2023 Rehabilitation Report

Holcim Quarry Mt Shamrock

General Information

Disclaimer

Naturelinks Landscape Management Pty Ltd has taken all the necessary steps to ensure that an accurate document has been prepared, however the company accepts no liability for any damages or loss incurred as a result of reliance placed upon the report and its contents.

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Report Scope

This report addresses all revegetation and maintenance works carried out by Naturelinks over the period of 2023. Works were undertaken in the following areas depicted in Figure 1: Net Gain (Yellow), Extraction (Orange), Phase C (White), South-East Extraction (Pink), South-East Extraction Back slope (Cream), Southern Extraction (Red), 0.8 Hectare (Dark Maroon), 1.2 Ha (Blue), 2023 Planting Area (Green), Phase A&B (Teal), Landslip (Bright Pink), Paddock Replacement (Ash), Chilean Needle Grass Monitoring & Control (Dark Green) and Southern Hillside (Purple).

This report outlines issues encountered and management challenges identified throughout the rehabilitation process. Following this a summary of proposed future management actions is detailed.

Figure 1: *Scope of report and individual sites at Holcim Mt Shamrock Quarry.*

Revegetation Approach

Preparation and Direct Seeding of Site

Areas for revegetation that were formerly part of active mining operations are rebuilt and sculpted to an even gradient with a layer of top soil spread across the surface by Holcim staff. For a few months the ground is left to settle and if required preparatory herbicide spraying is undertaken to control any weeds that may have germinated. Once any required spraying has been completed with a minimum of a two-week withholding period adhered direct seeding takes place during the months of June/July. Native grass seed from species suited to the site's environmental conditions (Weeping grass *Microleana stipoides* & Wallaby grass *Rytidosperma sp.*) sourced from local provenance is mixed with sterile rye-grass seed and papier-mache then sprayed as a thin layer over the site.

In the following weeks the sterile rye-grass germinates providing more favourable environmental conditions allowing for Wallaby grass to germinate and grow in the following months.
The sterile rye-grass presence reduces temperature fluctuation of the soil surface and aides in moisture retention assisting native grass survival rates. The sterile rye presence competes with many weed species reducing overall weed load while its habit being much taller than the native grass competes little with the native grass.

The rye-grass used in this process does not produce viable seed and is an annual species. In a few years' time all the sterile rye will have germinated and died in its decomposition will add a vital organic layer to the top soil.

In the first few years direct seeded Wallaby grass (*Rytidosperma sp.*) will dominate the understory. Weeping grass (*Microlena stipoides*) will predominately germinate and start to spread several years after direct seeding takes place. The Wallaby grass species used prefer drier areas which also is where weed competition is generally the least while Weeping grass will be found in wetter and more shaded areas. Site conditions determine which will dominate the understory.

The following sites have been revegetated by this process: Extraction, South-East Extraction, Southern Extraction, 0.8 Hectare, 1.2 Ha and 2023 Planting Area.

Species Selection

Holcim Quarry Mt Shamrock falls within State of Victoria's Ecological Vegetation Class (EVC) 16 Lowland Forest, and species for revegetation are selected based on this EVC.

However, for the following sites South East Extraction, Southern Extraction, 0.8 Hectare, 1.2 Hectare and 2023 planting area, we interpret that site conditions fall outside EVC 16. These sites are north and north-east facing with dry conditions with exposure to high winds, whereas Lowland Forests typically exist in areas of high soil fertility and relatively high rainfall. Indeed, in early years of revegetation the first of these sites to exhibit these conditions, namely South East Extraction the survival rates for many species were low. Consequently, Naturelinks sought to expand species diversity to accommodate these site conditions to select a more dry-tolerant species range.

To determine relevant dry-tolerant species Naturelinks undertook desktop analysis using the Victorian Government 'Naturekit' website (www.environment.vic.gov.au/biodiversity/naturekit) and located several parcels of native vegetation for all three EVC's 16, 45 and 128 within 5 km of

Mt Shamrock. Naturelinks conducted on-ground species surveys in two reference areas containing these EVCs:

- RJ Chambers Flora and Fauna Reserve - *Lowland Forest EVC 16 vegetation, and Shrubby Foothill Forest EVC 45 within 5 km of Mt Shamrock at RJ.*
- Beaconsfield Nature Conservation Reserve - *Grassy Forest EVC 128*

Species in these EVC's which were also found existing in similar conditions to that found at Mt Shamrock (considering slope, soil type and aspect) were considered appropriate for future planting lists. Species from EVC's 128 and 45 were sought due to their existence within a broader category of Dry Forests, a category which Lowland Forest does not fall within.

The expansion of EVC's to include EVC 45 & 128 was approved by as part of the 5 Year Review of Revegetation Planning. The addition of many species drawn from these EVC's significantly improved plant survival. All seed and tube stock for revegetation are sourced locally (within 5 km).

A comprehensive survey was also undertaken in both sections of Net Gain (North & South, Donazzan's Property, 415 Pakenham Road, Pakenham Upper) with a brief survey (with the landowners' permission) of the adjacent property (465 Pakenham Road SE corner). Many new species were identified, some suitable for revegetation, thus expanding the list of understory species used for revegetation of Net Gain. Both North & South Revegetation Zones of Net Gain fall within EVC 16 Lowland Forest and EVC 83 Swampy Riparian Woodland.

Small surveys have also been undertaken in the immediate area where remnant vegetation still remains or where native recruitment has taken place. This includes sections of the quarry and adjoining land, the nature strip west of Pakenham Road between Mt Shamrock Road, and 415 Pakenham Road.

Additional incidental species observations have been recorded while caring out revegetation works. Over time, this has facilitated the construction of an extensive list of both indigenous and exotic plant species providing a valuable resource for Naturelinks staff. A copy of the complete flora and fauna species list is supplied as an attachment to this document.

Tree and Shrub Planting Year One

Planting of trees and shrubs commences at a minimum one month after direct seeding has taken place during the months of July/August, avoiding overly wet conditions to limit harm caused to germinating native grass by staff traversing through the site. All trees and shrubs are protected from herbicide overspray and drift, grazing by both native and introduced animals, and strong wings by double staked Corflute guards. Two stakes are used to reduce the high rates of guard dislodgement caused by strong winds and collision from Kangaroos.

