services in Tree Protection Zones

Excavation to upgrade existing services or install new services in TPZs may damage retained trees. Where possible, all services will be outside TPZs and installation in TPZs will only be chosen as a last resort. If installation within TPZs is being considered, the decision must be made in consultation with the supervising arboriculturist before any work is carried out. If service installation is agreed within TPZs, the acceptable techniques in order of preference are:

- a) trenchless (eg horizontal bore)
- b) Broken trench – hand dug
- c) Continuous trench – hand dug

If trenchless methods are to be used, the starting and finishing pits dug at each end of the service run will be outside TPZs. Where a hand-digging option is agreed, any roots discovered during the excavations will be dealt with as described above. Backfilled material around excavated services must not be heavily compacted.

7.2 FENCE CONSTRUCTION

The CMP recommends that the boundary fencing is to reflect the rural character of the existing boundary fences of St Joseph's Mount. Fencing may be post and rail or post and wire. Wire mesh may be used to contain animals.

There is potential for trees throughout the area to be affected by the proposed fence. The type of fence to be constructed must allow for actual and final positional placement of posts to be flexible. Where possible construction impacts should be limited to the hole for the strainer post, and this should be positioned outside of the SRZ at a minimum, and preferably outside the TPZ of any tree. Where a post needs to be positioned in a TPZ the recommendations for excavation in a TPZ should be followed. Exploratory excavation would assist with determining the best locations for post holes within the TPZ.

8 WEED MANAGEMENT

8.1 CONTROL TECHNIQUES

Control techniques can be broadly grouped into several categories: manual control and herbicide control (**Error! Reference source not found.**). It is important to use the most suitable control method for your situation. For example, hand pulling of woody weed seedlings is fast, effective, and uses no herbicide. As such it should be the first option for weed management. However, for some woody weed seedlings it is difficult to get enough of the root when hand pulling, for example, Holly, which often breaks off and leaves enough root for it to reshoot.

Table 20 Weeds recorded on site and their best practice control methods

COMMON NAME	MANUAL CONTROL	HERBICIDE CONTROL	OTHER COMMENTS
Large-leaved Privet	hand pull seedlings	cut and paint larger stems with glyphosate	bag and remove any seeds
Small-leaved Privet	hand pull seedlings	cut and paint larger stems with glyphosate	bag and remove any seeds
Blackberry		cut and paint larger seedlings and stems with glyphosate diluted to around 70%, or stem inject very large stems	bag and remove any fruit
Cotoneaster	hand pull seedlings	cut and paint larger stems with glyphosate	bag and remove any seeds
Holly	carefully hand pull small seedlings	cut and paint larger seedlings and stems with glyphosate diluted to around 70%, or stem inject very large stems	bag and remove any seeds
Cherry Laurel	hand pull seedlings	cut and paint larger stems with glyphosate	bag and remove any seeds
Common Hawthorn			
Blue Periwinkle (Vinca)	hand pull runners, bundle and raft, take care not to drag runners off trees	scrape and paint larger stems and stems climbing on native vegetation	raft stems so they cannot regrow
Oleander	crown through roots	spot spray larger infestations with glyphosate	bag and remove any seeds
Willow	crown through roots	spot spray larger infestations with glyphosate	bag and remove any seeds
Prunus sp	crown through roots	spot spray larger infestations with glyphosate	bag and remove any seeds
Tree Lucerne	crown through roots	spot spray larger infestations with glyphosate	bag and remove any seeds
	crown through roots using a mattock or large knife	not suitable for spraying	bag and remove any seeds
	crown through roots	spot spray larger infestations with glyphosate	bag and remove any seeds

9 MONITORING AND REPORTING

The condition of bushland in the restoration area should be monitored following woody weed control, following herbaceous groundcover weed removal, and following any significant rainfall event. Monitoring should also record the numbers of plantings that have died. Replanting may need to be undertaken if large numbers of plants are lost. Council should be consulted to determine appropriate triggers for replanting as this may be offset by establishment of native species from seeds in the soil or from seeded brush matting.

Monitoring should record the following:

- Weed growth
- Slope stability
- Formation of any erosion gullies
- Regeneration of native plant species
- Plant density and the need for supplementary seeding or planting
- Establishment and health of any planted material
- Condition and effectiveness of erosion control measures

This information would form the basis of a site condition report suitable for submission to council.

