

Ecological Restoration Plan: Lawson Creek Upper Catchment

South Lawson Park Bushcare Group

Edition 1.0 February 2020

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A. Introduction

- South Lawson Park Bushcare Group (Group) was established in 1995 and has operated continuously since, under the auspices and supervision of Blue Mountains City Council (BMCC) and its appointed Bushcare Officer. For more details about the Group and *Bushcare* see: <https://southlawsonpark.bushcarebluemountains.org.au/> and <https://www.bushcarebluemountains.org.au/>
- The Group's ecological restoration plan (ERP) for the Lawson Creek upper catchment adopts the document *National Standards for the practice of ecological restoration in Australia* (edition 2.1 September 2018) as its planning model. See: <http://seraustralasia.com/standards/National%20Restoration%20Standards%202nd%20Edition.pdf>

- *Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed (SER 2004; Standards page 2).*
- *The Standards are relevant to—and can be interpreted for—a wide spectrum of projects ranging from minimally resourced community projects to large-scale, well-funded industry or government projects...The document provides a blueprint of principles and standards that will aid voluntary as well as regulatory organisations in their efforts to encourage, measure and audit ecologically appropriate environmental repair in all land and water ecosystems of Australia (Standards 1).*
- *The Standards list (i) the principles that underpin current best practice ecological restoration and (ii) the steps required to plan, implement and monitor restoration projects to increase their chance of success (Standards 3).*
- Accordingly, the Group has adapted the principles and standards of the National Standards to the limited resources available to a part-time and primarily volunteer bushcare group, to produce a concise and focused planning document. The plan is flexible, a *living document*, and can be modified to suit available resources. Crucially, the Group's ultimate aspiration is to restore to the significantly degraded upper catchment of a Blue Mountains' stream a high level of ecological functioning.

B. Ecological restoration principles

In this section the principles of the National Standards, and their ERP practical applications, are briefly outlined.

B.1 Aspiration (Principle Four Standards)

Qualification of a project as an ecological restoration activity is not determined by the duration of the project but by the intent to achieve the highest and best level of recovery possible (Standards 13).

The Group aspires to the restoration of a high level of ecological function to the site, the upper catchment of Lawson Creek, Lawson.

B.2 Local indigenous reference ecosystems (Principle One Standards)

A fundamental principle of ecological restoration is the identification of an appropriate reference ecosystem to guide project targets and provide a basis for monitoring and assessing outcomes. The reference ecosystem can be an actual site (reference site) or a conceptual model...target-setting needs to be informed by research into the anticipated

effects of climate change on species and ecosystems so that reference ecosystems and restoration targets can be modified as required. (Standards 4-6)

The Group has adopted specific local forest, riparian and swamp ecosystems as models to guide the restoration project, and is also mindful of available conceptual resources.

Adaptation of these models and resources to additional environmental influences such as climate change may be necessary.

B.3 Targets, goals and objectives (Principle Three Standards)

A restoration project will have greater transparency, manageability and improved chances of success if the restoration targets and goals are clearly defined and translated into measurable objectives (Standards 9).

- A target, and appropriate goals and objectives, are specified in the ERP.
- In this ERP completion dates for the goals and objectives have not been set as this is a community volunteer undertaking and resourcing levels are variable.

B.4 Appropriate inputs to site (Principle Two Standards)

...recovery may be able to occur without assistance, but in sites of somewhat higher [detrimental] impact, at least some intervention is likely to be needed to initiate recovery (Standards 6).

The Group commits to adopting a policy of intervening on the site only so far as is necessary, and appropriately:

- to maintain existing indigenous flora and fauna and their levels of natural resilience
- to foster natural regeneration as a first-choice re-vegetation strategy
- to utilise assisted natural regeneration where natural regeneration is not occurring i.e. distribute seed
- to utilise *reconstruction* techniques, such as replanting of provenanced indigenous flora, as a last choice option
- to minimise chemical application by engaging in manual weeding, avoiding spraying and utilising targeted dropper bottle cut and paint, or scrape, application only when necessary
- to minimise disturbance of existing abiotic features such as soil crust and water flow, and biotic features such as indigenous fauna.

B.5 Well informed restoration practice (Principle Five Standards)

Practitioner and stakeholder knowledge and experience, particularly where arising from local sources, is important to restoration practice. This knowledge however should, wherever

possible, be supported by knowledge drawn from informal and formal science. (Standards 16)

- The Group commits to using contemporary, appropriate, and professionally and scientifically developed restoration and work standards.
- In particular, the Group commits to utilising standards that comply with accepted and effective climate change management practices in conjunction with relevant ecosystem reference models.
- The Group also commits to the practice of adaptive management, noting ongoing successes, failures and potential for improvement.