Planting selection for year one is usually limited to Eucalyptus, fast growing acacias, and adaptable shrub species. Trees and shrubs are generally more vulnerable to temperature extremes and fluctuating site conditions than grasses. The rates of mortality for plantings are generally highest in the first year then decrease in subsequent years as site conditions become more favourable. The species with the highest chances of survival are planted first at half the desired final density.

Planting at half density reduces budgetary costs, labour, and resources when the mortality rate is likely to be the highest. Mortality rates will vary due between sites and different areas within a site.

Plant mortality in the first year usually ranges from 20 - 30% but can be as high as 50% in some areas to as low as 10% or even 5% in others. In the months preceding the second year planting all stakes and guards are removed from dead plants. This reveals where plant mortality has been high and where it has been low. A visual inspection may offer clues to the underlying causes for increased plant mortality and can guide an even more tailored species selection best adapted to particular areas of a site. If required actions such as the installation of watering system can be undertaken to further increase rates of survival.

All plants are supplied by a local indigenous nursery. Many of the species are sourced specifically from RJ Chambers Flora and Fauna Reserve and Beaconsfield Nature Conservation Reserve. Other sources include Hillview Bushland Reserve (Pakenham) and Donazzan's Property (415 Pakenham Road, Pakenham Upper). Seeds and cuttings are also collected from numerous sections of remnant roadside vegetation such as Pakenham Rd (Pakenham Upper), Army Road (Pakenham), Thewlis Road Aqueduct (Pakenham) and Reynolds Road (Pakenham).

Planting Year 2 & Subsequent years

The same number of trees and shrubs are planted in year two as year one, but with an expanded species range. Where plant survival has been high, year two planting density will be low; and where survival has been low, planting density is increased. To limit competition between trees which generally have more extensive root systems and a higher demand for resources, shrubs and trees are planted adjacent to one another.

Year three, and each subsequent year, tree and shrub planting numbers are generally reduced mainly reflecting the rate of attrition from previous year's plantings, while increasing number of species selected as the site becomes more suitable to a wider range of trees and shrubs. Expanding species range and the genus they belong may also reduce the impact caused by possible outbreaks of plant diseases and insects plagues which certain species and those of a related genus may be more vulnerable.

Lilies planted from years two and three predominantly belong to the genus Dianella and Lomandra. From year three onwards, Poa species (Tussock Grasses) are planted. Both Lily and Poa species are planted in areas of low weed load and have suitable conditions to reduce risk of off target damage from herbicide.

Large monoculture plantings are avoided as they are unsightly and stray from what you would find in nature. In such areas weeds can become difficult to manage as herbicide use is often limited due to increased risk of off target damage and a high planting density can actually suppress the natural recruitment process.

With the exception of Net Gain, which is much more established, additional understory species are generally not planted in this phase of revegetation. In particular the planting of forbs would make the control of broadleaf weeds growing near them with herbicide more difficult. Spontaneous recruitment of native forbs from seed bank and adjacent area is however encouraged.

Sustainability

Two hardwood stakes and Corflute tree guards are currently used for the majority of new plantings.

Each year all stakes and guards no longer required for protection of plantings are removed and stored at Naturelinks North Melbourne depot. All stakes and guards that can, will be used for the following years planting. Some stakes and guards will be re-used four or five times greatly reducing costs. The re-use of stakes and guards reduces the need to purchase new stakes and guards by around two-thirds each year. Broken or otherwise deteriorating guards are recycled. Some broken stakes will be reused to mark out areas at various sites, the rest designated as firewood.

Naturelinks has trialled eco-friendly tree guards made from unbleached cardboard with very poor results. Cardboard guards let little light through to the plant except for the opening at the top which if damaged can easily close, starving the plant of sunlight. They were more prone to damage from strong winds and animal collision and could not be re-used for subsequent year's plantings. Cardboard guards took longer to install increasing labour costs with a plant mortality rate of over 70%. They will not be used again.

Another option is tree guards made from Potato or Corn starch. However due to their design they would require three stakes and offer even less protection than the cardboard guards if any of the stakes or guard are damaged. Although, they would likely be a better option to cardboard, Naturelinks believes they would not be suitable.

All tube-stock pots and trays acquired in the process of yearly plantings are returned to the supplier for sterilisation and re-use.

Works & Management Recommendations

South-East Extraction Area

The South-East extraction area consists of three sections depicted in Figure 2; (a) bottom half in blue, (b) top half in pink and (c) ridgeline in yellow. An Echidna now lives between here and Southern Extraction.

Figure 2: *Bottom Half (blue), Top Half (pink), Ridgeline (yellow), Boot hold point (red)*

2023 Works

Although much of the site has generally dry conditions, the combination of increased rainfall during the summer months, continued establishment of trees and shrubs (offering protection from wind and temperature variation) and natural accumulation of biomass (adding to the top soil layer and improving moisture retention) has improved the survival rate and growth of recent plantings.

Silky Tea-tree (*Leptospermum myrsinoides*), tolerant of drier conditions and common locally, was added to the species planted here. Selective infilling throughout the site continues with trees, shrubs, grasses and lilies. The ridgeline that borders the very top of the site (figure 2, yellow) planted in 2022 is having good results.

The wetter conditions have also increased the growth of exotic weed species which continued to be managed by brush cutting low to the ground and followed up with selective herbicide spraying by tanker and Knapsack.

Common broad-leaf weeds include Sow Thistle (*Sonchus spp*), Fleabane (*Erigeron spp*), Wild Radish (*Raphanus raphanistrum*), Ribwort (*Plantago lanceolate*) and Cats-ear (*Hypochaeris radicata*). Common grassy weed species includes Toowoomba Canary-grass (*Phalaris aquatica*), Cock's-foot (*Dactylis glomerata*), Caterpillar grass (*Paspalum dilataum*), Pigeon grass (*Setaria sp.*) and Bromus (*Bromus sp.*).

Chilean needle grass (*Nassella neesiana*) infestations located west of the access road towards the bottom of the slope have increased despite herbicide application undertaken in 2022 (figure 3). In response Chilean Needle Grass control has intensified with works undertaken earlier in the season before seeds are mature. Both mature plants and those with seed are hand-weeded and disposed of off-site (Naturelinks has the required permits to remove and transport). Younger plants are sprayed with non-selective herbicide by Knapsack.

