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Net Gain Offset Management Plan for the Readymix Mt. Shamrock Quarry, Pakenham

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Plan prepared for
Readymix

Net Gain Offset Management Plan for the Readymix Mt. Shamrock Quarry, Pakenham

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FINAL REPORT

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ABBREVIATIONS

DSE	Department of Sustainability & Environment, Victoria
DPI	Department of Primary Industry, Victoria
EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EVC	Ecological vegetation class
FFG	*Flora and Fauna Guarantee Act 1988* (Vic.)
FIS	Flora Information System (DSE)

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1.0 INTRODUCTION

1.1 Background

This offset management plan has been prepared in order to achieve a net gain offset for the habitat hectares lost and large old trees removed for the expansion of the Readymix Mt. Shamrock Quarry, Pakenham (Figure 1). It satisfies the requirements of Planning Permit # T050156. This plan refers to specific planning permit conditions, which are detailed in this document.

An assessment of the flora and fauna values associated with the approved expansion of the quarry is contained in Biosis Research (2005).

Readymix will coordinate the conservation management of the offset area for the ten year duration of this plan. However beyond that the offset site could fall under different ownership. In this case, any gains achieved by the revegetation and management of the offset site will be of an ongoing and secure nature. Readymix will be financially responsible for the ten year management program and affiliated activities.

1.1.1 Native Vegetation Management Framework

The Native Vegetation Management Framework (NRE 2002) is State Government policy for the protection, enhancement and revegetation of native vegetation in Victoria. The Framework is an incorporated document in all planning schemes in Victoria. The primary goal of the Framework is:

> *a reversal, across the whole landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain* (NRE 2002).

In association with the regional Native Vegetation Plans, the Framework provides decision-making tools for native vegetation management.

Where an application is made to remove native vegetation, a proponent for a development must explain the three steps that have been taken to:

- Avoid adverse impacts, particularly through vegetation clearance.
- Minimise impacts if impacts cannot be avoided.
- Identify appropriate offset options.

A proponent for a development must demonstrate that the option to avoid and minimise vegetation clearance has been explored before considering offsets.

An offset may be achieved by improvements in the quality or extent of native vegetation in a selected 'offset area', either within a project area or off-site. An area that is revegetated and protected or set aside for natural regeneration may provide some, or all, of the required offset. The conservation significance of vegetation to be removed is also taken into account when offsets are determined.

1.1.2 Port Phillip and Westernport Native Vegetation Plan

This document (Port Philip and Westernport Catchment Management Authority 2006) has been prepared to develop a strategic and co-ordinated approach to the management of native vegetation within the region. The plan is designed to complement the Native Vegetation Management Framework and contains specific information and objectives relating to the region.

The plan has four strategic directions:

- Retain the quantity of native vegetation by minimising clearing.
- Protect native vegetation with reservation and management agreements.
- Maintain and improve the quality of native vegetation.
- Increase the quantity of native vegetation.

Responses and offset options for applications to clear native vegetation are outlined in Appendix 3.4 of the native vegetation plan (page 52). Offsets for unavoidable and permitted tree losses are calculated using this plan.

The objectives of the Native Vegetation Plan are similar to those of the Native Vegetation Management Framework and both sets of objectives can be met through the three step approach to achieving net gain.

Offsets for unavoidable tree losses are calculated using the Port Phillip and Westernport Native Vegetation Plan (PPWCMA 2006).

Implications for the proposal

Meeting the net gain vegetation policy objectives is a requirement of the planning agencies (Council and DSE) and is a condition of the planning permit (T050156).

1.2 Objective

This management plan addresses the third step of the net gain three-step approach – offsetting the loss of native vegetation. The objective is to achieve a net gain offset for native vegetation and large old trees removed during the expansion of the Mt. Shamrock Quarry in accordance with the planning permit.

Implementation of this vegetation management plan is the responsibility of Readymix.

The planning permit contains the following conditions:

Planning Permit Section 8
The landscape plan required in accordance with condition 5 of this permit must be drawn by a suitably qualified landscape architect or designer and must be generally in accordance with plans included in the endorsed Work Plan and marked as drawing numbers L1a (January 2005), L2a (November 2004), L3a (November 2004) and L4a (November 2004), but modified to show:

(d) full details of Net Gain requirements including the Net Gain offset area of no less than 1.71 hectares, to the satisfaction of the Regional Director, Port Phillip Region, Department of Sustainability and Environment (DSE); and

(e) plantings associated with surface water quality, including;

- Reinstatement of riparian vegetation along the waterway downstream of Donazzan's Dam to provide additional protection and improvement to the aquatic ecosystem.

Planning Permit Section 39
The EMP must include but not be limited to the following matters:

(a) rehabilitation and vegetation;

(b) Native Vegetation Offset Plan (that must be to the satisfaction of the Department of Sustainability and Environment);

Planning Permit Section 44
Before the commencement of Extractive industry works in the extension area, the permit holder must enter into an agreement with the Responsible Authority under Section 173 of the Planning and Environment Act 1987 *(the Act) that must provide for:*

(b) Maintenance and permanent protection of Net Gain offset areas identified in the Native Vegetation Offset Plan required under condition 40(k) of this permit.