Consult Council to determine reporting requirements, which should be following completion of each of the first three stages outlined in **Error! Reference source not found.**, and at six monthly intervals for Stage 4 Ongoing maintenance for a minimum period of two years, or as directed by BMCC.

9.1 PERFORMANCE TARGETS

Performance criteria for weed management and site restoration activities are provided in **Error! Reference source not found.**

Table 21 Performance criteria for weed management at 40 Wilson St, Wentworth Falls

MANAGEMENT ACTIONS	PERFORMANCE CRITERIA
STAGE ONE – RADIATA PINE CONTROL	
Boundary between restoration area and managed residential section of the subject lot and adjoining lots delineated using durable markers, eg logs, rocks etc If fencing must be installed use only plain wire fencing with a maximum of five strands Council should liaise with neighbouring landholders to control weeds on their side of the boundary (including community land)	Property boundary clearly marked Council and neighbours encouraged to control weeds in adjoining areas
Radiata Pines killed Radiata Pines felled in areas where there is potential for dead trees to become dangerous to lives or property. Preferably all pines will be felled, which will kill them	Radiata Pines dead Safety requirements met as a minimum for removal of trees Pine needles reduced/removed

MANAGEMENT ACTIONS	PERFORMANCE CRITERIA
Pine needles reduced on site by burning or disposal off site	
STAGE TWO – OTHER WEED CONTROL	
Woody weeds and climbers treated using best practice control methods	All woody weeds and climbers removed or killed in situ, weed propagules (seeds, fruit, corms etc) disposed of off site
Soil stability assessed, soft engineering solution used to stabilise soils in key erosion points	Soils stabilised
Native plant cover assessed and supplemented using direct seeding and/or planting as required	Native plant cover re-established
Groundcover herbaceous weeds treated using best practice control methods	All groundcover weeds removed or killed in situ, weed propagules (seeds, fruit, corms etc) disposed of off site
STAGE THREE - REVEGETATION	
Follow up woody weed control	All woody weeds and climbers continue to be controlled using best practice methods
Native plant cover assessed and supplemented using direct seeding and/or planting as required	Native plant cover re-established
Planted tubestock are maintained, eg. watered, weed control to prevent smothering, etc	Native plantings achieve survival rate >95%
Soil stability assessed, soft engineering solution used to stabilise soils in key erosion points	Soils stabilised
STAGE FOUR – ONGOING MAINTENANCE	
Ongoing weed control	Weeds controlled
Ongoing erosion control	Erosion prevented and/or mitigated
Native plant cover assessed and supplemented as required	Native plant cover maintained