Chilean Needle Grass infestations are marked with stakes tied with bright pink flagging tape. This will assist future identification and elimination of any remaining Chilean needle grass the following year. Brush cutting near Chilean Needle Grass when seeding is avoided to prevent further spreading of weed seed.

Rabbits are slowly becoming more numerous in the area but still exist at relatively low numbers. On the ridgeling rabbit droppings can be observed but no sign of any burrows has been found within the quarry boundary *(Figure 2, (c) Ridgeline)*. Currently, any negative impact they may be causing appears to be negligible. Naturelinks will continue to monitor rabbit activity and report any suspected rabbit burrows to quarry management.

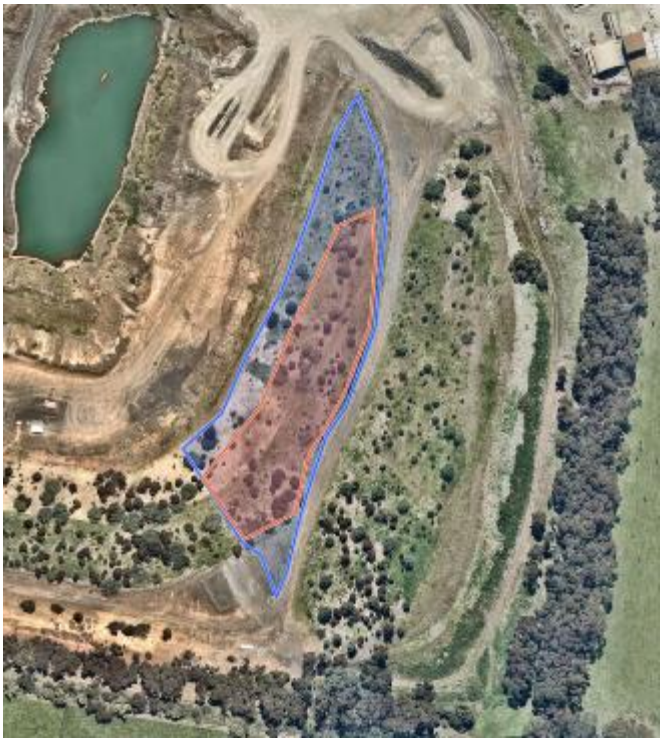

Figure 3: *Southern Eastern Extraction (blue), and known Chilean needle grass area (orange)*

Table 1. *List of species planted South-Eastern Extraction in* 2023.

Species	Common Name	No.
Acacia dealbata ssp. dealbata	Silver Wattle	25
Acacia pycnantha	Golden Wattle	25
Bursaria spinosa ssp. spinosa	Sweet Bursaria	25
Daviesia leptophylla	Narrow-leaf Bitter-pea	25
Eucalyptus dives	Broad-leafed Peppermint	25
Eucalyptus radiata	Narrow-leafed Peppermint	25
Leptospermum myrsinoides	Heath Tea-tree	25
Lomandra longifolia* var. *exilis	Cluster-headed Mat-rush	100
Poa labillardierei* var. *labillardierei	Common Tussock-grass	200

Future Management Recommendations

The recommendations for the south-eastern extraction area include:

- Continued hand-weeding and disposal of seeding Chilean Needle Grass followed up by herbicide spraying of younger plants.
- Continued slashing and herbicide application of perennial exotic grasses.
- Maintain broadleaf-selective herbicide application.
- Add additional dry-tolerant species used for in-fill plantings to expand diversity and reduce weed coverage *(Table 2)*.
- Continue to monitor rabbit activity and report any suspected rabbit burrows to quarry management.

Table 2. *List of recommended species for planting within the South Eastern Extraction Area in 2024.*

Species	Common Name
Acacia oxycedrus	Spike Wattle
Amperea xiphoclada var. xiphoclada	Broom Spurge
Dillwynia sericea	Showy Parrot-pea
Gompholobium huegelii	Common Wedge-pea
Goodia lotifolia var. lotifolia	Common Golden-tip
Lomatia ilicifolia	Holly-leaf Lomatia
Pimelea axiflora ssp. axiflora	Bootlace Bush
Spyridium parvifolium	Dusty Miller
Tetratheca ciliate	Pink-bells
Poa labillardierei var, labillardierei	Common Tussock-grass
Poa sieberiana var. sieberiana	Grey Tussock-grass
Dianella laevis var. laevis	Pale Flax-lily
Lomandra longifolia var. exilis	Cluster-headed Mat-rush

Southern Extraction Area

Southern Extraction is a north facing slope that borders South Eastern Extraction to its east and 0.8 hectare revegetation to the west. An Echidna now lives between here and South Eastern Extraction.

Figure 3: *Southern Extraction*

2023 Works

At the eastern boundary of Southern Extraction Eucalyptus, along with larger Acacia species, continue to establish a canopy providing favourable conditions for expansion of Weeping Grass *(Microlena stipoides)*. Infill planting of dry tolerant tree and shrub species has continued increasing understory coverage. Additional Poa species (Tussock-grass) were planted and have grown considerably since planting.

Due to increased rainfall, broadleaf weed growth has intensified particularly during spring and summer in late 2023. Prickly Sow Thistle (*Sonchus asper*) and Fleabane (*Erigeron spp.*) have been the most prevalent. The selective use of herbicide by both tanker and knapsack is the primary method of broadleaf weed control. Alternatively, some large fleabane plants are hand-weeded.

Higher rainfall has also caused increased weedy grass species growth. Intensive brush-cutting very low to the ground has been effective method of control for the following grass weeds: Toowoomba Canary Grass (*Phalaris aquatica*), Cock's-foot (*Dactylis glomerata*), Paspalum (*Paspalum dilatatum*), Bromus (*Bromus sp.*) and Pigeon Grass (*Setaria sp.*).

Chilean Needle Grass (*Nassella neesiana*) has increased marginally from the previous year. In response Chilean Needle Grass control has intensified with works undertaken earlier in the season before seeds are mature. Mature plants, and any with seed, are hand-weeded and disposed of off-site and younger plants are sprayed with non-selective herbicide by knapsack.

Chilean Needle Grass infestations are again marked with stakes tied with bright pink flagging tape.