The offset management plan will commence within six months of approval, assuming all other project approvals to facilitate site preparation are in place. The Department of Sustainability and Environment expects the offset management plan to commence within one year of the start of the vegetation clearance. The offset is to be actively and appropriately managed for ten years to ensure long-term viability.

1.3 Prescribed Offsets

The following offsets were defined for the expansion of the Mt. Shamrock quarry (Biosis Research 2005):

- 0.24 habitat hectares provided by 1.71 hectares of revegetation;
- Protection of 38 Large Old Trees (LOTs) and 20 Medium Old Trees (MOTs); and
- Recruitment of 290 Trees.

All the prescribed offsets are provided in the context of the exemptions provided within the Framework to mining and quarry industries (NRE 2002:page 24). In that context offsets are provided within the like-for-like guidelines for losses of Low conservation significance. As such the revegetation works can be for any EVC within the bioregion, must provide a similar or more effective land protection function and any habitat hectare losses may be completely offset by revegetation works.

1.4 Nominated Offset Site

The areas identified to provide the prescribed net gain offsets are outlined in Figure 2. These areas are all within existing property owned by Readymix contiguous with the Mount Shamrock quarry. The offset areas include an existing fenced area protecting the riparian vegetation below Donazzan's Dam and a parcel of land encompassing the stand of remnant indigenous trees about 400 metres to the north north east of this creek line and about 100 metres east of the existing house on this land.

The section of the offset site associated with the riparian vegetation below Donazzan's Dam is divided into two sections by an existing stock crossing and covers an area of about **1.8 ha**. This area supports 16 LOTs and 8 MOTs including:

- two large old Green Scentbark *Eucalyptus fulgens*
- two large and two medium old Manna Gum *Eucalyptus viminalis*
- one large and six medium old Messmate *Eucalyptus obliqua*
- 11 large old Swamp Gum *Eucalyptus ovata*

The large section of the offset site is to the north east of the driveway to this property and east of the existing house. It covers an area of **6.9 ha** and includes:

- two large old Mountain Grey Gum *Eucalyptus cypellocarpa*
- four large old Manna Gum *Eucalyptus viminalis*
- 16 large and 20 medium old Swamp Gum *Eucalyptus ovata*
- two large old Narrow-leaf Peppermint *Eucalyptus radiata*
- three large old Messmate *Eucalyptus obliqua*

About two hectares of this site is required to provide for the protection of the LOTs present (an area with twice the canopy diameter of the tree fenced and protected from adverse impacts to ensure natural regeneration or planting can occur). The site also supports over 1.71 ha of cleared pasture available for revegetation and a further two hectares of pasture to provide space for the natural recruitment of trees.

DSE (2006: Section 3.1) prescribes an area of one hectare for the establishment of 150 trees within a lowland/foothill forest environment. Therefore the prescribed recruitment of 290 trees through the stimulation of natural regeneration from existing trees requires an area of about two hectares to provide the prescribed offset. This area is available within the northern offset block.

Offset Summary

The prescribed offsets for Large Old Tree protection, revegetation and recruitment are all provided for within the defined offset sites within the Readymix property, adjacent to the eastern boundary of the Mt. Shamrock quarry.

2.0 MANAGEMENT ISSUES

Management for the natural values of the offset site aims to improve the condition of vegetation by allowing the natural recruitment of trees and the regeneration/revegetation of indigenous understorey species to replace the existing dominance of exotic species.

The vegetation throughout the offset site has been altered significantly from its original condition and is now dominated by introduced pasture and weed species beneath the remnant trees. A long history of grazing by domestic stock, and in more recent times, the invasion of noxious, environmental weeds (plants that invade and displace indigenous flora and fauna) throughout the study site has dramatically altered the floristic composition of the site.

The key management issues to improve the condition of indigenous vegetation within the offset site are:

- tree protection;
- retention of logs and organic litter;
- natural recruitment and enrichment planting;
- woody and grassy weed control;
- biomass control;
- pest control;
- access;
- signage;
- fire safety management; and
- long-term protection.

Qualified contractors with experience in the rehabilitation of indigenous vegetation should undertake bushland regeneration works. Audits will be necessary to review the success of the works program, and ensure appropriate forward planning.

Management issues are discussed below, and should be read in conjunction with the management activities outlined in Appendix 1. Suggestions are made as to how some of the management issues should be addressed, but techniques could be adapted or alternative techniques employed by the bushland management contractor according to experience and results from ongoing monitoring of the offset site.

2.1 Tree protection

All existing canopy trees are to be protected. This requires a minimum area of twice the canopy diameter to be protected from adverse impacts (DSE 2007). Management of the site should allow enough space surrounding each tree for fallen limbs and to allow future recruitment to eventually replace the old tree.

Tree canopy health should be monitored to ensure it is sustained. Mechanisms for maintaining tree health, may be required if tree health declines.

2.2 Logs and organic litter

Fallen trees and branches must be retained as coarse woody debris is an important habitat feature of natural forest systems.