B.6 Identify, connect to and work with stakeholders and community (Principle Six Standards)

Without considering...relationships between a site and its stakeholders, a restoration project may not gain the social support needed for success and may fail to deliver important benefits to ecosystems and to society (Standards 17).

The Group recognises the importance of connecting with relevant community stakeholders as a matter of social equity and also to ensure the success of the project.

C. The Plan: stakeholders, ecosystem inventory, targets, goals and objectives, implementation, monitoring, evaluation

Restoration projects need to adopt appropriate processes of planning, implementation, monitoring and evaluation to improve the chances of achieving the desired restoration outcomes (Standards 18).

C.1 Planning and design

In this section the stakeholders, the ecological significance and characteristics of the site, threats and detrimental impacts, reference ecosystems and finally, the actual targets, goals and objectives of the ERP, are outlined.

C.1.1 Stakeholder engagement

Stakeholders:

- The site is located within First Nations Gundungurra Country and is subject to the BMCC/Gundungurra Indigenous Land Use Agreement (ILUA).
- Local residents and the broader community are always welcome to join the Group. The Group has been well advertised over the past 25 years at community festivals and in print media. The South Lawson Park Bushcare Group film (2018) was well promoted and is online, the Group has a dedicated, active website, and the restoration site is signposted.
- Blue Mountains City Council administers the ERP site. The Group's work sites are mapped on BMCC Lawson Crown Lands Masterplan and the Group is an acknowledged site stakeholder. A BMCC Bushcare Officer and BMCC Community Conservation Officer are actively involved with the ERP.
- Lawson StreamWatch, part of the Greater Sydney Landcare Network, operates on Lawson Creek. Active liaison with GSLN takes place and adult members of the public are welcome at Lawson StreamWatch, which has a *page* on the Group's website.
- The neighbouring BMX club is aware of the presence and work of the Group, and the importance of maintaining the environmental integrity of Lawson Creek.

C.1.2 Ecological context

- The ERP project is designed to significantly enhance the ecological functioning of the upper catchment of Lawson Creek, and so complement the ecological functioning of the entire creek and its catchment and also the Erskine Creek catchment, by restoring the currently degraded indigenous flora communities of the Lawson Creek upper catchment and eliminating sources of invasive exotic flora, and enhancing landscape water retention capacity and water quality there.
- Connectivity between the indigenous flora and fauna of the upper catchment and the broader Lawson Creek and Erskine Creek catchments, and Blue Mountains National Park and the World Heritage Area, exists via passive open space, riparian and bushland corridors. Further ecological enhancement of these latter areas is planned as part of BMCC's Lawson Crown Lands Masterplan project (2019). See: <https://southlawsonpark.bushcarebluemountains.org.au/archive/2019-lawson-creek-and-environs-masterplan/>
- For specific locations, a Lawson catchment map and further Lawson catchment ecological context see:

<https://southlawsonpark.bushcarebluemountains.org.au/map/>

<https://southlawsonpark.bushcarebluemountains.org.au/lawson-creek/>

- Detailed map of the ERP site:



Figure 1 Upper Lawson Creek (LC). Key: #1 Western regeneration area; #2 Swamp; #3 Waratah Street; #4 Eastern riparian area. Ardill/ BMCC

C.1.3 Ecosystem baseline inventory

The four vegetation zones of the ERP, the current state of their fauna and flora, soil and water, and existing detrimental impacts, are described in this section.

There are four vegetation zones within the upper catchment (*Figure 1*):

- Zone #1 = degraded and modified bushland & western regeneration area
- Zone #2 = moderately degraded Blue Mountains Swamp/Riparian ecotone
- Zone #3 = degraded Waratah Street boundary
- Zone #4 = degraded Blue Mountains Riparian Complex & *E.piperita* & *Angophora costata* Open-forest.

C.1.3.1 Recorded ERP site Indigenous fauna species

See <https://southlawsonpark.bushcarebluemountains.org.au/the-landscape/> for overall Lawson Catchment indigenous fauna list.

Avifauna:

- Nil nesting species have been recorded.

