Fraser Ecological Consulting

abn 797 637 40114

665 Scenic Road

Macmasters Beach NSW 2257

telephone 042323 8193

Vegetation Management Plan

880 Londonderry Road

LONDONDERRY

AUGUST 2019 UPDATE

26th August 2019

SUMMARY

Fraser Ecological Consulting has been contracted by Mark Cohen to prepare a Vegetation Management Plan for bushland to be retained as part of the proposed development.

A majority of the subject site comprises a degraded form of Castlereagh Scribbly Gum Woodland which is listed as a Vulnerable Ecological Community listed under the NSW *Threatened Species Conservation Act 1995*.

Threatened species including *Grevillea juniperina subsp. Juniperina* and Cumberland Plain Land (CPL) Snail (*Meridolum corneovirens*), listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) was recorded at the rear of the site within the area to be protected as part of the Vegetation Management Plan via installation of fencing.

Weed control from areas of high resilience to low resilience, upper slope to lower slope in accordance with the '*Bradley Method*' (Buchanan 1989) shall be undertaken in 3 stages described as primary, secondary and maintenance weeding. Weed control techniques including hand removal and herbicide application have been described in detail and have been recommend for particular species of concern including woody weeds, small hand pull-able plants and those with underground reproductive structures.

Recommendations for noxious and environmental weed control have been provided.

Recommended bushfire protection measures to be implemented to protect the residence in accordance with *Planning for Bushfire Protection 2006*.

Disclaimer

This document may only be used for the purposes for which it was commissioned.

Fraser Ecological Consulting accepts no liability or responsibility in respect of any use or reliance upon this report by any third party.

Unauthorised use of this report in any form is prohibited.

Licensing

When conducting flora and fauna surveys, consultants are required to possess licences to ensure that works are completed in an appropriate manner. Fraser Ecological Consulting is licensed under s.132c and s.91 of the NSW National Parks and Wildlife Act (1974) from the NSW Office of Environment & Heritage. This allows Alex Fraser to undertake scientific investigations, collect specimens of protected flora and fauna across NSW in service and non-service areas and undertake bushland restoration works in EECs. This licence requires that all survey results are reported to the NSW NPWS for inclusion into the Atlas of NSW Wildlife.

Alex Fraser also holds an Animal Research Authority under the Animal Research Act (1995), as administered by NSW Agriculture. Surveys are approved and supervised by an Animal Care and Ethics Committee, applying the standards as detailed in the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes (NHMRC 1997).

1. Site characteristics and development proposal

The study site is located approximately 50km north-west of the Sydney CBD within the Sydney Basin Bioregion (Figure 1 and 2).

The entire property (Lot 3 DP 539282) is an existing vacant rural residential occupying an area of approximately 3.16 hectares. The site for the proposed dwelling and shed (the 'subject site') occurs 390m from the road frontage where there is adequate and more suitable area to provide these structures that are permissible and consistent with the zoning of the property (Figure 3).

The driveway from Londonderry Road to the proposed shed and dwelling site is approximately 330 metres long.

The subject development application that will be lodged with Penrith City Council takes into consideration the following impacts:

- Construction of new dwelling house (occupying approximately 1000 sqm)
- Construction of shed (re-positioned along the southern boundary)
- parking and turning area in front of shed
- Bushfire Asset Protection Zone (APZ) for a reduced extent of 24m (by increasing the BAL rating from the originally proposed BAL 12.5 to BAL 40)
- Wastewater disposal area within the APZ
- Retention of all native vegetation at the rear of the property including E2 zone (2.16ha) which is subject to this Vegetation Management Plan
- This includes fencing to restrict access for vegetation disturbance as requested by Council
- Minimal vehicle access along fence lines to allow property maintenance

One threatened species - *Grevillea juniperina* subsp. *juniperina*, listed as vulnerable under the NSW Threatened Species Conservation Act 1995 (TSC Act) was recorded at the rear of the site within the area to be protected as part of the Vegetation Management Plan. The plant will be outside the bushfire Asset Protection Zone (Figure 4).

Following recent targeted fauna surveys, the following threatened fauna were recorded on-site:

- Three (3) threatened species including Eastern Freetail Bat (*Mormopterus norfolcensis*), Little Bent-wing bat (*Miniopterus australis*) and Greater Broad-nosed Bat (*Scoteanax ruepelli*) listed under the NSW *Threatened Species Conservation Act 1995*
- Cumberland Plain Land Snail (*Meridolum corneovirens*) listed as Endangered under the NSW *Threatened Species Conservation Act 1995* was recorded dead at 2 locations at the western end of the study area as shown in Figure 5.

Installation of post and rail fencing as recommended within Section 8 will protect the local population of recorded threatened species mentioned above.