Current levels of fallen timber within the offset site are low and there is an opportunity to strategically place additional logs within the site. Logs created from permitted removal of trees within the quarry extraction limit should be retained and placed within the offset site to enhance its habitat value. Logs should be trimmed to the maximum practical length and placed in such a way that management activities (e.g. slashing) are not impeded.

All fallen logs, branches and leaf litter should be retained in situ.

2.3 Recruitment and enrichment planting

Past management of the site has resulted in a loss of habitat features such as an indigenous ground-cover, eucalypt saplings, mid-storey shrubs, and woody debris. The lack of these features reduces its attractiveness for many woodland fauna species. Management for recruitment and revegetation of indigenous vegetation can restore these features, and in turn, encourage indigenous fauna to utilise the area.

To meet the recruitment requirement, it should be emphasised that natural recruitment is preferable to planting in order to maintain the ecological integrity of the site. Apart from the presence of scattered remnant trees, this offset site supports few natural remnants of the natural vegetation of this site. Therefore while natural tree recruitment is possible, planting is required to establish most other species indigenous to this site.

2.3.1 Natural Recruitment

Eucalypts generally recruit well in the absence of grazing. Therefore once grazing has been removed the occurrence of tree recruitment should be

monitored. A dense cover of exotic pasture grasses has the potential to inhibit tree recruitment and some level of pasture control may be required. Options include boom spraying bands of pasture to generate strategically placed areas of bare ground. Once the seedlings have been able to establish, they may need to be protected to avoid being destroyed by other management activities (i.e. weed control works, patch burning, slashing).

It should be noted that due to the often prolific nature of eucalypt recruitment, not all of the recruits will be retained. There is a natural process of thinning that would occur if left over time. Once the recruiting eucalypts reach a height of approximately two metres (this will take up to five years), this process of thinning may be accelerated by the bushland regenerator to remove the less viable trees and improve the survival of the remaining, healthier recruits. Prolific recruitment around very old eucalypts may also affect their health due to stress from competition. If this is observed then seedlings around such trees should be more heavily thinned.

The following information is provided as a guide for managing land for natural regeneration:

- Areas proposed for regeneration/revegetation should be prepared by undertaking biomass control (see section 2.5) and recruitment may also be enhanced by 'scratching' the soil surface prior to seed dispersal.
- Where the distance from a mature tree canopy is greater than about 20 m, seed should be collected and scattered over the site. Seed can be collected from any remnant indigenous eucalypt in the local area.
- Under this new management regime, it is possible that additional native species with dormant seeds will begin to regenerate. However natural recruitment in this agricultural environment is expected to be limited and enhancement planting should occur after an initial period of site preparation.
- Additional species propagated from locally collected seed will be planted throughout the offset site, in accordance with the densities indicated in the Lowland Forest benchmark (Appendix 2).
- No infrastructure should be erected under the trees.
- As mentioned previously, some thinning of young eucalypts may be required.

2.3.2 Understorey enhancement

The understorey vegetation over virtually all of the offset sites is dominated by a suite of introduced grasses and Blackberry *Rubus fruticosus* spp. agg. and as a result is in poor condition. The removal of these weeds needs to be undertaken in conjunction with the re-establishment of the indigenous understorey species including species from all the life forms identified by the relevant EVC benchmark.

Enhancement planting for the northern section of the offset site should be based on the Lowland Forest (EVC 16) benchmark while the northern area was predominantly Swampy Riparian Woodland (EVC 83), although more elevated areas should use the Lowland Forest Benchmark. These benchmarks are provided in Appendix 2.

The re-establishment of this indigenous understorey requires a reduction in competition from introduced grasses, followed by the introduction of indigenous seed. A bush regenerator with experience in re-establishing indigenous species could provide advice on the most up-to-date best practice techniques for re-establishing indigenous vegetation. **It is important that a contactor with expertise in revegetating the local indigenous vegetation community be appointed.** The contractor should provide further detail on the methods to be used in a detailed works program, to be approved by the land manager prior to commencement of works. This would involve specific site preparation works followed by direct seeding, hand dispersal of seed or planting of nursery grown tube stock.

All species selected should be of local provenance and suitable for the relevant EVC (suggestions in Appendix 3).

Where feasible weed control should be carried out using non-herbicide dependant methods such as slashing, mulching and hand removal. Often, a combination of herbicide and non-herbicide based methods is most appropriate. Where it is necessary to utilise herbicides ensure that chemicals are appropriate for use in areas adjacent to waterways. Also consider that some chemicals are residual, and may contaminate waterways and affect regeneration or revegetation efforts.

2.3.3 Minimum Revegetation Standards

The DSE revegetation standards (DSE 2006) require minimum densities for different life forms when establishing native vegetation for net gain accounting. The minimum requirements for each life form are presented in Table 1.

2.4 Woody weed control

There are a small number of high threat woody weeds located within the offset site including Briar Rose *Rosa rubiginosa*, Hawthorn *Crateagus monogyna* and Blackberry. These species should be controlled / removed in the first year of management. Ongoing monitoring and control of any seedlings will be required, as these species are widely dispersed by birds and are likely to recolonise the site. Refer to Appendix 4 for descriptions and control guidelines of these key woody weeds.