10 APPENDIX ONE: SULE TABLE

Table 22 ULE, LSV and SULE ratings for trees in Lot 224

GROUP	NUMBER	SPECIES	DIAMETER	ULE	LSV	SULE	TPZ
1	22	COTONEASTER				REMOVE	0
1	23	PINE	0.45	HIGH	AMEDIUM	MEDIUM	5.4
1	24	PINE	0.71	MEDIUM	AMEDIUM	MEDIUM	8.52
1	29	PINE	0.4	HIGH	AMEDIUM	MEDIUM	4.8
1	103	KURRAJONG	0.15	MEDIUM	HHIGH	MEDIUM	1.8
1	104	KURRAJONG	0.45	HIGH	EHIGH	HIGH	5.4
2	25	EUCALYPT	0.25	MEDIUM	LOW	MEDIUM	3
2	26	EUCALYPT	0.25	MEDIUM	LOW	MEDIUM	3
2	27	EUCALYPT	0.25	MEDIUM	LOW	MEDIUM	3
2	28	EUCALYPT	0.4	HIGH	EMEDIUM	MEDIUM	4.8
3	19	CONIFER	1	HIGH	HHIGH	HIGH	12
3	35	IRONBARK	0.5	HIGH	HHIGH	HIGH	6
3	36	CONIFER	0.3	HIGH	HHIGH	HIGH	3.6
3	37	CONIFER	0.2	HIGH	HHIGH	HIGH	2.4
3	38	CONIFER	0.2	HIGH	HHIGH	HIGH	2.4
3	39	WEeping CONIFER	0.35	HIGH	HHIGH	HIGH	4.2
3	40	CONIFER	0.15	HIGH	HHIGH	HIGH	1.8
3	41	WEeping CONIFER	0.2	HIGH	HHIGH	HIGH	2.4
3	45	CEDAR	0.4	HIGH	HHIGH	HIGH	4.8
3	46	WEeping CONIFER	0.35	HIGH	HHIGH	HIGH	4.2
3	47	WEeping CONIFER	0.2	HIGH	HHIGH	HIGH	2.4
3	48	CEDAR	0.5	HIGH	HHIGH	HIGH	6
3	49	CONIFER	0.3	HIGH	HHIGH	HIGH	3.6
3	50	CONIFER	0.3	HIGH	HHIGH	HIGH	3.6
3	51	PINE	0.6	HIGH	HHIGH	HIGH	7.2
3	52	CEDAR	0.5	HIGH	HHIGH	HIGH	6
3	53	CEDAR	0.4	HIGH	HHIGH	HIGH	4.8
3	54	CORK OAK	0.6	HIGH	HHIGH	HIGH	7.2
3	55	CONIFER	0.35	HIGH	HHIGH	HIGH	4.2
3	130	CUPRESSUS	0.25	MEDIUM	LOW	LOW	3
4	20	SHRUB					0
4	21	SHRUB					0
4	42	OLIVE	0.4	HIGH	HVHIGH	HIGH	4.8
4	43	EUCALYPT	0.4	HIGH	HVHIGH	HIGH	4.8
4	125	WEeping CONIFER	0.2	HIGH	HVHIGH	HIGH	2.4
5	7	WHITE CEDAR	0.35	MEDIUM	LOW	MEDIUM	4.2
5	8	FRAXINUS	0.5	MEDIUM	LOW	LOW	6
5	9	SHRUB			LOW	REMOVE	0
5	56	OVER PRUNED DEAD STUMP				REMOVE	0
5	131	CONIFER	0.3	MEDIUM	LOW	LOW	3.6
5	132	CONIFER	0.5	LOW		REMOVE	

GROUP	NUMBER	SPECIES	DIAMETER	ULE	LSV	SULE	TPZ
5	133	CONIFER				REMOVE	
6	1	CHINESE ELM	0.2	MEDIUM	HMED	MEDIUM	2.4
6	3	CHINESE ELM	0.3	MEDIUM	HMED	MEDIUM	3.6
6	109	SHRUB					0
6	110	EUCALYPT	0.46	HIGH	AVHIGH	HIGH	5.52
6	111	EUCALYPT	0.4	HIGH	AVHIGH	HIGH	4.8
6	112	DYING ELM				REMOVE	0
6	113	PINE	0.4	HIGH	HVHIGH	HIGH	4.80
6	134	PINE				REMOVE	
6	135	PENCIL PINE	0.2	HIGH	HMEDIUM	MEDIUM	2.4
6	136	CHINESE ELM		MEDIUM	HHIGH	MEDIUM	0.25
7	10	CUPRESSUS	0.49	HIGH	AHIGH	HIGH	5.88
7	11	CUPRESSUS	0.54	HIGH	AHIGH	HIGH	6.48
7	12	CUPRESSUS	0.45	HIGH	AHIGH	HIGH	5.4
7	13	CEDAR	0.7	HIGH	AHIGH	HIGH	8.4
7	14	CONIFER	0.4	HIGH	AHIGH	HIGH	4.8
7	15	CONIFER	0.55	HIGH	AHIGH	HIGH	6.6
7	16	CEDAR	0.35	HIGH	AHIGH	HIGH	4.2
7	17	CEDAR	0.75	HIGH	AHIGH	HIGH	9
7	18	CONIFER	0.4	HIGH	AHIGH	HIGH	4.8
7	119	OAK	0.5	HIGH	AHIGH	HIGH	6
7	120	OAK	0.5	HIGH	AHIGH	HIGH	6
7	126	AFRICAN OLIVE				REMOVE	0
7	127	OAK	0.6	HIGH	AHIGH	HIGH	7.2
7	128	OAK	0.5	HIGH	AHIGH	HIGH	6
8	4	SHRUB					0
8	5	SHRUB					0
8	6	SHRUB					0
8	129	EUCALYPTUS PULVERULENTA	0.01	HIGH	HHIGH	HIGH	0.12
9	30	WEED				REMOVE	0
9	31	WEED				REMOVE	0
9	32	WEED				REMOVE	0
9	33	WEED				REMOVE	0
9	34	CONIFER	0.35	HIGH	HHIGH	HIGH	4.2
13	121	FRAXINUS	0.3	LOW	LOW	LOW	3.6
13	122	COTONEASTER	0.2	MEDIUM	LOW	REMOVE	2.4
13	123	FRAXINUS	0.3	MEDIUM	LOW	LOW	3.6
13	124	FRAXINUS	0.3	LOW	LOW	LOW	3.6
N/A	105	SHRUB					0
N/A	106	SHRUB					0
N/A	107	SHRUB					0
N/A	108	SHRUB					0
N/A	114	SHRUB					0
N/A	115	SHRUB					0