Table 3. *List of species planted within Southern Extraction in 2023.*

Species	Common Name	No.
Banksia spinulosa var. cunninghamii	Hairpin Banksia	25
Eucalyptus baxteri	Brown Strinybark	25
Eucalptus dives	Broad-leafed Peppermint	25
Pimelea flava ssp. flava	Yellow Rice-flower	25
Pultanea scabra	Rough Bush-Pea	25
Poa Labillardierei var. labillardierei	Common Tussock-grass	200
Lomandra longifolia var. exilis	Cluster-headed Mat-rush	100

Future Management Recommendations

The recommendations for the Southern Extraction include:

- Continued hand-weeding and disposal of seeding Chilean needle grass followed up by herbicide spraying of younger plants.
- Continue control of perennial weedy grass by brush-cutting and follow up herbicide treatment.
- Continual management of broad-leaf exotic species with selective herbicide application.
- Spot spray with knapsack weedy species growing amongst and near Weeping Grass *(Microlena stipoides)* to reduce competition to encourage Weeping Grass recruitment and spread.
- Plant additional drought-tolerant shrub species *(Table 4)*.

Table 4. *List of recommended species for planting within the Southern Extraction Area in 2024.*

Species	Common Name
Acacia oxycedrus	Spike Wattle
Amperea xiphoclada var. xiphoclada	Broom Spurge
Gompholobium huegelii	Common Wedge-pea
Goodia lotifolia var. lotifolia	Common Golden-tip
Hakea teretifolia ssp. hirsuta	Dagger Hakea
Pimelia axiflora subsp. Axiflora	Bootlace Bush
Pultenaea scabra	Rough Bush-Pea
Spyridium parvifolium	Dusty Miller

Extraction Site

The Extraction site is south facing starting from the ridgeline of the northern side of the quarry through to the base of current operational area. This is the first zone that Naturelinks direct seeded with native grass and planted.

Extraction is the wettest of the revegetation zones its sites conditions best match EVC 16 Lowland Forest. However, a small rise south of the main access track that divides the site in half opposite and to the east of the cargo container is somewhat drier.

Figure 4: *Extraction area*

2023 Works

Many aspects of revegetation work for this site are complete with the exception of weed management which will need to remain ongoing. The site will continue to evolve as tree coverage and canopy expands in turn shaping site conditions for the understory which will with management favour a native understory over exotic.

A deliberate effort has been made across Extraction to let natural processes shape the various parts of this site. Species selection and planting density has been designed to highlight this contrast.

Increasing biodiversity will remain the focus of tree and shrub plantings with several new species planted most years in relatively low numbers.

In 2023 Purple-sheath Tussock-grass's (*Poa ensirformis*) were planted above and below the main access track on the eastern side of the site where conditions are wettest. Tussock-grasses and lilies from previous years planting continue to grow and spread by rhizome and seed.

Exotic broadleaf weeds remain at low levels. The following species were sprayed with selective herbicide by knapsack: Sow thistle *(Sonchus spp)*, Wild Radish *(Raphanus raphanistrum)*, Fleabane *(Erigeron bonariensis)*, Cat's-ear *(Hypochaeris radicata)* and Ribwort *(Plantago lancceolata)*.

Exotic grass herbicide spraying and control is currently a low priority. Weedy grass species prevalent within the site include: Toowoomba Canary Grass *(Phalaris aquatica)*, Cocksfoot *(Dactylis glomerata)*, Caterpillar Grass *(Paspalum dilatatum)* and Kikuyu *(Chenchrus clandestinum)*.

Blackberry *(Rubus fruiticosus)* has increased significantly throughout the site over the last year due to favourable weather conditions. This species control will be a high priority in 2024 and will be targeted from mid-spring to mid-autumn when it is most actively growing. Blackberry will be primarily controlled with by herbicide spraying by knapsack. In areas of concern through native trees and shrubs that hold a high risk of off-target damage, stalks will be cut and painted with glyphosate.

A single Coastal wattle *(Acacia longifolia)*, closely related, but not to be confused with the invasive Sallow wattle *(Acacia longifolia ssp. sphorae)*, is growing on the small rise on the south side of the main access track opposite the cargo container. Naturelinks has become aware that this plant poses a risk of hybridisation between it and Hedge wattle *(Acacia paradoxa)* for which a number of individuals are planted close by. Naturelinks will be removing the Coastal wattle along with any potential germinates and hybrids via chainsaw of the parent plant, and cut and painting on young plants as well as spraying the cambium layer with glyphosate.

Table 5. *List of species planted within the Extraction Area in 2023*

Species	Common Name	No.
Poa ensiformis	Purple-sheath Tussock-grass	250

Future Management Recommendations

The recommendations for the Extraction area include:

- Targeting broad leaf exotic species with herbicide application by knapsack.
- Targeting blackberry with herbicide application by knapsack and cut and paint with glyphosate where there is a risk of damage to native vegetation.
- Removal of Coastal wattle *(Acacia longifolia)* along with any germinates and hybrids.
- Planting of a small number of tree and shrub species to expand biodiversity *(Table 6)*.

Table 6. *List of recommended species for planting in the Extraction Area in 2024.*

Species	Common Name
Lomatia fraseri	Tree Lomatia
Sambucus gaudichaudiana	White Elderberry
Tetratheca ciliate	Pink-bells

Phase A & B Site

The Phase A and B site encompasses a planted area bordering the outer quarry fence-line that acts as a visual barrier and screen for noise and dust pollution.

Figure 6: *Phase A & B marked in teal, Chilean needle grass area in red*

2023 Works

Chilean Needle Grass infestations expanded marginally from last year but are still confined to a single section of the site. Herbicide spraying of Chilean Needle grass commenced earlier in the season in an effort to prevent plants seeding. Multiple spray runs took place weeks apart in an effort to eliminate all adult plants and as many germinates as possible.

Extensive herbicide spraying of the main infestation located behind the quarry and source Phase A&B infestation is detailed under Chilean Needle Grass monitoring and control.

Evidence of deer are continuing to cause damage to softwood trees and shrubs particular Banksia species. Damage includes removing bark or damaging and breaking the main stem.

Weed control of thistle and blackberry species was undertaken by knapsack spraying prior to planting. 500 trees were planted in areas where die-off has occurred continuing on with in-fill planting of previous years.