Table 1: Minimum 10 year revegetation survival targets per hectare.

EVC Life Form	Lowland Forest	Swampy Riparian Woodland
Understorey Tree /Large Shrub	100	250
Medium Shrub	1200	800
Small Shrub	500	100
Large tufted Graminoid	500	1500
Total No. of Plants per Hectare	**2300**	**2650**

The weed management program needs to also account for the potential introduction of new weeds, or changes in population sizes of existing weeds that may change their priority for control.

2.5 Biomass control

In the absence of grazing by domestic stock the biomass of pasture grasses and associated environmental weeds may accumulate to form a dense ground cover. This accumulation would inhibit the proposed revegetation works and also provides a significant fire hazard.

The easiest and most economic way to control the biomass levels surrounding the trees is to slash/mow. However with the broad-scale revegetation works proposed, the regeneration of trees and shrubs is likely to make slashing impractical. In that context it is important to reduce or eliminate species likely to cause significant problems for biomass accumulation such as Toowoomba Canary-grass *Phalaris aquatica* during the site preparation phase of the revegetation program.

Fire is not an appropriate biomass management tool in vegetation supporting a high density of shrubs although in this environment the small scale use of fire to remove areas dominated by rank exotic grasses could be possible and efficient, especially if burning at times of low fire danger. Otherwise where the accumulation of biomass retards revegetation objectives these areas could be brush cut and mulched.

2.6 Pest control

Control of rabbits and foxes should be compatible with the surrounding land use. The site should be fenced with a rabbit-proof fence and monitored to determine

the extent of the populations. A strategy for vermin control should then be developed, and may include fumigation, hand destruction of burrows, and/or baiting. Ongoing monitoring will be required to ascertain the success of these techniques and to recommend any additional measures.

Control of rabbits should be undertaken in accord with *Victorian Pest Management: A Framework for Action – Rabbit Management Strategy* (NRE 2002).

2.7 Access

A secure and permanent perimeter fence should be erected to exclude stock and restrict public and vehicular access to the site. This fence will be rabbit-proof to facilitate the control of this exotic browser which provides a significant threat to revegetation objectives.

Access should be limited to management activities only, although limited interpretive access may be permitted if Readymix wish to utilise the site for education purposes.

2.8 Signage

If public access is permitted, interpretive signage will be installed in the offset site. The information boards will be designed to inform the public of the ecological values of the offset site, including descriptions of the vegetation/habitats, and pictures of some of the common flora and fauna within the reserve. They will also include information on ways the public can help to retain the values of the reserve, such as:

- staying on the access track;
- not littering;
- not dumping garden waste into the reserve;
- not letting dogs off lead;
- recommended indigenous plants for landscaping in the area;
- common garden plants which are environmental weeds; and
- not removing branches and logs for firewood.

Signs should be low enough for children to read, and could allow the information to be changed/updated either with the seasons or as the offset site improves over time.

2.9 Rubbish removal

Windblown litter and or dumped rubbish may be an issue. Litter should be periodically removed, as it will smother ground level vegetation. Dumped garden rubbish is a potential source of new weeds and must be removed immediately.

2.10 Fire safety management

As the offset site is to be managed for conservation, there will be an accumulation of leaf litter and woody debris over time. It is not planned to undertake fuel reduction activities within the offset site during the initial 10 years of this plan.

The site is surrounded by pasture and readily accessible for fire control if required. Vehicle access gates will be provided in the boundary fence at selected locations.

Readymix undertakes to negotiate any fire safety management requirements with the Country Fire Authority (CFA) and incorporate any requirements into the Net Gain Offset Management Plan.

2.11 Long-term protection

Readymix is responsible for the management of this site for the next ten years. Subject to mutual agreement, formal arrangements may be made within this period to delegate responsibility and funding to undertake management to the a third party. Permanent protection of the trees and designated offset areas will be ensured through a legal agreement, to be negotiated with Council.

2.12 Planning, monitoring and audit

Once a contractor is appointed to deliver the works program, the bushland management contractor and an ecologist should conduct an initial site inspection together to discuss specific management issues and requirements for the site. The bushland management contractor should then prepare and implement an annual works program, including achievable management objectives consistent with this management plan.

Ongoing monitoring of the reserve will be required to ensure that the required gains (in terms of tree recruitment and revegetation) are achieved. This could be undertaken by the bushland regenerator on an annual basis as part of the ongoing management of the reserve.

Audit by an independent ecologist is also recommended following years 1, 2, 3, 5 and 7. The reserve should be inspected by a qualified ecologist after 10 years of management to document the achievement of Net Gain offsets, and the results of this inspection should be reported to DSE.

3.0 MANAGEMENT PROGRAM

Implementation of this management plan/program is the responsibility of Readymix.