GROUP	NUMBER	SPECIES	DIAMETER	ULE	LSV	SULE	TPZ
N/A	116	COTONEASTER				REMOVE	0
N/A	117	COTONEASTER				REMOVE	0
N/A	118	GLEDITSIA				REMOVE	0

Table 23 ULE, LSV and SULE ratings for trees in Lot 225

GROUP	NUMBER	SPECIES	DIAMETER	ULE	LSV	SULE	TPZ
10	R1	EXOTIC		LOW	HMEDIUM	LOW	0
10	R2	EXOTIC		LOW	HMEDIUM	LOW	0
10	R3	EXOTIC		LOW	HMEDIUM	LOW	0
10	R4	BOX ELDER		LOW	HMEDIUM	LOW	0
10	R5	EXOTIC		LOW	HMEDIUM	LOW	0
10	R6	EXOTIC		LOW	HMEDIUM	LOW	0
10	R7	EXOTIC		LOW	HMEDIUM	LOW	0
10	R9	EUCALYPT	0.4	MEDIUM	EMEDIUM	MEDIUM	4.8
11	R25	EXOTIC		MEDIUM	LOW	LOW	0
11	R26	EXOTIC		MEDIUM	LOW	LOW	0
11	R27	EXOTIC		MEDIUM	LOW	LOW	0
11	R28	EXOTIC		MEDIUM	LOW	REMOVE	0
11	R29	POPLAR		MEDIUM	LOW	REMOVE	0
11	R30	EXOTIC		MEDIUM	LOW	LOW	0
11	R31	CUPRESSUS		MEDIUM	LOW	REMOVE	0
11	R32	CUPRESSUS		MEDIUM	LOW	REMOVE	0
11	R33	CUPRESSUS		MEDIUM	LOW	REMOVE	0
11	R34	EXOTIC		MEDIUM	LOW	LOW	0
11	R35	EXOTIC		MEDIUM	LOW	LOW	0
11	R36	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
11	R37	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
11	R38	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
11	R39	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
11	R40	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
11	R41	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
11	R42	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
11	R43	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
11	R44	EUCALYPT	0.2	VHIGH	EHIGH	HIGH	2.4
12	R11	ELM		LOW	LOW	LOW	0
12	R11	ELM		LOW	LOW	LOW	0
12	R12	ELM		LOW	LOW	LOW	0
12	R13	ELM		LOW	LOW	LOW	0
12	R14	RECENT PLANTINGS		MEDIUM	LOW	LOW	0
12	R15	RECENT PLANTINGS		MEDIUM	LOW	LOW	0
12	R16	RECENT PLANTINGS		MEDIUM	LOW	LOW	0
12	R17	RECENT PLANTINGS		MEDIUM	LOW	LOW	0
12	R18	RECENT PLANTINGS		MEDIUM	LOW	LOW	0
12	R19	RECENT PLANTINGS		MEDIUM	LOW	LOW	0

GROUP	NUMBER	SPECIES	DIAMETER	ULE	LSV	SULE	TPZ
12	R20	RECENT PLANTINGS		MEDIUM	LOW	LOW	0
12	R21	RECENT PLANTINGS		MEDIUM	LOW	LOW	0
12	R22	DEAD		DEAD	HEHIGH	MEDIUM	0
12	R23	PINE	0.6	MEDIUM	HHIGH	MEDIUM	7.2
12	R24	DEAD				REMOVE	0

11 APPENDIX TWO: BEST PRACTICE GUIDELINES FOR WEED CONTROL

The following techniques are considered current best practice for weed management. Use of a local restoration contractor is strongly recommended, and must have experience in working in this type of environment.