- The ERP site attracts a range of indigenous avifauna, including smaller species, as some canopy sections are quite dense and surface water promotes insect life. See <https://southlawsonpark.bushcarebluemountains.org.au/the-landscape/> for recorded indigenous avifauna of the Lawson catchment.

Stream macroinvertebrates and crayfish

- A juvenile *Eustacus sp.* was recorded in the main Lawson Creek tributary, Zone 4, February 2020. No other evidence of aquatic fauna activity has been observed.
- Actual water quality is good but vegetative and stream habitat in the form of riffles, pools, decayed timber, leaf litter is very degraded in sections.
- There is potential for post-restoration re-colonisation by macroinvertebrates and crayfish, as both have been recorded at an established Lawson Creek StreamWatch testing site located 200m downstream of the ERP site. See *Lawson Creek macroinvertebrates* at <https://southlawsonpark.bushcarebluemountains.org.au/the-landscape/>
- However, the shallower upper sub-catchment tributaries, even when restored, may not constitute suitable habitat for some aquatic fauna species.

Frogs

- Striped Marsh Frog call has been recorded in #2 zone, 16/09/18, and numerous nearby calls (< 200 metres) of the Striped Marsh Frog and Common Eastern Froglet have been recorded.
- Potential exists for re-colonisation by additional frog species once habitat is restored: four frog species have been recorded within one kilometre of the restoration site and along a bushland/riparian corridor. See <https://southlawsonpark.bushcarebluemountains.org.au/the-landscape/>

Marsupials

- *Antechinus sp.* Antechinus species, traces/specimens, Waratah St east #4, August 2018
- *Perameles sp.* Probably *Perameles nasuta*, Long-nosed Bandicoot, 1995, traces 2018, Waratah St east #4
- *Petaurus breviceps* Sugar Glider, trace Waratah Street east, #4, July 2018
- *Pseudochirus peregrinus* Common Ringtail Possum, April 2016; Waratah St west #1
- *Trichosurus vulpecula* Common Brushtail Possum, July 2018 Waratah St east #1
- *Wallabia bicolor* Swamp Wallaby scats, Waratah St west #1, August 2018 & June 2019.

Reptiles

- *Chelodina sp.* likely *Chelodina longicollis*, Eastern Long-necked Turtle, Lawson Creek approx. 2000 #4
- *Lampropholis guichenoti* Common Garden Skink, frequently Waratah St east #4
- *Morelia spilota* Diamond Python, 2008 Waratah St east #4

- *Notechis scutatus* Tiger Snake, 2008 Waratah St east #4
- *Pseudechis porphyriacus* Red-bellied Black Snake, frequent 1984-present, Waratah St east #4
- *Pseudonaja textilis* Eastern Brown Snake, 1984-2012, Waratah St east #4
- *Tiliqua scincoides* Blue Tongue Lizard, approx. 2000 Waratah St east #4.

C.1.3.2 Recorded site Indigenous flora species

- See <https://southlawsonpark.bushcarebluemountains.org.au/the-landscape/> for overall Lawson catchment site indigenous flora species list
- Zone #1 modified bushland see *Schedule A*
- Zone #2 Blue Mountains Swamp see *Schedule B*
- Zone #3 Waratah Street see *Schedule C*
- Zone #4 Blue Mountains Riparian Complex in zone see *Schedule D*
- Zone #4 *E.piperita* & *Angophora costata* Open-forest in zone see *Schedule E*
- The more prominent site indigenous flora species are also listed in *C.1.3.4 site description* below.

C.1.3.3 Recorded site non-indigenous flora and fauna species

See <https://southlawsonpark.bushcarebluemountains.org.au/the-landscape/> for overall Lawson catchment non-indigenous species' list. Specific site non-indigenous species are listed in *C.1.3.4 site description* below.

- Privet and seedlings, Yorkshire Fog, Creeping Buttercup, Japanese Honeysuckle and Blackberry are the dominant invasive exotic flora species on the ERP site.
- Cats, rats and mice are likely but have not been observed.
- *Arion ater*, invasive Black Slug, has been observed once.

C.1.3.4 Site description: administration, topography, vegetation zones, specific zone indigenous flora and fauna

- For location and general site information see <https://southlawsonpark.bushcarebluemountains.org.au/>
- The total area of the ERP site is approximately one hectare.
- The site is situated within a moderately sloping, concave shaped, upper Lawson Creek and minor tributaries catchment area that was likely historically swamp and riparian in character.