The offset site manager is responsible for:

1. Site definition and protection;
2. Organising plant propagation and/or plant purchasing;
3. Site preparation;
4. Planting/stimulating tree recruitment;
5. Maintenance of plantings/revegetation for 10 years;
6. Organising independent audit/monitoring procedures (years 1, 2, 5, 7 & 10);
7. Implementation of any further management actions identified by audit; and
8. Reporting to responsible authority (forwarding of audits).

All management works are to be undertaken only by qualified and experienced horticulturalist / landscape contractors.

This offset management plan is current to January 2018, unless it is superseded by another plan.

Site identification and protection

1. Establish an approved 173 Agreement under the *Planning and Environment Act 1987*.
2. The offset site will be fenced in order to clearly delineate the site's extent. Fencing will be of a standard rabbit-proof farm fence.
3. Install an appropriate sign to inform residents/visitors of the site's ecological characteristics, purpose and value.

Plant propagation

4. Propagate plants or collect seed for dispersal for species listed per Appendix 3. These species are selected because they are components of Lowland Forest or Swampy Riparian Woodland and/or are locally indigenous species that are suitable for the offset site. Local provenance (material collected within 20 km) is essential. Non-local provenance is not to be used, and any inadvertent plantings are to be removed. Species substitution within life forms is acceptable if species are not available.

   It is recommended that the plants/seed be ordered from an indigenous nursery 6 to 12 months in advance as they are not all likely to be in stock and most may need to be propagated from seed or cuttings specifically for this project. Since local provenance is required, failure to plan ahead may result in long delays in meeting the planning permit conditions.

Site preparation

5. Prepare the site over a minimum six month period through:
   (a) monthly sprays of existing (introduced) vegetation to deplete the weed soil seed bank;
   (b) cut and paint and/or drill and fill weedy shrubs such as Hawthorn, Briar Rose and Blackberry;
   (c) installation of a shallow layer of mulch (less than 5 cm deep) to prevent soil loss but not inhibit the germination of weeds; and

Planting

6. Plant / recruit appropriate species as per Appendix 3 within the offset site (Figure 2). Planting / recruitment densities need to comply with the minimum revegetation standards provided by DSE (DSE 2006).

Maintenance of plantings for 10 years

7. Maintain the plantings taking all necessary measures to ensure (a) survival and growth of the plants, and (b) good appearance or presentation of the plantings. Supplementary watering may be required during exceptionally dry periods. Plantings that do not survive are to be replaced. Substitution of species within life forms is acceptable for replacement purposes.
8. Undertake complete weed control on a monthly basis during the primary weed season (June to December inclusive) and at other times as required. All weeds are to be controlled using appropriate and efficient techniques that do not damage the plantings. Manual control is an important technique, as plantings are frequently killed by herbicide spray drift.

Offset management audit/monitoring

9. Undertake a management audit/monitoring exercise at 1, 2, 5, 7 and 10 years after planting to evaluate performance and thus compliance with the planning permit. Photo points will be set up and offset progress will be shown in audit reports.

   Implementation and monitoring of the offset site is to be conducted by a qualified ecologist, engaged by Readymix. Their responsibilities include:
   (a) Ensuring offset site management contractors are suitably qualified;
   (b) Approving plant selection and supply;
   (c) Approving works plan;
   (d) Monitoring adherence to this plan such as site management, and recommending alternative actions where appropriate; and
   (e) Completion of audit/monitoring reports for submission to Readymix.

Implementation of further management actions as identified by audit

10. Implement any further management actions as identified by the audit. The offset site manager should have a flexible adaptive approach to vegetation management and will undertake actions identified in the audits. Additional management actions that may be engaged to protect the offset site include ecological burning for biomass reduction, hand weeding between plantings, supplementary watering and targeted weed spraying.

Reporting to responsible authority

11. Readymix will forward all audit reports (sequentially) to the Cardinia Shire Council.

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APPENDICES

APPENDIX 1
MANAGEMENT ACTIVITIES

Management – Years 1-2

Organise year's team

12. Allocate staff time and appoint contractors (program ecologist, specialist bushland contractor) as appropriate for delivery of the program over the following year.

Annual management objectives

13. The bushland management contractor and the ecologist should conduct an initial site inspection together and discuss specific management issues and requirements for the site. The bushland management contractor should then prepare and implement an annual works program, including achievable management objectives consistent with this management plan.

    Management objectives are to be specific, with emphasis on the primary season for weed control (June to January).

Access

14. Control access to the Offset Site by fencing the boundary, providing adequate access for management activities through the strategic location of gates.

15. Engage appropriate personnel (eg. ecologist, graphic designer and landscape architect) to design and install information boards, as per Section 2.8 of this management plan.

Tree protection, logs and organic litter

16. All existing canopy trees are to be protected and tree canopy health should be monitored to ensure it is sustained.

17. Fallen logs and organic litter should be retained. Fallen logs may require shifting and/or trimming to ensure ease of slashing grasses where required.

Recruitment and enrichment planting

18. Facilitate recruitment of juvenile eucalypts as described in this plan.

19. Any regenerating indigenous plants should be protected during weed removal or slashing.

20. Investigate and initiate appropriate methods for revegetation of ground flora.

Weed control

21. Remove woody weeds from the offset site. Techniques and timing of control are species dependent, and include manual removal and the use of herbicides.