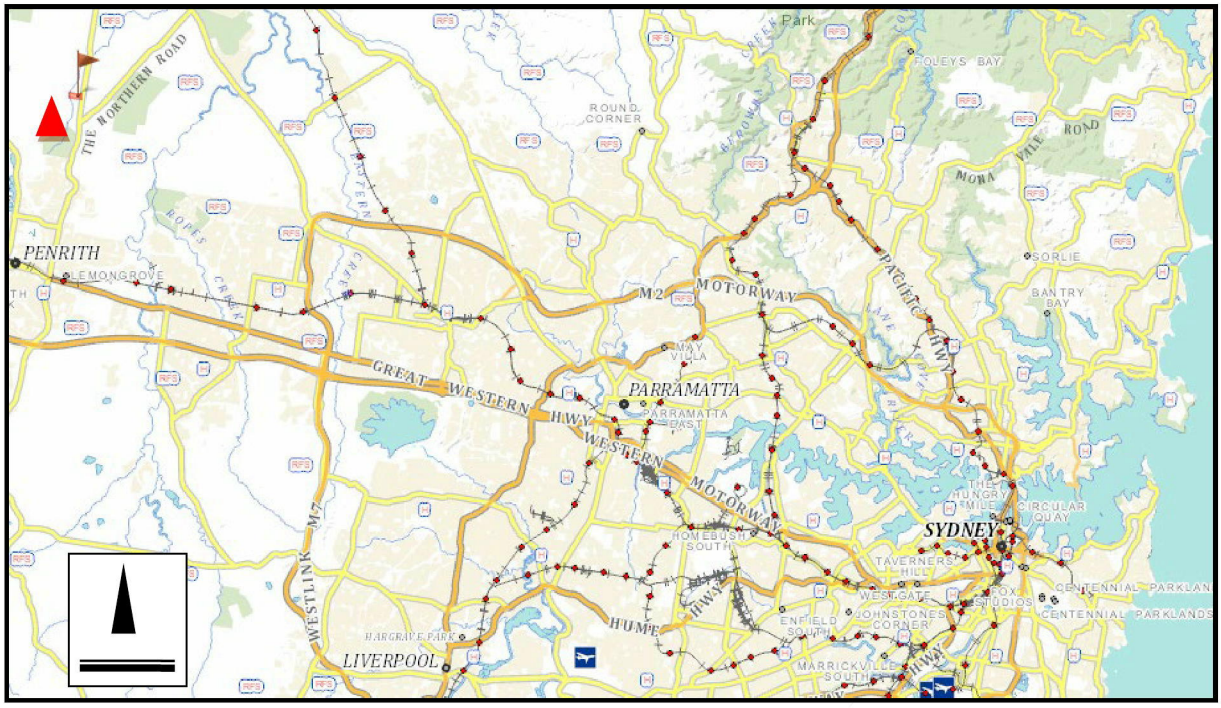


Figure 1: The site in context of the Sydney Basin bioregion

Figure 2: Aerial map of the entire property boundaries (Source: SIX Maps)

Figure 3: Aerial map of the subject site showing the approximate vegetation clearing in orange polygon equating to approximately 7830sqm (Source: SIX Maps)

Figure 4: Location of *Grevillea juniperina* subsp. *juniperina* plants recorded on site (red markers)

Figure 5: Location of CPL Snails recorded during recent surveys

1.1 Climate

The climate of the area is temperate with mild to hot summers and cool to cold winters. The Bureau of Meterology summary statistics for rainfall for all years at the nearest weather station (Castlereagh Station No. 60072) is provided in Figure 5 (below). The local rainfall patterns influence the vegetation and habitat presents on site.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	105.7	115.4	85.0	65.9	56.6	64.2	34.1	43.1	39.9	60.4	79.5	68.4
Median	79.0	86.8	75.6	34.1	30.5	32.2	16.8	22.0	30.0	40.8	72.5	50.4
Highest Daily	167.6	200.0	167.6	95.6	191.8	100.0	138.4	171.0	172.0	66.0	113.0	94.0

Figure 6: Bureau of Meterology summary statistics for rainfall for Castlereagh Weather Station No. 60072

1.2 Geology

The Penrith 1:100 000 Soil landscape of the Penrith 1:100 000 map sheet (Hazelton et al 1989) producedby the NSW Office of Environment and Heritage identifies the site as being part of the Berkshire Park soil landscape. The Berkshire Park soil landscape is found on the low rises of the Tertiary geology of the Hawkesbury/Nepean River system. Soils are weakly pedal of heavy orange clays and clayey sands. These soils are often mottled. Large silcrete boulders can occur as can unstructured plastic clays. Berkshire Park soils are prone to wind erosion when cleared of vegetation.

The limitation of this soil landscape is that it has very high wind erosion if cleared and gully, sheet and rill erosion on dissected area. It is also susceptible to water logging, impermeable subsoils and low fertility (Hazelton et al 1989).

Landscape—dissected, gently undulating low rises on the Tertiary terraces of the Hawkesbury/Nepean River system.

Soils—weakly pedal orange heavy clays and clayey sands, often mottled. Ironstone nodules common. Large (up to 20 cm) silcrete boulders occur in sand/clay matrix. Solods (Dy3.41), yellow podzolic soils (Dy4.11, Dy2.11, Dy2.21, Dy2.22), red podzolic soils (Dr4.11), chocolate soils (Dr4.11, Dr4.61), structured plastic clays (Uf6.11, Uf6.12), structured clays (Uf5.23, Gn4.11 and Gn3.11).

Limitations—very high wind erosion hazard if cleared. Gully, sheet and rill erosion on dissected areas. Localised seasonal waterlogging, localised flood hazard, impermeable subsoils, low fertility.