- Exotic flora species, modified bushland and ecotones of indigenous flora intermingle with distinct indigenous vegetation communities.
- The entire site consists of NSW Crown land managed by BMCC.
- BMCC has endorsed and mapped the Bushcare Group's activities on the ERP site and the ERP project is supported by BMCC Bushland Management Team (Linda Thomas, Community Conservation Officer; Karen Hising, Bushcare Officer).
- BMCC provides occasional professional bush regeneration support on the site and aquatic system services support.
- *BMCC Bushcare Manual* standardised procedures apply to Group activities.

#1 Western regeneration area modified bushland 1500 m² approx.

- This is predominantly a level area.
- 10% of the total surface area, and its soil profile, is likely to be disturbed due to underground service pipelines.
- Open-forest/Riparian/Swamp ecotone restoration potential exists.
- Historically, dense stands of Privet, Montbretia and Japanese Honeysuckle occupied the zone, and in 2017 July these weeds were cleared by a BMCC contractor. See: <https://southlawsonpark.bushcarebluemountains.org.au/regeneration-techniques/>
- Good resilience capability exists and between 2017-2019 there has been good natural regeneration of native grasses, *Leptospermum* sp., *Gleichenia dicarpa*, *Homalanthus populifolius*, *Dianella* sp., and *Blechnum nudum* but structural diversity (layers) and spatial mosaic (variety/coverage/extent) are still lacking. See Schedule A.
- Treatment of minor stands of Privet and seedlings continues. Further seeding of Privet has been minimised and the Group is treating seedlings.
- Indigenous fauna includes Common Ringtail Possum, Swamp Wallaby (scats) with good avifauna visitation.

#2 Blue Mountains Swamp 1500 m² approx.

- The swamp has a basin formation with shallow slopes and primarily damp swamp conditions with flow channels present and water to 30cm during average rainfall conditions.
- There is good resilience potential present in the degraded sector as there are already dense stands of swamp indigenous flora including unidentified sedge (likely *Baumea rubiginosa*), also *Blechnums nudum* and *watsii*, *Leptospermum* sp., *Kunzea ambigua* on margin, *Gahnia sieberiana*, *Gleichenia dicarpa* with some good structure and spatial mosaic.
- Substantial exotic flora exists along the swamp edges particularly Blackberry (highly controlled), Privet (some control), *Juncus microcephalus*, Japanese Honeysuckle (controlled), *Melaleuca armillaris*, *Montbretia* sp.
- Common Ringtail Possum has been observed. Nil aquatic fauna.

#3 Waratah Street 600 m² approx.

- This is a 3m x 140m strip bordering the southern edge of central unformed Waratah Street.
- The area is gently sloping or level.
- This is the most degraded zone and vegetation consists predominantly of Privet, Blackberry and exotic grasses.
- The surface area and its soil profile and hydrology may be somewhat altered due to pipeline, road and urban/grazing impacts. They require further investigation.
- The site is well drained in parts but there are also exposed seepage sections and historically the zone may have been a swamp/riparian ecotone.
- There are scattered specimens of indigenous flora species eg. *Acacia elata*, Tree ferns and smaller ferns.
- Resilience levels may be low as little indigenous flora exists and the seed bank may be exhausted. Potential for adjacent indigenous flora seed dispersal exists.
- Indigenous avifauna (and naturalised Bulbuls feeding on Privet) frequent the canopy.

#4 Eastern Riparian/Open-forest area 5500 m² approx.

- This zone has level sections and then slopes steeply to the east with 2-4m cliffs and rock formations.
- There are overhead power lines and infrequent power company vegetation trimming operations.
- Good resilience potential and very good indigenous flora structural diversity and spatial mosaic exists over 70% of the zone.
- Indigenous vegetation predominantly consists of healthy *E.piperita* & *Angophora costata* Open-forest with riparian ecotone of *Gahnia sieberiana*, *Blechnum nudum*, King Fern, Bracken Fern, *Leptospermum sp.* and native grasses.
- Much of the Lawson Creek riparian zone has appropriate riparian vegetation, habitat and aquatic fauna.
- *Juncus microcephalus* and extensive mature Privet and seedlings thrive upstream.
- Three upper creek tributaries are shallow, of approx. 1 metre width with some ponding, with scattered indigenous flora and also extensive Privet infestation and *Juncus microcephalus* along banks.
- No aquatic fauna has been observed apart from a single juvenile *Euastacus sp.*
- Noticeable indigenous fauna includes breeding *Antechinus sp.*, avifauna feeding including Yellow-tailed Black Cockatoo, Sugar Glider traces and reptiles.