The addition of a second stake to further secure tree guards when planting has reduced rates of guards' dislodgement caused by deer and breaking of guards from collision by kangaroos.

Table 7. *List of tree and shrubs planted within the Phase A & B area in 2023*

Species	Common Name	No.
Acacia mearnsii	Black Wattle	100
Eucalyptus baxteri	Brown Stringybark	100
Eucalyptus dives	Broad-leafed Peppermint	100
Eucalyptus goniocalyx	Long Leafed Box, Bundy	100
Eucalyptus radiata	Narrow-leaf Peppermint	100

Future Management Recommendations

The recommendations for Phase A & B include:

- Continue herbicide application of Chilean Needle Grass with the aim of eventual elimination.
- Continue herbicide application by both knapsack and tanker spray unit targeting blackberry.
- Continue herbicide application by both knapsack and tanker spray unit targeting thistle species.
- Planting of additional trees to bolster screening for nearby stakeholders *(Table 8)*.
- Recommend further action be taken to address the impact of deer and the repair of external fencing to be considered.

Table 8. *List of recommended species for planting Phase A & B area in 2024*

Species	Common Name
Acacia mearnsii	Black Wattle
Eucalyptus baxteri	Brown Stringybark
Eucalyptus dives	Broad-leafed Peppermint
Eucalyptus goniocalyx	Long Leafed Box, Bundy
Eucalyptus Radiata ssp. radiata	Narrow-leafed Peppermint

Phase C Site

The Phase C site comprises of disturbed remnant and revegetated areas that border the Extraction site to the west. The most significant remnant areas include: A small open area northeast of Extraction *(yellow in Figure 7)* where many Slender Sun-orchid *(Thelymitra pauciflora)* and Common Onion-orchid *(Microtis unifolia)* persist. During high rainfall this gully *(orange in figure 7)* provides a breeding ground for large numbers of native frogs. Just north of the gully are two remnant adult Rough Tree-ferns *(Cyathea australis) (Blue markers in in Figure 7)* and a single remnant Clover Tree *(Goodia lotifolia) (Green marker in Figure 7)*.

Two areas shown in red *(Figure 7)* contain scattered Tall Sword-sedge *(Lepidosperma elatius)* east of Graveyard and north of Extraction. This species cannot be supplied from indigenous nursery's due to the difficulty of its propagation.

Figure 7: *Phase C, Mt Shamrock Quarry*

2023 Works

Native fern species including a small number of Rough Tree ferns *(Cyathea australis)* are recruiting naturally below the east/west Graveyard track.

Knapsack spraying with herbicide has significantly reduced blackberry *(Rubus fruiticosus)* and broadleaf weed species coverage. The southern-most area west of the Graveyard track bordering east/west road above Sales is the only location where the prevalence of blackberry and weedy broadleaf species remain high.

Young woody weeds under chest-height have been sprayed with herbicide at the same time and chemical mixture as blackberry. A reduction of young woody weeds across the site is apparent.

English ivy *(Hedera helix)* has been targeted with a combination herbicide mix at the south end of the site east of the Graveyard track in December. A significant reduction in the infestation along this border is expected.

Scattered individuals of Ragwort *(senecio jacobaea)* are either hand-weeded and left in-situ, or if small, sprayed with herbicide. Ragwort population remains small and controlled.

An infestation of Pampas grass *(Cortaderia selloana) (azure in figure 7)* is spreading along the cliff face above the east/west road and above Sales. This infestation borders the southern tip of Extraction and the SE corner of Phase C. Spraying this species with herbicide by knapsack and tanker is planned for 2024.

Stands of predominantly Willow *(Salix sp.)* bordering the southern end of Phase C and east of the main Graveyard track have been significantly reduced in size. Adult trees were felled and glyphosate applied to the trunk's cambium. Alternatively, some were left standing and the base of the tree frilled by chain sawing a line into the trees cambium and sprayed with concentrated glyphosate.

Above and below the east/west Graveyard track there is a mature stand of planted Tasmanian blue gum *(Eucalyptus globulus ssp. globulus)* which are not native to the area. Due to their size and age these trees are of ecological value but younger plants are recruiting nearby. Control of recruiting Tasmanian blue gums will commence after control of Willow and other exotic tree species is completed.

A small number of Powelltown Corea *(Corea reflexa var. lobatus)* were planted above the Graveyard track under the canopy of established trees.

Table 9. *List of species planted Phase C in 2023*

Species	Common Name	No.
Corea reflexa var, lobatus	Powelltown Corea	25

Future Management Recommendations

The recommendations for Phase C include:

- Continue control of broadleaf weeds, blackberry, English ivy and small woody weeds with herbicide.
- Herbicide spray or hand weed all Ragwort when encountered.
- Tanker spray with herbicide Pampas Grass when inaccessible by knapsack; knapsack spray isolated and small plants.
- Chainsaw remaining Willow and other large woody weeds and treat the cut stems or frilled trunks with glyphosate.
- Cut, paint, and chainsaw recruiting Tasmanian blue gums, spraying cut stem with glyphosate.
- Encourage natural regeneration of ferns species with particular care paid to any young Tree ferns.
- Increasing species diversity by planting a small number of Muttonwood *(Myrsine howittiana)*

Table 10. *List of recommended species for planting in the Phase C area in 2024*

Species	Common Name
Myrsine howittiana	Muttonwood

0.8 Hectare Revegetation Site

The 0.8 Ha site is north facing slope adjacent to the Southern Extraction Zone *(see figure 8)*.

Figure 8: *0.8 Ha Revegetation Area*

2023 Works

0.8 Ha Revegetation Site was direct seeded and first round of planting was undertaken in 2021. Survival rates overall for the first and second year for trees and shrubs was substantial with the exception of some areas in the top third (southern end) where conditions are drier and the top soil layer appears to be thin.

A variety of shrub species suited to dry conditions were planted at the top end that previously had poor survival rates. Shrubs appear to be doing well along with Spreading Flax-lily *(Dianella admixta)* that was planted at the same time.

More Cluster-headed Mat-rush *(Lomandra longifolia var. exilis)* had survived from the 2022 planting than previously thought and were bolstered by two trays adding another 100 plants in 2023. With consideration of the reduced rate of loss from off target damage, Cluster-headed Mat-rush were again planted without being staked and guarded to keep costs down. Naturelinks will continue to monitor the situation and re-evaluate this decision if necessary.