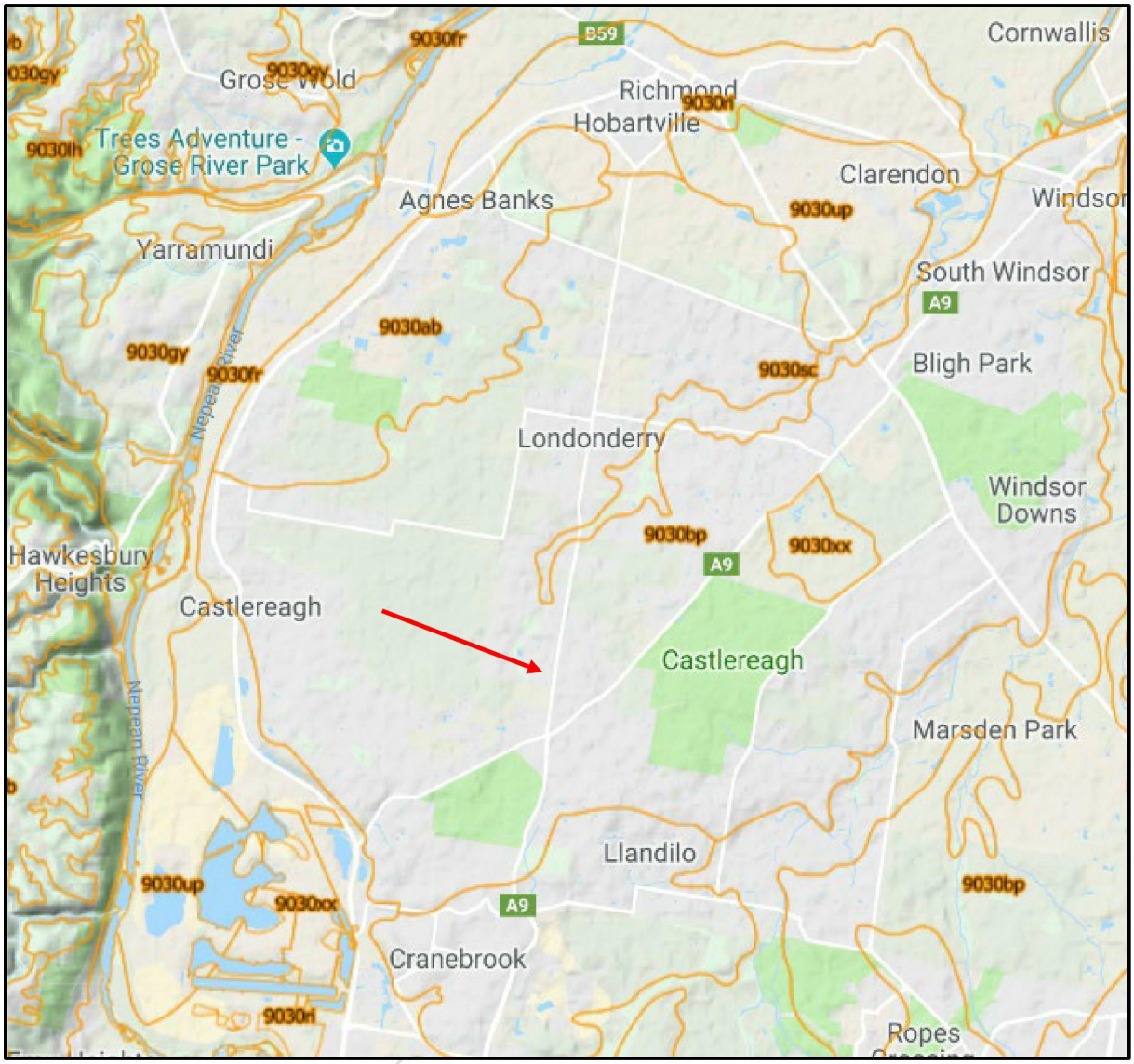


Figure 7: Berkshire Soil Landscapes mapped for the site

2. VMP Objectives

This report provides recommendations including:

- Bushland restoration techniques encouraging natural regeneration
- Revegetation techniques
- Erosion control
- Establishment and maintenance of an Asset Protection Zone in accordance with NSW Rural Fire Service guidelines and *Planning for Bushfire Protection2006*
- The removal and suppression of introduced and environmental weeds
- Maintenance requirements for plan implementation

The major objective of this plan is to provide a working document to deliver successful weed management in the long term and thus enhance and protect habitat for threatened species. This is to be achieved by weed management, regeneration of the native vegetation and supplementary native plantings where appropriate. In recognition of the site's sensitive nature, the actions are also consistent with the "*Checklist for Bush Regeneration Activities in the Habitat of Threatened Species, Endangered Populations and Endangered Ecological Communities*" issued by the NSW National Parks and Wildlife Service (see Appendix 1). The plan is also in accordance with "*Bush Regeneration- Recovering Australian Landscapes*" (Buchanan 1989) and "*Bringing the Bush Back to Western Sydney*" (DIPNR and AABR 2003).

The area subject to this VMP will be protected and managed as part of the development consent and is likely to be stipulated by Council that:

- any future dwelling and associated development is confined to the building envelope on the approved plans
- the vegetation within this area is to be managed in accordance with this plan
- noxious and environmental weeds are to be managed and controlled within this area

3. Methods

3.1 Desktop survey

A desktop survey is performed to ensure all relevant documentation is considered when preparing the plan. Documents surveyed include:

- Aerial photographs
- Topographic maps
- Appendix 5 of Planning for Bushfire Protection (NSW Rural Fire Service)
- Standards for Asset Protection Zones (NSW Rural Fire Service)
- *Guidelines for the preparation of Vegetation Management Plans* (Department Infrastructure Planning and Natural Resources 2007).
- Sydney Soil Landscape Series Sheet 9130 (Chapman and Murphy 1998)
- Planning for Bushfire Protection (2006)
- Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion – profile https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20154
- Juniper-leaved Grevillea – Profile https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10367

3.2 Field Surveys

A visual inspection was undertaken in October 2018 and January 2019 to identify and evaluate vegetation assessment including floristics, structure, extent, type and projective foliage cover, presence of weed species and other significant features were noted and recorded). All flora recorded were predominantly identified to family, genus and species level with confirmation according to *Field Guide to the Native Plants of Sydney* (Robinson, 2003), *Weeds of the south-east: an identification guide for Australia* (Richardson, 2006) and the Botanic Gardens Trust (2009) *PlantNET* flora database.