    Key woody weeds targeted in year one are: Sweet Briar, Hawthorn and Blackberry.

    Stage 1 – Removal of all woody weeds, including appropriate disposal of plants.
    Stage 2 – Spot spray regrowth and seedlings.

    Wherever feasible, weed control should be carried out utilising non-herbicide methods. Consider that some chemicals are residual, and may contaminate waterways and affect regeneration or revegetation efforts.

22. Undertake control of pasture grasses in conjunction with revegetation of ground flora.

    Key weed grasses are: Soft Brome, Perennial Rye-grass, Sweet Vernal-grass, and Toowoomba Canary-grass.

Pest control

23. Monitoring of rabbit and fox populations to advise required management.

Rubbish

24. On-going removal of litter from within the reserve.

Long-term protection

25. Initiate process for legal agreement to provide permanent protection of the reserve, in negotiation with Council.

Management – Years 3-10

Organise year's team

1. Allocate staff time and appoint or re-engage contractors (program ecologist, bushland manager) as appropriate for delivery of the program over the following year.

*Ecological management review / audit**

**Auditing is suggested following years 1, 2, 3, 5, 7 and 10 as a minimum.*

2. Review the results of the current year's management actions in relation to the annual management objectives.

   This requires site inspection by a qualified and experienced ecologist independent of the bushland management contractor. A report from the bushland management contractor is also required. Both reports shall be submitted to the land manager for review.

Annual management objectives

**Providing the specialist bushland management contractor has been re-engaged from the previous year, this step may only be required following years 1,2,3,5 and 7.*

3. The bushland management contractor should prepare and implement an annual works program based on the ecologist's management review, including achievable management objectives consistent with this management plan. This program shall be approved by the Responsible Authority.

   Management objectives are to be specific, with emphasis on the primary weed season (June to January).

Weed control

**This will be required for the first five years, and possibly additional years, depending on the success of the weeding, spraying, planting and natural recruitment.*

4. Continue to control recruitment of woody weeds within the offset site. This requires weed control using appropriate techniques with negligible off-target damage, and replacement with indigenous species.

   Key woody weeds targeted in years three to five are: Sweet Briar, Blackberry and Hawthorn.

5. Maintain herbaceous/grassy weed cover at low levels. This requires weed control using appropriate techniques with limited off-target damage.

   Key weed grasses are: Soft Brome, Perennial Rye-grass, Sweet Vernal-grass, and Toowoomba Canary-grass.

Recruitment and enrichment planting

6. Any regenerating indigenous plants should be protected during weed removal.

7. Thin eucalypt seedlings after 3-5 years, if necessary.

8. Review natural recruitment throughout the reserve after 2-3 years and consider supplementary planting where appropriate (refer to recommended planting list in Appendix 3).

Tree protection, logs and organic litter

9. All existing canopy trees are to be protected, and tree canopy health should be monitored to ensure it is sustained.

10. Fallen logs and organic litter should be retained. Fallen logs may require shifting and/or trimming to ensure ease of slashing grasses.

Pest control

11. If required, control and aim to eliminate rabbits within the offset site through fumigation and hand destruction of burrows.

12. Monitor for foxes and instigate control measures if required.

Public use of site

13. Update information boards as necessary to reflect ongoing management of the site.

14. On-going removal of litter from within the reserve.

APPENDIX 2

EVC BENCHMARKS

Department of Sustainability and Environment

EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 16: Lowland Forest

Description:
Eucalypt forest to 20 m tall on relatively fertile, moderately well-drained soils in areas of relatively high rainfall. Characterised by the diversity of life forms and species in the understorey including a range of shrubs, grasses and herbs.

Large trees:

Species	DBH(cm)	# / ha
Eucalyptus spp.	70 cm	20 / ha

Tree Canopy Cover:

% cover	Character Species	Common Name
30%	*Eucalyptus obliqua*	Messmate Stringybark
	Eucalyptus radiata s.l.	Narrow-leaf Peppermint
	Eucalyptus consideniana	Yertchuk

Understorey:

Life form	# Spp	% Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	2	10%	T
Medium Shrub	7	30%	MS
Small Shrub	5	10%	SS
Prostrate Shrub	2	5%	PS
Large Herb	1	1%	LH
Medium Herb	7	10%	MH
Small or Prostrate Herb	7	5%	SH
Large Tufted Graminoid	2	15%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	7	15%	MTG
Medium to Tiny Non-tufted Graminoid	1	1%	MNG
Ground Fern	2	15%	GF
Scrambler or Climber	3	1%	SC
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	*Acacia melanoxylon*	Blackwood
MS	*Epacris impressa*	Common Heath
MS	*Leptospermum continentale*	Prickly Tea-tree
MS	*Banksia marginata*	Silver Banksia
MS	*Leptospermum myrsinoides*	Heath Tea-tree
SS	*Amperea xiphoclada var. xiphoclada*	Broom Spurge
PS	*Acrotriche serrulata*	Honey-pots
MH	*Gonocarpus tetragynus*	Common Raspwort
MH	*Drosera peltata ssp. auriculata*	Tall Sundew
MH	*Viola hederacea sensu Willis (1972)*	Ivy-leaf Violet
SH	*Opercularia varia*	Variable Stinkweed
LTG	*Xanthorrhoea minor ssp. lutea*	Small Grass-tree
LTG	*Lomandra longifolia*	Spiny-headed Mat-rush
LNG	*Gahnia radula*	Thatch Saw-sedge
MTG	*Lomandra filiformis*	Wattle Mat-rush
MTG	*Poa australis spp. agg.*	Tussock Grass
MNG	*Microlaena stipoides var. stipoides*	Weeping Grass
GF	*Pteridium esculentum*	Austral Bracken
SC	*Billardiera scandens*	Common Apple-berry