A weedy mint *(Menth sp.)* had become a problem in the lower areas of the site where conditions are much wetter. Repeated treatment with Kamba (a selective broadleaf herbicide) had failed to make a significant impact so adding the herbicide 'Associate' (active ingredient Metsulfuron-methyl, a selective broadleaf herbicide) at half its standard rate was trialled. The results were overwhelmingly positive and this chemical combination has already been used elsewhere at the quarry and is now the standard herbicide mix used to control broadleaf weeds at this site.

Native Wallaby Grass *(Rytidosperma spp.)* continues to dominate the understory but exotic Toowoomba Canary-grass is starting to increase its coverage in sections of the site. During the warmer months Whorled pigeon-grass *(Setaria verticillats)* and Barnyard grass *(Echinochloa sp.)* are prolific in the area.

Table 11. *List of species planted within the 0.8 Hectare Revegetation Area in 2023*

Species	Common Name	No.
Acacia verticillata ssp. verticillata	Prickly Moses	25
Cassinia longifolia	Long-leaf Cassinia	25
Eucalyptus Radiata ssp. Radiata	Narrow-leafed Peppermint	25
Grevillea alpine (Southern Hills Form)	Mountain Grevillea	25
Leptospermum myrsinoides	Silky Tea-tree	25
Pimelea humilis	Common Rice-flower	25
Pultanaea gunnii ssp. gunnii	Golden Bush-pea	25
Dianella admixta	Spreading Flax-lily	50
Lomandra longifolia var. exilis	Cluster-headed Mat-rush	100

Future Management Recommendations

The recommendations for 0.8 hectare include:

- Continue targeting broadleaf exotic species with herbicide application with the addition of Associate at half standard rate.
- Control Toowoomba Canary-grass *(Phalaris aquatic)* and summer-growing annual grassy weeds with herbicide.
- Continue expanding species diversity in particular shrub species more adapted to stabilised conditions *(Table 12)*.

Table 12. *List of recommended species for planting in the 0.8 Hectare Revegetation Area in 2024*

Species	Common Name
Acacia oxycedrus	Spike Wattle
Dillwynia sericea	Showy Parrot-pea
Epacris impressa	Common Heath
Lomatia ilicifolia	Holly-leaf Lomatia
Daviesia leptophylla	Narrow-leaf Bitter-pea

Landslip Sites

The Landslip sites for 2022/23 are three separate sites, the largest, Mass 4, containing a small natural seasonal spring, south of the quarry in a fenced area surrounded by former grazing paddocks. The second, Mass 5, is located a hundred meters to the south east of Mass 4 in an openly grazed paddock, is a circular scarp. The third, Mass 13, is a small circular failure measuring about 2 meters across to the west of the quarry.

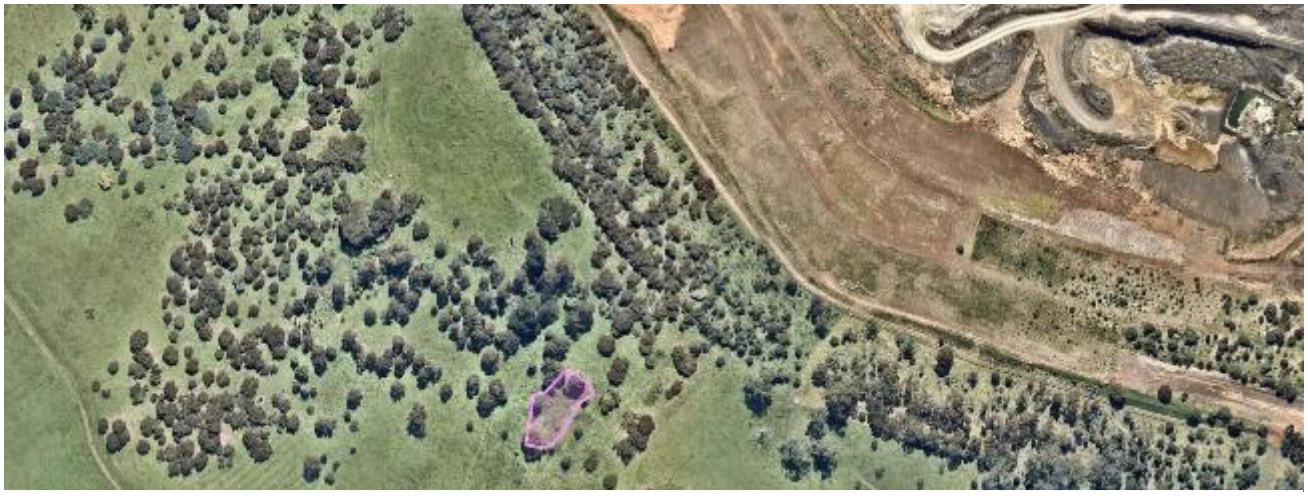

Figure 9: *Mass 4*

2023 Works

No on-ground works were conducted in 2023 but a brief site inspection of Mass 4 only was undertaken while working nearby. Substantial damage by grazing deer was evident along with the removal of many guards and muddying of large areas of ground. These combined effects had led to the death of many the previous year's plantings and further damage and death of plantings from earlier years.

Once deer numbers are controlled or the site fences are sufficient to offer full protection from roaming deer, this site needs will require re-planting.

Large stands of blackberry *(Rubus fruiticosus)* and Spear Thistles and other broadleaf weeds dominate sections of the site.

Table 13. Recommended list of native tree, shrubs, lily and grass species to be planted within the Landslip area in 2024.

Location	Species	Common Name
Mass 4	***Acacia dealbata ssp. dealbata***	Silver Wattle
	Acacia verticillata ssp. verticillata	Prickly Moses
	Bursaria spinosa ssp. spinosa	Sweet Bursaria
	Eucalyptus oblique	Messmate
	Eucalyptus viminalis ssp. viminalis	Manna Gum
	Leptospermum continentale	Prickly Tea-tree
	Leptospermum lanigerum	Woolly Tea-tree
	Melicytus denatus	Tree Violet
	Poa ensiformis	Sword Tussock-grass
	Poa Labillardierei	Common Tussock-grass
	Lomandra longifolia var. exilis	Spiny-headed Mat-rush

Future Management Recommendations

The recommendations for Landslip plantings include:

- Replacement planting at such a time that deer can be excluded from site.
- Herbicide treatment of blackberry stands and Spear thistles Mass 4.