Activities specifically related to the preparation of this plan included:

- Identification of native and weed species occurring on the subject site
- Determination of appropriate revegetation and rehabilitation techniques (where appropriate)
- Determination of appropriate weed control techniques

- Outlining the applicant's responsibilities including environmental safeguards, performance criteria and preparation of a schedule of works for the plan's implementation.

4. Vegetation and threatened plants

The site contains Cooks River/ Castlereagh Ironbark Forest which is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and an Endangered Ecological Community under the *NSW Threatened Species Conservation Act 1995*.

The site is likely to be a transition zone between Castlereagh Scribbly Gum Woodland (Vulnerable Ecological Community of lower conservation significance) due to similar species present of both vegetation communities.

This native vegetation is generally dominated by *Eucalyptus fibrosa* (Broad-leaved Ironbark) and *Corymbia gummifera* (Red Bloodwood) trees that are approximately (15-20m tall). The mid-storey vegetation is largely dominated by smaller trees of *Melaleuca decora,* (10-15m tall). The groundcover is generally bare, however, there is the occasional occurrence of some natives including common grass species such as *Lepidosperma laterale* and *Entoalsia stricta*. Sparse shrubs of *Bursaria spinosa* and *Ozothamnus diosmifolius* were recorded. The vegetation community was considered to be in moderate to good condition.

The area where the proposed shed and fence line maintenance area was considered to be poor condition, as it was subject to edge effects and included some existing dead trees.

One threatened species - *Grevillea juniperina* subsp. *juniperina*, listed as vulnerable under the NSW Threatened Species Conservation Act 1995 (TSC Act) was recorded at the rear of the site within the area to be protected as part of the Vegetation Management Plan. The plant will be outside the bushfire Asset Protection Zone (Figure 4). Installation of post and rail fencing as recommended within Section 8 will protect the local population of this plant.

5. Fauna habitat features

The main development impact area provides fauna habitat in the following forms:

- Seasonal foraging resources when eucalypts and other plants flower provide nectar and insect resources for mobile fauna including Grey-headed Flying Fox, possums, gliders, microchiropteran bats and a variety of woodland bird species
- marginal foraging area for owl species that may periodically roost or glean prey items such as possums from the area

The site does not contain significant unique habitat features in habitat hollows (in trees), hollow logs and other dead wood on the forest floor, rocky outcrops, creek lines, dams and a diverse vegetation habitat structure as the site vegetation strata is limited to tree canopy and groundcovers.

It is likely that a variety of common woodland birds frequent the locality. Blossoms from flowering canopy of Myrtaceae would attract a variety of nectivores including possums, birds and threatened Grey-headed Flying Fox.

Nocturnal arboreal marsupials including Common Brushtail Possum are likely to occasionally use the site for foraging. Reptiles likely to occur include a variety of snakes (Red-bellied Black Snake and Brown Snake).

Large Forest Owls including threatened Barking Owl (*Ninox connivens*) may occasionally visit the site depending upon the availability of prey such as Common Ringtail Possum (*Pseudocheirus ringus*), however important breeding habitats in the form of tree hollows were absent.

Cumberland Plain Land Snail surveys

Targeted searches for Cumberland Plain Land (CPL) Snail (*Meridolum corneovirens*) was also undertaken across the entire property by 2 experienced ecologists. The surveys were undertaken at the ideal time following a brief period of rain. Targeted searches were undertaken through debris on the ground (i.e. fallen logs, bark at base of trees and dumped rubbish material). Species verification was undertaken by ID confirmation from Dr. Frank Koeheler, invertebrate expert at Australia Museum. The location of any recorded individuals was recorded by handheld GPS and mapped on aerial photograph (Figure 6).

Cumberland Plain Land Snail (*Meridolum corneovirens*) listed as Endangered under the NSW *Threatened Species Conservation Act 1995* was recorded dead at 2 locations at the western end of the study area as shown in Figure 5. The species was recorded outside the proposed works area. The species was confirmed via photographic reference from Dr. Frank Koelher from the Australian Museum who is a well known NSW invertebrate expert.

The entire property contains potential habitat for this species, however, despite targeted surveys only two (2) individuals of the species were recorded (at the rear of the property). This species will not be impacted by the property as sufficient areas of known habitat will retained

Cumberland Plain Land Snail primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities.

Cumberland Plain Land Snail lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish and can dig several centimetres into soil to escape drought. Is a fungus specialist and is generally active at night. Little is known of its biology, including breeding biology. It is known to be hermaphroditic, laying clutches of 20-25 small, round, white eggs in moist, dark areas (such as under logs), with the eggs taking 2-3 weeks to hatch. There is a suggestion that the species breeds throughout the year when conditions are suitable.

Installation of post and rail fencing as recommended within Section 8 will protect the local population of this species.

6. Management actions/ recommendations

All works are to be carried out in accordance with this plan.

This plan shall be formally activated from the issue of the Construction Certificate.