Recruitment:
Continuous

Organic Litter:
40 % cover

Logs:
20 m/0.1 ha.

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
MH	*Hypochoeris radicata*	Cat's Ear	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment

Gippsland Plain bioregion

EVC 83: Swampy Riparian Woodland

Description:
Woodland to 15 m tall generally occupying low energy streams of the foothills and plains. The lower strata are variously locally dominated by a range of large and medium shrub species on the stream levees in combination with large tussock grasses and sedges in the ground layer.

Large trees:

Species	DBH(cm)	# / ha
Eucalyptus spp.	70 cm	15 / ha

Tree Canopy Cover:

% cover	Character Species	Common Name
20%	*Eucalyptus ovata*	Swamp Gum
	Eucalyptus radiata s.l.	Narrow-leaf Peppermint

Understorey:

Life form	# Spp	% Cover	LF code
Immature Canopy Tree		5%	IT
Understorey Tree or Large Shrub	4	30%	T
Medium Shrub	5	20%	MS
Small Shrub	1	1%	SS
Prostrate Shrub	1	1%	PS
Large Herb	3	5%	LH
Medium Herb	7	10%	MH
Small or Prostrate Herb	3	5%	SH
Large Tufted Graminoid	3	15%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	5	10%	MTG
Medium to Tiny Non-tufted Graminoid	2	10%	MNG
Ground Fern	2	10%	GF
Scrambler or Climber	2	5%	SC
Bryophytes/Lichens	na	10%	BL

LF Code	Species typical of at least part of EVC range	Common Name
T	*Acacia melanoxylon*	Blackwood
T	*Melaleuca ericifolia*	Swamp Paperbark
T	*Leptospermum lanigerum*	Woolly Tea-tree
MS	*Leptospermum continentale*	Prickly Tea-tree
MS	*Coprosma quadrifida*	Prickly Currant-bush
MS	*Bursaria spinosa*	Sweet Bursaria
LH	*Senecio minimus*	Shrubby Fireweed
MH	*Gonocarpus tetragynus*	Common Raspwort
MH	*Acaena novae-zelandiae*	Bidgee-widgee
MH	*Hydrocotyle hirta*	Hairy Pennywort
SH	*Dichondra repens*	Kidney-weed
LTG	*Carex appressa*	Tall Sedge
LTG	*Cyperus lucidus*	Leafy Flat-sedge
LTG	*Lepidosperma elatius*	Tall Sword-sedge
LTG	*Juncus procerus*	Tall Rush
LNG	*Phragmites australis*	Common Reed
MTG	*Themeda triandra*	Kangaroo Grass
MTG	*Lomandra filiformis*	Wattle Mat-rush
MNG	*Microlaena stipoides* var. *stipoides*	Weeping Grass
GF	*Pteridium esculentum*	Austral Bracken

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APPENDIX 3

FLORA PLANTING LIST

Table A3.1: Lowland Forest planting list for Net Gain offset sites: Readymix Mt. Shamrock Quarry

Life form	Species	Common name
T	*Acacia mearnsii*	Black Wattle
T	*Allocasuarina littoralis*	Black Sheoak
T	*Eucalyptus fulgens*	Green Scentbark
T	*Eucalyptus obliqua*	Messmate Stringybark
T	*Eucalyptus radiata* ssp. *radiata*	Narrow-leaf Peppermint
T	*Eucalyptus viminalis*	Manna Gum
MS	*Acacia stricta*	Hop Wattle
MS	*Acacia verticillata*	Prickly Moses
MS	*Banksia marginata*	Silver Banksia
MS	*Bursaria spinosa*	Sweet Bursaria
MS	*Coprosma quadrifida*	Prickly Currant-bush
MS	*Epacris impressa*	Common Heath
MS	*Leptospermum continentale*	Prickly Tea-tree
MS	*Ozothamnus ferrugineus*	Tree Everlasting
LNG	*Gahnia radula*	Thatch Saw-sedge
LTG	*Austrostipa rudis*	Veined Spear-grass
MH	*Acaena novae-zelandiae*	Bidgee-widgee
MH	*Gonocarpus tetragynus*	Common Raspwort
MNG	*Dianella revoluta*	Black-anther Flax-lily
MNG	*Microlaena stipoides*	Weeping Grass
MTG	*Austrodanthonia caespitosa*	Common Wallaby-grass
MTG	*Austrodanthonia fulva*	Copper-awned Wallaby-grass
MTG	*Austrodanthonia racemosa*	Stiped Wallaby-grass
MTG	*Austrodanthonia setacea*	Bristly Wallaby-grass
MTG	*Lomandra filiformis*	Wattle Mat-rush
MTG	*Lomandra longifolia*	Spiny-headed Mat-rush
MTG	*Poa morrisii*	Soft Tussock-grass
MTG	*Themeda triandra*	Kangaroo Grass
PS	*Acrotriche serrulata*	Honey-pots
SC	*Billardiera scandens*	Common Apple-berry
SC	*Rubus parvifolius*	Small-leaf Bramble
SH	*Geranium* sp. 2	Variable Cranesbill
SH	*Veronica gracilis*	Slender Speedwell
SH	*Wahlenbergia gracilis*	Sprawling Bluebell