Net Gain Site

The Net Gain Site is located at the Donazzan's Property' 415 Pakenham Road (Quarry owned) comprises of two offset zones Northern and Southern section. Net gain both North & South Revegetation Zones fall within EVC 16 Lowland Forest and EVC 83 Swampy Riparian Woodland. This is the most species diverse of all the sites with the highest amount of remnant vegetation.

Figure 10: *Net Gain: North (top) & South (bottom) both marked in yellow*

2023 Works

In general plantings from 2022 are doing well with some mortality and damage from grazing deer observed in the boggy area far south of the northern zone. The growth of plantings has been moderate but now plants are established growth should become more vigorous in the proceeding years.

Powelltown Correa *(Correa reflexa var. lobatus)* were planted south of the creek line in the bottom half of southern zone and are now established.

Several invasive weed species are of concern and have been the focus of weed control activities. Bishops weed *(Ammi visnaga)* located along spillway below Donazzan's Dam *(figure 11)* is now being more successfully controlled with a change in herbicide from Kamba M

(active ingredient MCPA. & Dicamba) to Associate (active ingredient Metsulfuron-methyl) which better targets species with tuberous roots.

English ivy *(Hedera helix)* is prevalent in the Northern Section and germinates can be difficult to spot within the undergrowth. English ivy continues being controlled with both herbicide spraying and hand-weeding.

Japanese honeysuckle *(Lonicera japonica)* is confined to the northern section of the swamp area. It is difficult to access except in dry conditions. Herbicide application and hand-weeding over the last year has been successful, but it is uncertain if it has been fully eliminated *(figure 11)*.

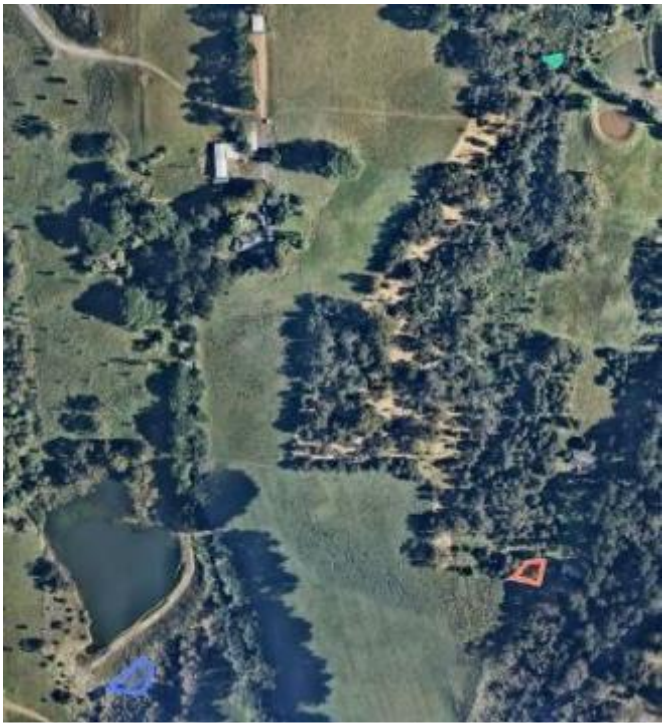

Figure 11: *Bishops Weed (blue), St Augustine grass (orange), Japanese Honeysuckle (green)*

St. Augustine grass *(Stenotaphrum secundatum)* was prominent within the bottom NE corner of northern section *(Figure 9)*. This weed was sprayed with herbicide knapsack and tanker and appears to of been eradicated.
Naturelinks will to monitor for signs of this weed in 2024.

Damage by deer has worsened; they appear to be the source of the largest negative environmental impact for the site. Small Trees and shrubs are regularly being lost to deer activity and potential reduction of biodiversity if remedial actions are not taken. Management plans for feral deer are in place for 2024.

Table 14. *List of understory species planted within the Net Gain area in 2023.*

Location	Species	Common Name	No.
Southern Section	***Correa reflexa var. lobatus***	Powelltown Correa	25

Future Management Recommendations

The recommendations for Net Gain include:

- Continue managing the problem of exotic species with herbicide application and hand-weeding including Bishop's Weed *(Ammi visnaga)*, English ivy *(Hedera helix)*, Japanese Honeysuckle *(Lonicera japonica)* and St. Augustine Grass *(Stenotaphrum secundatum)*.
- Increasing species diversity by planting a of trees and shrubs in northern and southern zones *(table 15)*.
- Recommend further action be taken to address the impact of deer.

Table 15. *List of recommended species for planting in the Net Gain area in 2024.*

Location	Species	Common Name
Northern section	***Myrsine howittiana***	Muttonwood
Southern section	***Acacia stictophylla***	Dandenong Wattle

1.2 Hectare Revegetation Site

The 1.2 Ha site is directly to the west 0.8 Revegetation Site sharing similar environmental conditions such as north facing, mostly dry with occasional high winds.

Figure 12: *1.2 Hectare site*

2023 Works

In 2022 direct seeding was carried outside the optimal time period. This led to a shorter time period for soil to settle and fewer herbicide spray runs undertaken prior direct seeding and planting. The result was a higher-than-normal weed load and lower germination rates of Wallaby grass.

Extensive weed control was required particularly for the western half of the site where the spreading of top soil delayed. Wild Raddish *(Raphanus raphanistrum)* germination and growth was a huge problem in some locations blanketing an entire area, growing over and smothering plantings. Multiple tankers of herbicide were required to fully control this weed. Herbicide treatment proved to be very effective.

The same weedy mint *(Menth sp.)* present at adjacent 0.8 Hectare Revegetation Site also occurs on 1.2 Hectare Revegetation Sites lower slopes where conditions are similarly wet. The addition of herbicide Associate (active ingredient Metsulfuron-methyl) at half standard rate to Kamba M has proven successful.

Rates of survival for both 2022 and 2023 have overall been good, infilling with additional species to improve diversity to continue in subsequent years.

Table 16. List of tree and shrub species planted in 1.2 Hectare Revegetation Area in 2023.