C.1.3.5 Detrimental impacts and threats

- On site exotic flora species, especially Privet and seedlings, are the most serious detrimental impacts. There is potential for exotic seed transfer from adjacent sites.
- Cats have not been sighted on the site but most likely roam the area. Fox and dog scats have not been sighted.
- Stormwater flows are mostly well managed as the site is reasonably well vegetated and rock lining for stormwater management has been established on the two major tributaries of Lawson Creek.
- Measured stream turbidity and phosphates are satisfactory, even in high rainfall events.
- Potential for ‘one-off’ sediment, chemical and pollution events from residential and industrial urban areas exists.
- Sewer pipelines extend both east-west and north-south across the site and have most likely resulted in some soil profile, erosion and hydrological disturbance over approximately several hundred square metres.
- The major anticipated climate change influences are a 10-20% per cent decrease in precipitation (currently 1200mm per year), and overall warming. Approximate current average temperature range is mild (10C-25C) but daily forecast maximums in excess of 35C in summer are now common.
- Occasional residential impacts such as rubbish dumping have been recorded.

C.1.3.6 Reference ecosystems

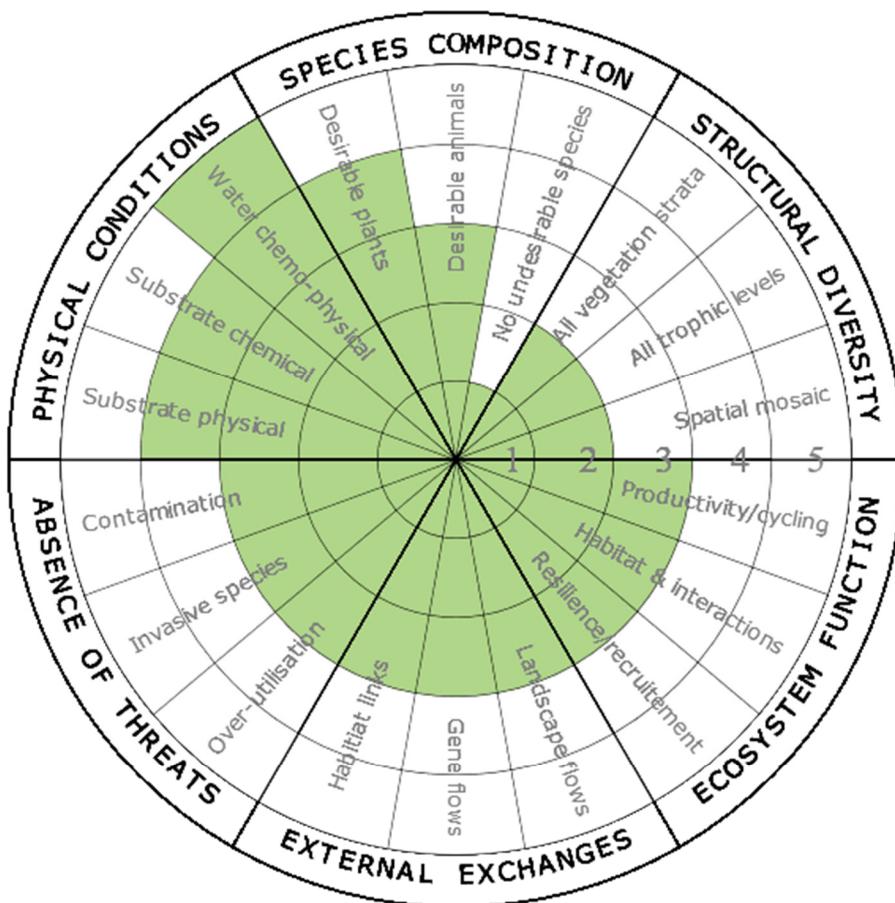
- As ‘reference ecosystem’ models to guide our work the Group adopts the following specific sites:
 1. Blue Mountains’ Upland Swamp: North Lawson Park/Park Road Swamp
 2. Blue Mountains’ Riparian Complex: South Lawson Park Lawson Creek Riparian Complex
 3. *Eucalyptus piperita - Angophora costata* Open-forest: South Lawson Park *Eucalyptus piperita - Angophora costata* Open-Forest.
- Conceptual reference ecosystems also exist and may be of use. For descriptions of the conceptual reference ecosystems go to
<https://www.legislation.nsw.gov.au/#/view/EPI/2015/829/sch6/dup1> Part 8 Schedule 6 Significant Vegetation Communities Blue Mountains LEP 2015
- For the locations of the specific reference ecosystem sites go to
<http://emapping.bmcc.nsw.gov.au/connect/analyst/mobile/?mapcfg=Locality#/main?mapcfg=Locality> North and South Lawson Parks/Vegetation Communities zonings: #5B Blue Mountains Swamps, #6 Riparian Complex and #11B *E. piperita - A. costata* Open-forest.
- Indigenous fauna reference guides of interest are:
 1. *Native Fauna of the Greater Blue Mountains*, J Smith, P Smith & K Smith; P & J Smith ecological Consultants (Pub), Blaxland, 2019