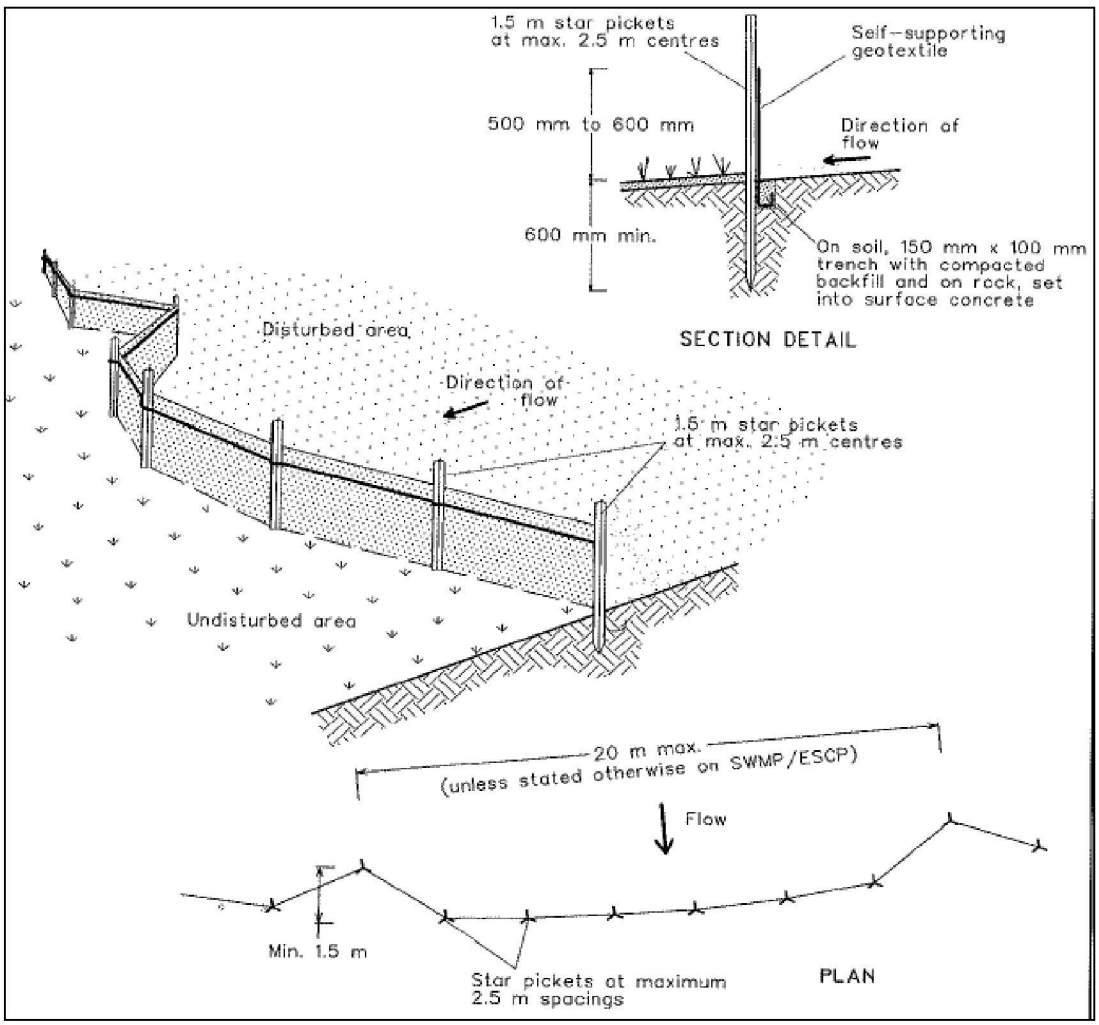
The main actions recommended within this VMP are:

1) Maintain recently installed rear fence to protect the E2 environment protection zone
2) Maintain boundary fencing and access long property boundary
3) Install post and rail fence (with gate vehicular access at both boundary fences edges) as depicted in Figure 8
4) Environmental weed control
5) Installation of sediment/erosion control during construction
6) Thinning out dense shrub layer and retain large Ironbark trees as a rural property similar to adjacent properties
7) Maintenance of the Asset Protection Zone for bushfire protection

Some of the specific techniques required to undertake these actions are provided in the following section.

6.1 Erosion and Sediment Control

All erosion and sediment controls (i.e. geotextile sediment fence and straw bales) shall be in place before any works begin so as to protect the remnant bushland and native fauna habitat. Techniques used for erosion and sediment control on building sites are to be adequately maintained at all times and must be installed in accordance with Council guidelines. All techniques shall remain in proper operation until all development activities have been completed and the site fully stabilised. This condition must be complied with during building work.



6.2 Mulching

After the initial weeding, exposed soil may be covered by wood chips, leaf mulch or jute matting to prevent soil loss in the event of heavy rainfall, soil temperature fluctuation and weed invasion. This will not only reduce soil loss downslope, but also protect young plants and help conserve moisture, as many weeds can successfully compete with seedlings for nutrients and water.

Any mulch brought onto the site must be native mulch and certified weed free. The native vegetation approved for removal shall be used back on the site.

It is recommended mulch be applied to the boundary areas where vehicle access will be maintained.

6.3 Weed Control

Weed control is important to reduce fuel loads and stop noxious and environmental weeds from invading Council bushland on the neighbouring property.
Weed control from areas of high resilience to low resilience, upper slope to lower slope in accordance with the Bradley Method (Buchanan 1989) is to be undertaken in 3 stages described below:

1) Primary weed control: The first step. Targets primary weeds but does not remove all weeds as the soil will be eroded (DEC 2005). Areas identified with the greatest resilience (e.g. around the base of remnant trees) should be cleared first to encourage regeneration from the soil seed bank. Involves getting rid of larger debris and raking up areas of invasive creepers. All non-exotic woody material is to be retained within the BGHF zone as fauna habitat.