WEED CONTROL TECHNIQUES

Cut and paint

This is suitable for coppicing and suckering weeds such as Camphor and Privet, or any weeds which are too large for hand-pulling or have long taproots such as Ochna. This method provides for no soil disturbance and weed eradication is successful.

1. Cut the stem/s 1-2 cm above (a cut stump or stem protruding above the ground can be dangerous to work around and the seed's ability to re-shoot is reduced), ground level using either secateurs, loppers, a pruning saw or a chainsaw, depending on the thickness and toughness of the stem.
2. Immediately apply glyphosate™ (generally 1:1 or 1:1.5 or 100%) to the cut surface of the stem or, with medium and large trees, to the outside edges of the cut surface. (Herbicides need to be applied immediately after the cut is made because the ability of the plant to transport fluids ceases as soon as the tissues are severed.)
3. Search through the leaf litter to locate any exposed stem or root surface. Scrape the exposed stem or root surface slightly with a knife until you can see a light green coloured layer. (Do not scrape too deeply.) Apply the herbicide to the scraped sections, either with a brush, injector or spray bottle.
4. Follow up as required.

Stem injection – Drill & frill

Drilling

A rechargeable drill with a 5mm drill bit, is used to drill holes in the tree. The battery life of the drill will not last very long, so make sure you have charged them up properly. 100mm deep holes are drilled into the sapwood at a downward sloping angle, drilling 1 to 2 holes at a time, then immediately (within 10 seconds) filling the holes with a glyphosate mix dependent on tree type. The holes are drilled approx. 15cm apart in a circular pattern around each and every multi-branch. The holes are easily filled using a drench gun. These are available from the Rural Co-op and Farmcare for approx. \$110.00, and are easy to use. The drill method is good in difficult to get to spots (eg. multi-stemmed tree).

Frilling

Use a small axe to cut into the sapwood at a downward angle. Three rows of cuts are made in a brick pattern around all multi-branches, low to the ground. 1 to 3 cuts are made before immediately filling the cuts with a glyphosate mix dependent on tree type. The cuts need to be filled slowly to avoid chemical spills. The axe is easy to use in readily accessible spots. Note: The cordless drill and the axe could be used together: the axe for the easily accessible trunks and the drill for the hard to get at multi-stems. This way the battery lasts a lot longer. An alternate method is to use a hammer and

chisel, which have the advantage of being able to get to awkward spots, and they never go flat or stop working after being dropped in the creek/river. A hone stone is handy to touch up the edge on the chisel or axe.

Scrape and paint

This is a variation of the cut, scrape and paint technique described above, the difference being the plant is not cut but left intact and scraped. This technique is suitable for Madeira Vine, saplings of Camphor Laurel and Privet as it ensures the translocation of the herbicide throughout the entire plant.

1. Scrape several sections of the stem along one side only, in lengths of at least 30 cm. The stem needs to be scraped firmly, exposing the fibres and/or light green coloured layer. Be careful not to sever the stem completely.
2. Each scraped section is immediately painted, prior to scraping the next section, with the recommended diluted glyphosate for the particular weed.

Crown grasses and herbs

Crowning: This technique is useful for weeds such as grasses and asparagus fern, which have their growing points below the surface of the soil. (corms, rhizomes or tufted fibrous root systems).

1. Grasp the leaves or stems of the plant and hold them firmly so that the base of the plant is visible. Any weeds with sharp leaves or stems should be cut back first.
2. Insert a knife close to the base of the plant at an angle, with the tip well under the root system.
3. Cut through the roots close to the base of the plant. Make sure that the hard crown or base of the plant where the roots begin is completely removed. It may require several cuts.
4. Hang the crowned plant matter up off the ground.
5. Follow up on a regular basis.

Manual removal (hand pulling)

Hand pulling: This requires holding the plant stem as close as possible to the base of the plant. Gently tug the plant. This will loosen the soil and allow the plant to come free. The plant may be hung up off the ground or piled in a heap.