2. Smith, P. and Smith, J. 1995c. Flora and Fauna Study for Blue Mountains Environmental Management Plan – Study Area 3, Bullaburra to Linden. P. and J. Smith Ecological Consultants: Blaxland
3. *Blue Mountains Fauna Inventory Project*, First Edition 2019, Anne Carey, Katie Cordes, Georgina Galea at <https://www.bmcc.nsw.gov.au/bushland-management/native-animals>

C.1.3.7 Recovery Wheel (Figure 2)

- The ongoing recording of various site attributes on successive recovery wheels illustrates *the degree to which the project is achieving its ecosystem goals over time... A practitioner with a high level of familiarity with the goals and achievements of the project can shade the segments for each sub-attribute after formal or informal evaluation.* (Standards 10).
- Recovery wheel charting also influences the setting of site goals and objectives.
- The recovery wheel for 2020-01-24 reflects the baseline condition of the whole ERP site i.e. the condition at the commencement of the project.
- Although several zones/ecosystems are present within the overall ERP site, only one recovery wheel has been developed. The four zones/ecosystems of the site do impact upon each other, and so a picture of the overall ecological functionality of the entire ERP site was considered to be desirable. Observations and data from the individual zones were aggregated and conceptually averaged to produce the recovery wheel ratings. (Individual recovery wheels could be produced for each site zone/ecosystem and this method has its advantages too).
- The recovery wheel charting reveals that the overall site has promising levels of actual physical condition (soil and water quality) and indigenous flora and fauna (three to five star ratings on a five star rating system).
- The presence of undesirable species (mainly mature Privet and seedlings), lack of structural diversity (still large areas with poorly formed indigenous flora layers/strata) and presence of relatively bare areas and concentrations of exotic flora species (overall low spatial mosaic) are the major challenges facing the ERP site (one to two star ratings).

Next item: Figure 2



ASSESSOR: Peter Ardill

DATE: 2020-01-24

SITE: South Lawson Park ERP

Figure 2 Recovery Wheel

Source: SERA

C.1.3.8 Target, goals and objectives

Target:

Restoration of *four star** level ecological function to the tributaries and zones/ecosystems of the upper Lawson Creek catchment by re-establishing Blue Mountains Upland Swamp, Blue Mountains Riparian Complex and *Eucalyptus piperita - Angophora costata* Open-forest vegetation communities and ecotones and their associated indigenous fauna.

*Note: four star recovery level criteria: *A substantial subset of characteristic biota present (representing all species groupings), providing evidence of a developing community structure and commencement of ecosystem processes. Improved connectivity established and*

surrounding threats being managed or mitigated (Standards 13). Five star level represents maximum recovery.

Goals:

A. Appropriate liaison with all stakeholders.

B. #1 Western regeneration area:

- re-establishment of 90% and more cover (mosaic) of four star* indigenous flora level as Open-Forest/Riparian/Swamp ecotone via natural and assisted regeneration and possible replanting
- less than 10% Privet seedlings and other minor weeds cover on site
- natural regeneration of four star level of typical indigenous fauna species.

*Note: Four star species' composition recovery level: *Substantial diversity of characteristic biota (e.g. up to 60% of reference) present on the site and representing a wide diversity of species' groups* (Standards 15). Five star level represents maximum recovery.

C. #2 Swamp:

- nil Blackberry, *Juncus microcephalus* and Japanese Honeysuckle infestation and less than 10% Privet seedlings and other minor weeds
- re-establishment of 90% and more cover (mosaic) of four star indigenous flora level as Riparian/Swamp ecotone via natural and assisted regeneration and possibly replanting
- natural regeneration of four star level of typical indigenous fauna species.