Notes:
(1) Local (within 20km) provenance is essential, non local provenance to be removed if planted.
(2) Species substitution within life forms is acceptable if species are not available.

Lifeforms:

T	tree	MTG	medium tufted graminoid
MS	medium shrub	MNG	medium non-tufted graminoid
LTG	large tufted graminoid	LH	large herb
MH	medium herb	PS	Prostrate Shrub
LNG	large non-tufted graminoid	SH	Small Herb
SC	Scrambler		

Table A3.1: Swampy Woodland planting list for Net Gain offset sites: Readymix Mt. Shamrock Quarry

Life form	Species	Common name
T	***Acacia melanoxylon***	**Blackwood**
T	***Eucalyptus fulgens***	**Green Scentbark**
T	***Eucalyptus ovata***	**Swamp Gum**
T	***Eucalyptus viminalis***	**Manna Gum**
MS	***Acacia verticillata***	**Prickly Moses**
MS	***Coprosma quadrifida***	**Prickly Currant-bush**
MS	***Leptospermum continentale***	**Prickly Tea-tree**
MS	***Melaleuca ericifolia***	**Swamp Paperbark**
MS	***Ozothamnus ferrugineus***	**Tree Everlasting**
TF	***Cyathea australis***	**Rough Tree-fern**
LNG	***Gahnia radula***	**Thatch Saw-sedge**
LTG	***Carex appressa***	**Tall Sedge**
LTG	***Lepidosperma elatius***	**Tall Sword-sedge**
LTG	***Poa labillardierei***	**Common Tussock-grass**
MH	***Acaena novae-zelandiae***	**Bidgee-widgee**
MNG	***Microlaena stipoides***	**Weeping Grass**
MTG	***Lomandra longifolia***	**Spiny-headed Mat-rush**
MTG	***Poa morrisii***	**Soft Tussock-grass**
SC	***Billardiera scandens***	**Common Apple-berry**
SC	***Rubus parvifolius***	**Small-leaf Bramble**
SH	***Geranium potentilloides***	**Soft Cranesbill**
SH	***Wahlenbergia gracilis***	**Sprawling Bluebell**

APPENDIX 4
Woody Weeds within the Offset Site

Sweet Briar *Rosa rubiginosa*

Sweet Briar (or Briar Rose) is a deciduous shrub up to 3m high which has stems covered with sharp curved prickles. The leaves are divided into 5-7 leaflets with finely serrated margins, and fine prickles on the leaf stalks. Flowers are pale pink and appear in spring, followed by bright red rose hips. Sweet briar spreads by seeds which are bird dispersed.

Management: The most effective control method for the small patches of Sweet Briar in the reserve is using the cut-paint method. This should be undertaken in spring/summer when the plants are actively growing. Cut material with fruit should be disposed of safely, and follow up treatments may be required, as larger plants will often resprout. Smaller plants can be dug out, but to prevent regrowth the crown should be removed from the site.

Hawthorn *Crateagus monogyna*

Hawthorn is a deciduous small shrub to tree to 10m, once widely used for hedges. It has thorny branches and deeply lobed, small bright green leaves. White or pink flowers in spring are followed in autumn by red berries. Hawthorn reproduces by seed, which is dispersed by birds, foxes, possums, stock and water.

Management: Plants should be treated using the cut-paint method (for best results apply when plants are healthy and there is good foliage cover).

Blackberry *Rubus fruticosus* spp. agg.

Blackberry is a semi-erect mound-forming shrub with arching, thorned stems to over two metres long. Leaves support three to seven leaflets which are typically discolourous, being lighter underneath. White or pink flowers appear in spring producing succulent fruit to 10 mm in diameter.

Reproduces vegetatively and by seed which is dispersed by birds and foxes. Small fragments of this plant can form new plants so care needs to be taken to remove or destroy all material present.

Management: Dense thickets of this species should be manually removed or burnt. Regrowth is then sprayed. Regular follow-up control is required to destroy resprouting material and new seedlings.

FIGURES

Figure 1: Location of the Readymix Mt Shamrock Quarry, Pakenham

Figure 2: Location of the net gain offset sites for the Mt Shamrock quarry, Pakenham