Winding up: This process is suitable for plants with surface or climbing runners such as Morning glory.

1. You need to locate a runner, gently pull it along the ground towards you. Roll the runners up for easy removal. Continue doing this until all the runners have been rolled up. Small fibrous roots growing from the runners can be cut with a knife.
2. You should locate the main root system whilst removing the runners. When you do, remove it manually.
3. Do not leave any bits of stem or large roots, as these may reshoot.
4. Bag or compost the runners/roots.

5. Follow up on a regular basis.

Spray

Foliar spraying is a complementary or alternative method to some hand removal techniques. It is used in large areas of weed infestations that have a small native component or small dense areas of weeds with no natives. There are three different spraying techniques.

Spot spray

Spot spraying: is useful in areas with native seedlings present. In circumstances where solitary natives are scattered throughout a weed infestation, the individual trees may be covered or marked with a piece of bright coloured flagging tape. An area of about 10- 50 cm around the base of each native or clump of natives should be hand weeded. Spray units with adjustable nozzles should be set to produce a fine spray, at low to medium pressure. The weed clumps are sprayed with appropriate herbicide at the recommended strength plus a tracer dye. If a native is inadvertently sprayed, remove the affected leaves or immediately rinse off the herbicide with water.

HERBICIDE USE AND REQUIREMENTS

11.1.1 Safety Gear

When using herbicides, it is essential to equip yourself with appropriate safety clothing.

Key items are rubber gloves, overalls, shoes or boots, eye goggles and a hat. An agricultural respirator is required for moderately and highly toxic herbicides. Avoid any parts of your skin being in contact with any herbicide. Immediately wash any parts of your body which come into contact with any herbicide, particularly your hands before eating.

11.1.2 Training, Certification

Weed control should be undertaken by appropriately qualified and experienced professional bush regenerators, or by volunteers under the direct supervision of a appropriately qualified and experienced professional bush regenerator. Selecting the appropriate technique can be a matter of experience, both with local conditions, and the weed species being targeted.

11.1.3 Labels, Permits, MSDS

When using herbicides it is essential that you read the label on the container and follow the manufacturers' instructions. The label describes how the herbicide should be used (method and concentration, plus additives) for best results to control particular weeds. The permit describes the conditions under which the herbicide can be used in NSW. The MSDS describes a range of information about the chemical constituents in the herbicide, the most important of which is the safety measures required for use and first aid/medical treatment required following exposure.

11.1.4 Commonly used herbicides and additives

Glyphosate

Glyphosate is a systemic chemical which is inactivated upon contact with the soil. Roundup Bioactive™ and Weedmaster 360™ are products with improved surfactants, making them safer to use near waterways. Do not use Glyphosate within 6 hours of rainfall and where there is likelihood of rain within 24 hours.

LI 700®

LI 700® is a penetrant, which facilitates the transfer of the herbicide through the surface tissue and is often used for plants with waxy leaves, such as Madeira Vine and Wandering Jew. (Oils are also used for this purpose.) Manufacturer's instructions should be followed when using any penetrant.

This will help the chemical stick to the leaves, is rain-fast within minutes and helps spread the chemical evenly over the plant.

Tracer Dyes

Tracer Dyes are used with herbicides to improve efficiency and safety. The tracer allows areas/plants that have been treated to be identified. The tracer alerts anyone entering the treated area that a herbicide has been used for a short period of time. It also helps to ensure that the target plants are treated and non-target plants avoided.

Commonly used tracer is a red fluorescent dye such as Spraymate Marker Dye®. Manufacturer's instructions should be followed.

Metsulphuron Methyl

Metsulfuron is a non-residual herbicide, which is the active ingredient in Brushkiller® and Brushoff®.

11.2 WEED CONTROL – ALTERNATIVE METHODS

Repeated sprays with a knockdown herbicide (such as glyphosate) are effective in that they exhaust the soil weed seedbank, resulting in less weeds germinating after the planting. Residual herbicides prevent the weed seeds in the soil from germinating until the effect of the herbicide diminishes over time. Care should be used in the selection of herbicides: consider factors such as the development of herbicide resistance, residue in the soil, impacts on native plants and waterways. Alternatives to herbicides should always be considered.