D. #3 Waratah Street southern boundary:

- less than 10% Privet seedlings and minor weed cover
- re-establishment of 90% and more cover (mosaic) of four star level of Open Forest/Riparian/Swamp indigenous flora by either natural and assisted regeneration, and replanting
- natural regeneration of four star level of typical indigenous fauna.

E. #4 Eastern Riparian/Open-forest area:

- less than 10% Privet seedlings and minor weed cover
- re-establishment of 90% and more cover (mosaic) of four-star level of indigenous flora of Riparian Complex by natural and assisted regeneration and possibly replanting
- maintain healthy Riparian/Open Forest ecotone composition
- natural regeneration of four-star level of typical indigenous fauna.

Objectives (including restoration treatment prescriptions for zones):

(+ = priority)

A. Stakeholders:

- +advise Gundungurra First Nation of ERP and arrange site visit and feedback
- +ongoing South Lawson Park Bushcare Group ERP consultation
- circulate ERP to BMCC Bushland and Bushcare management, BMCC Bushcare Network and Blue Mountains' bushcare community and arrange site visit and feedback
- maintain liaison with Lawson StreamWatch and host site meeting with Greater Sydney Landcare Network/StreamWatch
- plan for publicising the ERP and its focus on restoring the upper catchment of a significant Blue Mountains' stream in the local and broader Blue Mountains' community and with BMCC Media Unit.

B. #1 Western regeneration area:

- +continue to foster natural regeneration
- +continue removal of Privet, seedlings and other woody weeds at manageable rates
- conduct soil profile test to aid with determining vegetation restoration status
- monitor and control as necessary herbaceous and grass weeds
- implement assisted regeneration and replanting if required
- continue monitoring and recording of fauna levels.

C. #2 Swamp:

- +continue removal of Privet and seedlings at manageable rates, and *Juncus microcephalus*
- +control Blackberry and Japanese Honeysuckle seedlings
- foster natural regeneration and existing strong stands of indigenous flora
- conduct soil profile test to aid with determining vegetation restoration status
- continue monitoring and recording of fauna levels.

C. #3 Waratah Street southern boundary:

- +commence and then continue staged, small section removal of Privet and seedlings and other weeds leaving protective exotic flora barrier in place to discourage unauthorised use of the site, at a pace that does not overly encourage uncontrollable Privet seedling regrowth
- +staged re-establishment of indigenous flora via natural regeneration if possible or assisted natural regeneration and replanting, and gradual removal of protective exotic flora barrier
- conduct soil profile test to aid with determining vegetation restoration status
- examine hydrology once access to zone gained
- commence monitoring and recording of fauna species.

D. #4 Eastern Riparian/Open-forest area:

- +commence staged and concurrent removal of mature Privet and seedlings and re-establishment of riparian indigenous flora along upper tributary banks most likely via

replanting of provenanced indigenous flora as natural regeneration may be exhausted

- +establish aquatic fauna habitat in the form of riffles, pools, decayed timber, leaf litter
- +continued removal and control of Privet and seedlings in riparian/woodland ecotone area and prevent any further seed distribution
- continue to foster natural regeneration in riparian ecotone
- continue water quality testing and observe for aquatic fauna such as crayfish
- test for macroinvertebrates after re-establishment of habitat
- continue monitoring and recording of fauna levels.

E. Fauna:

- +support natural regeneration of indigenous fauna species via appropriate selection of indigenous flora for replanting where appropriate e.g. flowering flora that encourages pollinators, seed productive flora for food e.g. *Acacia sp.*, *Hakea sp.*, *Kunzea ambigua*, and habitat providing flora e.g. *Eucalyptus sp.*
- further natural regeneration of indigenous fauna will be facilitated by the strengthening of the various zone's indigenous flora, and also by the extensive widening of the Lawson Creek riparian/forested corridor downstream as planned in the BMCC Crown Lands Management Plan
- commence where necessary and also maintain current observation and recording of indigenous fauna species, both individual specimens and scats, tracks and traces
- maintain observation and recording of potentially damaging exotic fauna species.

F. Monitoring of ERP:

- +establish fixed photo points and record site changes
- collate existing photographic record of zones
- continue to document work sessions in workbook and online, noting changes in zones
- revise recovery wheel at appropriate intervals
- explore Third Party or BMCC monitoring and assessment
- consider student/academic involvement for ERP assessment etc.