2) Secondary weed control: Intensive follow up weeding straight after primary weeding and treating weed seedlings as they germinate (Buchanan 1989). The weeds progress is monitored and some are allowed a month or two of annual weed growth before they are treated. Sites in good condition require little follow-up while others in worse condition require more effort.

3) Maintenance weeding: Maintain and controlling low weed levels ensuring new weeds that have moved into the area or have had the chance to germinate are eliminated.

Weed Management Techniques

Weeds are to be progressively removed in accordance with the following techniques recommended by the National Trust, NSW National Parks and Wildlife Service and Australian Association of Bush Regenerators.

Bush regeneration techniques are described as a guide to infer their intended performance. These techniques are to be implemented by a qualified and experienced bush regeneration company. The use of trained personnel will ensure correct plant identification, work methods and compliance with required Occupational Health and Safety standards.

Woody Weeds Removal Techniques

1) Cut and Paint

This technique involves cutting the weed (using chainsaw, bush/ pruning saw, secatuers or loppers) at the base of the stem an immediately painting them.

- Make a horizontal cut close to the ground using secateurs, loppers or a bush saw; and
- Immediately apply herbicide to the exposed flat stump surface.

Considerations:

- Cuts should be horizontal to prevent herbicide from running off the stump, sharp
- angle cuts are hazardous;
- Herbicide must be applied immediately before the plant cells close (within 30
- seconds) and translocation of herbicide ceases;
- If plants re-sprout, cut and paint the shoots after sufficient regrowth has occurred; and
- Stem scraping can be more effective on some woody weeds.

2) Stem Injection

- At the base of the tree drill 10mm diameter holes at a 45 degree angle into the
- sapwood;
- Fill each hole with herbicide immediately; and
- Repeat the process at 5 cm intervals around the tree.

3) Frilling

- At the base of the tree make a cut into the sapwood with a chisel or axe;
- Fill each cut with herbicide immediately; and
- Repeat the process at 5 cm intervals around the tree.

Considerations:

- Plants should be actively growing and in good health;
- Deciduous plants should be treated in spring and autumn when leaves are fully formed;
- For multi-stemmed plants, inject or chip below the lowest branch or treat each
- stem individually; and
- Herbicides must be injected immediately before plant cells close (within 30
- seconds) and translocation of herbicide ceases.

Small Hand-Pullable Plants Removal Techniques

1) Hand Removal

- Remove any seeds or fruits and carefully place into a bag;
- Grasp stem at ground level, rock plant backwards and forwards to loosen roots
- and pull out; and
- Tap the roots to dislodge any soil, replace disturbed soil and pat down.

Considerations:

- Leave weeds so roots are not in contact with the soil e.g. Rafted in a dedicated area, composted in dedicated bin or removed from the site via green waste bin.

Vines and Scramblers Removal Techniques:

1) Hand Removal

- Take hold of one runner and pull towards yourself;
- Check points of resistance where fibrous roots grow from the nodes;
- Cut roots with a knife or dig out with a trowel and continue to follow the runner;

- The major root systems need to be removed manually or scrape/cut and painted with herbicide; and
- Any reproductive parts need to be bagged.

2) Stem Scraping

- Scrape 15 to 30 cm of the stem with a knife to reach the layer below the
- bark/outer layer; and
- Immediately apply herbicide along the length of the scrape.

Considerations:

- A maximum of half the stem diameter should be scraped. Do not ringbark;
- Larger stems should have two scrapes opposite each other; and
- Vines can be left hanging in trees after treatment.

<u>Weeds with Underground Reproductive Structures Removal Techniques</u>

1) Hand Removal of Plants with a Taproot

- Remove and bag seeds or fruits;
- Push a narrow trowel or knife into the ground beside the tap root, carefully loosen
- the soil and repeat this step around the taproot;
- Grasp the stem at ground level, rock plant backwards and forwards and gently pull removing the plant; and
- Tap the roots to dislodge soil, replace disturbed soil and pat down.

2) Crowning

This technique is useful when the weed may regenerate from root material left in the soil.

- Remove and bag stems with seed or fruit;
- Grasp the leaves or stems together so the base of the plant is visible;
- Insert the knife or lever at an angle close to the crown;
- Cut through all the roots around the crown; and

- Remove and bag the crown.

Herbicide Treatment – Stem Swiping

- Remove any seed or fruit and bag; and
- Using a herbicide applicator, swipe the stems/leaves.

Considerations:

- Further digging may be required for plants with more than one tuber;
- Some bulbs may have small bulbils attached or present in the soil around them
- which need to be removed;
- It may be quicker and more effective to dig out the weed;
- Protect native plants and seedlings; and
- For bulb and corm species the most effective time to apply herbicide is after
- flowering and before fruit is set.
- Exotic vegetation should be removed and stockpiled in a clear area away from adjoining bushland. This stockpile should be removed from the site at a convenient time. As part of the regular maintenance of the restored area any regrowth of the exotic plant species should be removed and disposed of appropriately.

Use of Herbicides

Herbicides are required for use with the cut and paint technique to control woody weeds and spraying exotic herbs and grasses.

IMPORTANT NOTE: Herbicides can cause serious environmental harm if not used properly and enter waterways.