Scalping (removing some of the surface soil) removes the majority of weed seeds and is very effective in a range of soils, although it may expose subsoils that are prone to cracking as they dry. Non-chemical methods include mulching with newspaper, straw, sawdust or similar; flaming; repeated cultivation and hand-chipping. Mowing reduces the vigour of the competing plants but is not as effective as complete removal. Many direct seeding machines have a built in scalping blade or disc to do weed control in a single pass. Most sites will still benefit from two-years of weed control prior to direct seeding.

Great care should be taken before exposing highly-erodible soils. Weed control should be in strips approximately one metre wide with a grassy strip retained between rows, or in spots one metre in diameter around each planting location.

12 APPENDIX THREE: BEST PRACTICE REVEGETATION GUIDELINES

12.1 Revegetation methods

In most situations direct seeding is far more cost effective than planting seedlings for broadscale vegetation establishment. Some broad direct seeding principles are:

- use seed with high genetic and physical quality
- treat seed to break dormancy where necessary
- the single most important factor in site preparation is weed control. Methods vary according to soil type, climate, weeds species present (both standing and in the soil seed bank), the scale of the project, equipment available and other site constraints
- use knockdown herbicides such as glyphosate, residual herbicides such as simazine or a combination of both. If knock-down only is used the more than one application is usually necessary to kill of successive flushes of germinating weeds from the weed seed bank.

Suitable methods for revegetation on this site include:

- Planting of tubestock and small pots

12.2 Direct seeding using brush matting

Branches of trees and shrubs such as hakeas or casuarinas laden with woody fruits can be lopped from another site and laid directly on the revegetation site. The seed-laden brush not only introduces seeds for regeneration, but can also act as a soil protection layer. By slowing overland water flow, water can infiltrate the soil and provide ideal conditions for germination. Wind blown seed from other species can also collect in the brush and germinate. It may also deter unwanted visitors from trampling or degrading the site in high use areas.

12.3 Before you start planting

Before commencing planting, ensure the following have been completed in order:

- Biodiversity Conservation licence has been approved to work in EECs on site
- Native flora has been retained
- Comprehensive weed control, including depleting the soil seedbank
- All necessary earthworks including soil stabilisation has been completed using appropriate geotechnical solutions
- Local native tubestock has been sourced for the site

12.4 Plant Establishment Phase

It is important to protect juvenile plants until they become tolerant of local conditions. Applied Ecology recommends watering for the initial 3 months of plant establishment. Watering regimes are in part dictated by prevailing climatic conditions and an appropriate watering regime must be established by the contractor to ensure adequate and acceptable plant survival. The most important activities necessary to maintain terrestrial plant growth during the establishment phase include:

- Watering
- weed control
- replanting
- plant protection

- restriction of public access
- monitoring plant establishment

12.4.1 Watering

Planted areas require high (but not excessive) soil moisture levels for plant survival. The first month after planting is a critical time for watering:

- if the soil is not waterlogged, sowed areas and young plant stock will require watering every 1-2 times per week, using manual or sprinkler irrigation. This should continue for a period of 1 month.
- if hot or windy conditions are encountered soon after planting then additional watering will be required
- a minimum of 500 mL of water per plant per week should be adopted as a general guide

After the first month of maintenance, planted areas should be watered as required to maintain a healthy condition and free of water stress. Progressively harden the plant to natural climatic conditions.

12.4.2 Weed Control

Weed growth should be monitored every month and controlled until plants are established. It may be necessary to remove weeds more frequently in the warmer, summer months when weed growth is rapid. Woody and vine weeds will require ongoing treatment of seedlings as they germinate.

12.4.3 Plant Replacement

Replanted terrestrial zones should be monitored monthly to ensure 90% plant establishment. Damaged or failed plants should be replaced with native plants endemic to the region. Provide plants with the following characteristics:

- large healthy root systems, with no evidence of root curl, or damage
- vigorous, well established and free from disease and pests
- hardened off and suitable for planting in the climatic conditions at the site

12.4.4 Monitoring Plant Establishment

The following activities are required for the duration of the project:

- set up fixed monitoring points to photograph and document the progress of plant establishment each month
- carry out plant counts to ensure at least 90% plant establishment
- monitor weed densities and record the control measures that appear to be most effective
- review the maintenance program and adjust the management of the terrestrial habitats according to these monitoring results