C.2 Implementation

South Lawson Park Bushcare Group meets monthly for three hourly work sessions and a significant proportion of its overall work is focused on the ERP site. See:

<https://southlawsonpark.bushcarebluemountains.org.au/about/>

Some important National Standards' considerations:

- The natural landscapes and waterways of the ERP zones are being retained and ecologically enhanced.

- The intrinsic values of nature are respected and nurtured. See <https://southlawsonpark.bushcarebluemountains.org.au/about/>
- All equipment is cleaned before and after work sessions.
- A trained and experienced Bushcare Officer supervises all work sessions.
- The maintenance of existing indigenous species and use of natural regeneration as a primary restoration technique are high priorities.
- BMCC Bushcare Manual/WHS procedures are followed.
- A range of support resources are utilised: BMCC Bushland Management Unit, BMCC Bushcare Officer and equipment, BMCC regeneration team and occasional contractor support, restoration association and industry news and reports.
- *Smaller budgets applied over long time-frames can be highly effective if works are limited to areas that can be adequately followed-up within available budgets before expanding into new areas* (Standards 38). On-ground works are carefully planned by BMCC Bushcare Officer and Group members.

C.3 Monitoring, Documentation, Evaluation, Reporting

- *The most direct and critical form of monitoring for adaptive management is routinely inspecting the site to identify whether restoration actions are working or need to be modified* (Standards 2).
- *A minimum standard of monitoring for small, volunteer projects is the use of photo points, along with species' lists and condition descriptions* (Standards 22).
- Work session notes are recorded after each session in the Group Log Book and also at <https://southlawsonpark.bushcarebluemountains.org.au/>.
- As part of their regular work activities, The Group will record the implementation and achievement of specific objectives and goals, via site observations, photos, documentation and comparison with successive recovery wheels.
- Potential exists for BMCC Bushland Management staff, or independent/student/academic assessors, to inspect and comment on ERP progress.
- BMCC Bushland Management, and also the Group, will be responsible for post-ERP maintenance.

Prepared by Peter Ardill
South Lawson Park Bushcare Group
February 2020

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The author accepts responsibility for all errors.

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Schedules A, B, C, D, E

Schedule A – Zone #1 Modified Bushland indigenous flora on site

Entolasia sp. grass

Gleichenia dicarpa

Hakea sp. shrub/small tree, extensive

Homalanthus populifolius Bleeding Heart, small tree

Leptospermum polygalifolium

Pittosporum undulatum

Polyscias sambucifolia

Schedule B – Zone #2 Mountains Swamp indigenous flora on site

Baumea rubiginosa? sedge

Blechnum nudum Fishbone Fern

Blechnum wattsii fern

Gleichenia dicarpa fern

Cyathea australis Rough Tree Fern, margins

Leptospermum polygalifolium Tea-tree

Schedule C – Zone #3 Waratah Street indigenous flora on site

(Small quantities or single specimens)

Acacia elata

Blechnum nudum

Blechnum wattsii possible

Cyathea australis Rough Tree Fern

Gahnia sieberiana Saw Sedge

Schedule D – Zone #4 Riparian zone indigenous flora on site

Blechnum nudum fern

Blechnum wattsii fern

Calochlaena dubia fern

Gahnia sieberiana Saw Sedge

Gleichenia dicarpa fern

Leptospermum polygalifolium small tree

Pittosporum undulatum as modified bushland species

Polyscias sambucifolia Elderberry Panax, tall shrub on edge of swamp

Todea Barbara King Fern

Schedule E - Zone #4 *E. piperita* & *Angophora costata* Open-forest indigenous flora on site

Acacia terminalis Sunshine Wattle

Angophora costata Smooth-barked Apple, tree

Dianella caerulea Blue Flax Lily

Dillwynia retorta shrub

Entolasia sp. Right-angled grass

Eucalyptus piperita Sydney Peppermint, tree

Gompholobium sp. shrub

Goodenia bellidifolia

Hakea dactyloides shrub/small tree

Hakea salicifolia shrub/small tree

Isopogon anemonifolius Drumsticks, shrub

Lambertia formosa Mountain Devil, shrub

Leptospermum polygalifolium, Tea-tree, small tree

Leptospermum trinervium, Flaky-bark Tea-tree, small tree

Lomandra longifolia

Lomandra obliqua

Lomatia silaifolia

Microlaena stipoides Weeping Meadow grass

Patersonia sericea Native Iris

Petrophile pulchella shrub

Polyscias sambucifolia Elderberry Panax

Pteridium esculentum Bracken Fern