Herbicides should not be applied 0 to 12 hours prior to rain occurring. This reduces the herbicides effectiveness as well as being transported in runoff to creek lines and waterways. An advantage of herbicide use is the low time taken to spray weeds as compared to physically removing them, particularly for large infestations of weeds.

The use of herbicides should be considered when:

- There are small areas of dense weeds with few or no native plants to protect;

- There are large areas of weeds;
- The weeds are growing too rapidly for physical removal; and
- The weeds are located in areas with a high potential for erosion if vegetation is removed.
- The success of each treatment must be evaluated by the operator after a set period of time

6.4 Requirements of an Inner Protection Area (IPA)

The site shall be treated as an Inner Protection Area.

The purpose of the IPA is to ensure that the presence of fuel, which could become involved in fire, is minimised. Minimum fine fuel is permitted at ground level, which could be set alight by bushfire. This area should have all fuel removed e.g. fallen branches, leaf build-up.

IPA vegetation requirements:

- Trees should be well spread out and do not form a continuous canopy;
- Plant species used are not to be species that retain dead material or deposit excessive quantities of ground fuel in a short period; and
- Are located far enough away from the house so that they will not ignite the house by direct flame contact or radiated heat emissions.

General recommendations for maintenance of IPA zones:

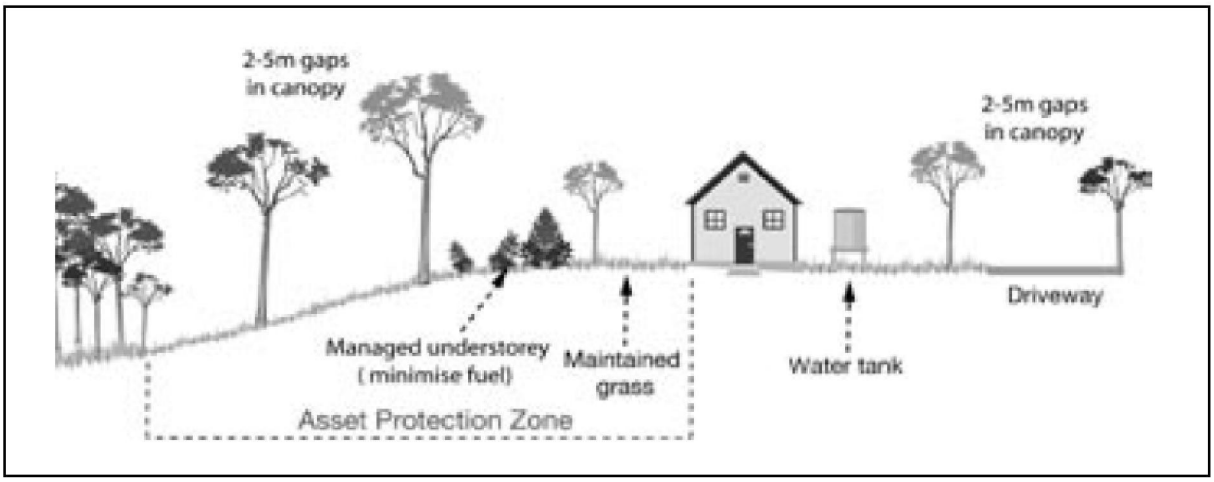
- All vegetation will be maintained in a fuel free condition;
- Controlled burning is not required. Manual fuel reduction will sufficiently
- reduce fuel loads surrounding the existing dwelling;
- All trees will be maintained so that a continuous canopy is not formed;
- All regrowth of shrubs and bushes will be removed.

Vegetation Management within the APZ

Vegetation Management is the responsibility of individual landowners and should include (as per PBP 2006):

- Maintaining a low cut lawn;
- Keeping areas around the garden free of fuel;
- Utilising non-combustible fencing materials;
- Breaking up tree and shrub canopies by defining garden beds;
- Using non-flammable mulch;
- Ensuring tree branches do not overhang roofs;
- Ensuring tree canopies are not continuous

Refer to Appendix D of this report for standards for APZs.



Property Maintenance

Sensible arrangements for landscaping and maintenance of the property are critical in the prevention of losses. In considering property maintenance the following items should therefore be implemented in advance of the bush fire season (October):

- removal of material such as litter from the roof and gutters;
- ensure painted surfaces are in good condition with decaying timbers being given particular attention to prevent the lodging of embers within gaps;
- check pumps and water supplies are available and in working order;
- driveways are in good condition with trees not being too close and forming an obstacle during smoky conditions;
- check tiles and roof lines for broken tiles or dislodged roofing materials;
- screens on windows and doors are in good condition without breaks or holes in flyscreen material and frames are well fitting into sills and window frames;
- drenching or spray systems are regularly tested before the commencement of the fire season;
- hoses and hose reels are not perished and fittings are tight and in good order;
- doors are fitted with draught seals and well maintained;
- mats are of non combustible material or in areas of low potential exposure; and
- woodpiles, garden sheds and other combustible materials are located down slope and well away from the house.

6.5 Post and rail fencing

The installation of post and rail fencing is required between the western extent of the APZ and remnant bushland containing recorded threatened species.

This shall comprise of a post and rail fence with gates to allow vehicular access along the northern and southern boundary of the property.

7. Performance measures

Maintenance effort must meet the following criteria:

1. commencement of all tasks outlined in the plan or evidence of planning for their implementation
2. primary and follow up (secondary) weeding needs to be undertaken at the appropriate time, in this case, if primary weeding spraying, cut and paint) is undertaken now, then autumn and spring would be an appropriate time to follow up if necessary. Extensive primary weeding may be totally negated if follow up weeding is not undertaken or inappropriate control is implemented.
3. no adult seeding woody weeds present by the end of an 18 month period no evidence of seeding annual weeds present across the site
4. evidence that existing weed patches have been contained and are not spreading.
5. Post and rail fence installed
6. Threatened species are protected
7. the site is to be maintained in a tidy order and kept free of waste litter
8. ensure all recommended bushfire protection measures are undertaken prior to start of the bushfire season (October)

8. Works schedule

Phase	Activity	Details	Timing
1. Preparatory Works	Threatened species protection (fencing)	Install fencing as per Section 6.5	Prior to the commencement of construction works
	Photographic record	Establish photographic reference points	
2. Primary weed control	Weed management	Hand pull and chemically control weeds	Weeks 2- 26
	Soil protection	Apply mulch or similar to exposed soils.	
3. Secondary weed control	Weed management	On at least a monthly basis, weed herbaceous and woody weeds using techniques appropriate to the species and scale of outbreak.	
		Monitoring photos from standard locations to be taken.	
		Appropriate responses to weeds formulated according to status of rehabilitation works.	
		Inspection report provided toCouncil	
	Maintenance	Continue weed control on at least a two-monthly basis.	Between inspections
		Carry out actions determined necessary at inspection.	
		Monitoring photos from	

Phase	Activity	Details	Timing
		standard locations to be taken.	
		If required, source and plant local provenance material.	
		Inspection report provided to Council	
	Maintenance	Weed and manage as necessary.	Between inspections

.

9. References

Auld, R.A & Medd, R.W 19897. Weeds – an illustrated guide the weeds of Australia. Inkata Press Melbourne

ARBOR 1996. Garden plants that go feral in the Sydney Bushland, Sydney.

Australian Museum (2005) Birds in Backyards. http://birdsinbackyards.net/finder

Benson, D. (1992) The natural vegetation of the Penrith 1:100,000 map sheet. Cunninghamia 2(4):541-5962

Benson, D.H. and Howell, J. (1990) Taken for Granted: The Bushland of Sydney and Its Suburbs. Kangaroo Press, Sydney

Benson, D.H. and Howell, J. (1994) The Natural Vegetation of the Sydney 1:100,000 Map Sheet. Cunninghamia 3(4):679-788

Benson, D.H. and Howell, J. (2000) Sydney's Bushland — More than Meets the Eye. Royal Botanic Gardens, Sydney

Benson, D. and Howell, J. (1994) The natural vegetation of the Sydney 1:100 000 map sheet Cunninghamia 3(4):677-995.

Buchanan, R. 1989. Bush Regeneration. TAFE Publications.

Department of Environment and Conservation 2005. Restoring bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland. Department of Environment an4d Conservation. Sydney.

Fairley, A. (2004) Seldom Seen - Rare Plants of Greater Sydney. Reed New Holland:Sydney

Fairley, A. and Moore, P. (2002) Native Plants of the Sydney District. Revised edition. Kangaroo Press:Sydney

Fairley, A. Moore, P; Native Plants of the Sydney Distrcit and identification guide: New Holland Sydney 2002

NSW Department Infrastructure Planning and Natural Resources 2007. *Guidelines for the preparation of Vegetation Management Plans*, Parramatta.

NSW Rural Fire Service (2006) Planning for Bushfire Protection A Guide for Councils, Planners, Fire Authorities, Developers and Homeowners NSW Rural Fire Service, Sydney.

Tozer, M.G. (2003) The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities. Cunninghamia 8(1):1-75

APPENDIX A

RELEVANT QUALIFICATIONS & EXPERIENCE

OF THE AUTHOR

Alex Fraser (Fraser Ecological Consulting) has over 10 years experience in ecological assessment and on-ground bushland restoration management. Previous work roles include ecological consulting with Parsons Brinckerhoff (large infrastructure), NPWS (biodiversity surveys), NSW Department of Environment and Climate Change (SIS DGRs) and Hornsby Shire Council (residential and light industrial development) have focussed primarily on ecological survey, development assessment, project management and policy development for consent authorities. Alex also has practical experience in landscape construction, bushland restoration and property management. A full list of flora and fauna assessments previously undertaken can be provided upon request.

Professional Affiliations include the Australian Association of Bush Regenerators, Ecological Society of Australia, Royal Zoological Society of NSW, Birds Australia, Australasian Bat Society, Urban Feral Animal Action Control Group (Sydney North Councils), Surfrider Foundation & Fred Hollows Foundation.

Relevant qualifications and training:

- Bachelor of Applied Science – Coastal Resource Management (Honours)
- Certificate 3 Natural Area Restoration (Ryde Horticultural College)
- Chemcert (Department of Natural Resources)
- Chainsaw Cross Cutting Techniques (Ryde Horticultural College)
- Certificate 3 Vertebrate Animal Pest Control (NSW DPI, Orange)
- OH&S General Induction for Construction Work (Work Cover NSW)
- Senior First Aid (St. Johns Ambulance Australia)
- Project Management 'the hard and soft skills' (NPWS- 2004)
- Frog, Bat and Reptile: species identification and survey skills (Forests NSW)
- Certificate 3&4 Japanese language proficiency (The Japan Foundation)
- Advanced Open Water SCUBA diver (PADI Australia)
- State Rail Contractor Safety Awareness (State Rail Authority)
- NPWS Scientific Licence (NSW Office of Environment and Heritage)