Species	Common Name	No.
Acacia genistifolia	Spreading Wattle	100
Acacia Verticillata ssp. Verticillata	Prickly Moses	75
Banksia marginata	Silver Banksia	100
Bursaria spinosa ssp. spinosa	Sweet Bursaria	75
Cassinia aculeata	Dogwood	100
Cassinia longifolia	Long-leaf Cassinia	75
Corea reflexa var. reflexa	Common Correa	100
Daviesia latifolia	Hop Bitter-pea	100
Eucalyptus baxteri	Brown Stringybark	25
Eucalyptus dives	Broad-leafed Peppermint	50
Eucalyptus goniocalyx	Long Leafed Box, Bundy	250
Eucalyptus Radiata ssp. Radiata	Narrow-leafed Peppermint	50
Kunzea leptospermoides	Yarra Burgan	50
Leptospermum myrsinoides	Silky Tea-tree	100
Lomandra longifolia var. exilis	Cluster-headed Mat-rush	400

Future Management Recommendations

The recommendations for 1.2 Hectare Revegetation Site include:

- Keeping broadleaf weeds controlled via selective herbicide application by spray tanker.
- Continue planting with additional species to expand diversity.

Table 17. List of recommended species for planting in 1.2 Hectare Revegetation Site in 2024.

Species	Common Name
Acacia dealbata ssp. dealbata	Silver Wattle
Acacia myrtifolia	Myrtle Wattle
Acacia oxycedrus	Spike Wattle
Daviesia leptophylla	Narrow-leaf bitter-pea
Hakea nodosa	Yellow Hakea
Hakea teretifolia ssp. hirsuta	Dagger Hakea
Indigofera australis	Austral Indigo
Melicytus dentatus	Tree Violet
Dianella admixta	Spreading Flax-lily

Paddock Replacement

This site encompasses 4 separate paddock areas that are grazed by cattle. Stock proof fencing has been erected around 150 approximately 1.5m^2 quadrants in which Eucalyptus were originally planted in 2018.

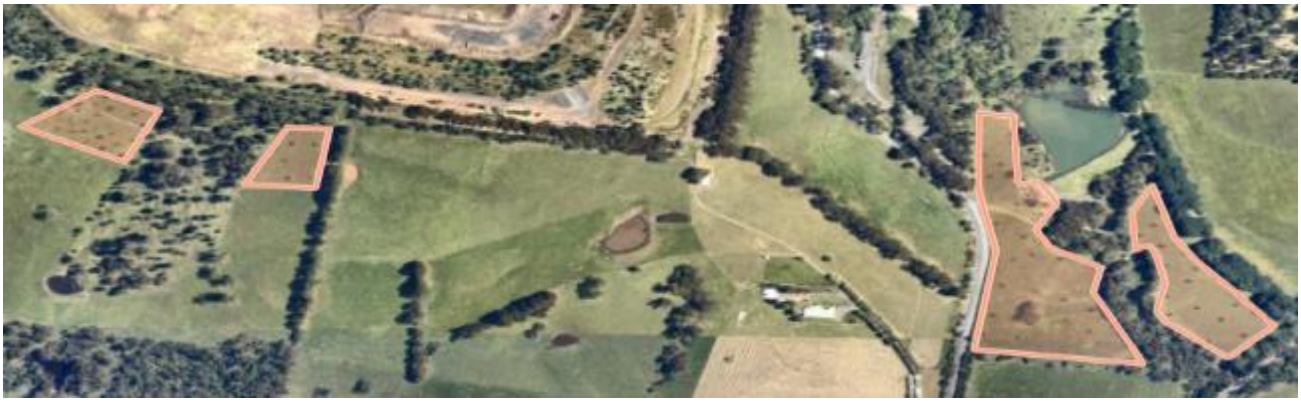

***Figure 13**. Paddock Replacement zones*

2023 Works

Multiple fenced enclosures that protect planted Eucalyptus from cattle grazing and rubbing needed to be repaired before re-planting could commence. The damage had been caused by planted eucalyptus that had reached a sufficient size, then blown over by strong winds causing it to break through fencing. Approximately 30 Eucalyptus that had perished and needed to be replaced.

A mixture of Messmate *(Eucalyptus obliqua)*, Manna Gums *(Eucalyptus viminalis ssp. Viminalis)* and Green Scentbark *(Eucalyptus fulgens)* were planted.

***Table 18.** List of Eucalyptus species planted in Paddock Replacement site 2023.*

Species	Common Name	No.
Eucalyptus fulgens	Green Scentbark	10
Eucalyptus obliqua	Messmate Stringybark	10
Eucalyptus viminalis ssp. Viminalis	Manna Gum	10

Future Management Recommendations

The recommendations for Paddock Replacement Site include:

- Monitor plant survival and replace any dead plantings. Notify quarry management if any additional quadrants are in need of repair.

2023 Planting Area

This site was originally supposed to be 1.5 Ha in size but due to limited availability of top soil was reduced to 1.1 Ha in size. The excess of trees and shrubs were re-directed to SE Extraction Backslope. Although both sites are considered part of 2023 new plantings, due to very different site conditions and being in separate areas of the quarry, both are treated as separate sites.

2023 Planting Area sits directly below 1.2 Hectare Revegetation Site, north facing subject to occasional dry winds but with a higher degree of fluctuation in site conditions than adjacent areas. It can be similarly dry during hot periods but its lower elevation also accentuates wet conditions. This variability will pose difficulties for establishing some species particularly during early years of revegetation.

***Figure 14**. 2023 Planting Area*

2023 Works

2023 Planting Area was direct seeded with the following native grass mix: 20% Weeping *Grass (Microlaena stipoides var. stipoides)* and 80% Wallaby Grass *(Rytidosperma spp.)* seed at 40kg/Ha. *Rytidosperma* species included ~50% of *setaceum*, *caespitosum, duttonianum, racemosum & fulvum* and 50% of *geniculatum, caespitosum, pilosum & setaceum*.

Germination of sterile rye and native wallaby grass species has so far been moderate. More is expected to germinate in 2024 as with the 1.2 Hectare revegetation site in 2023.

Broadleaf weeds have been controlled by the application of herbicide with tanker spray unit. So far weed growth has been kept under control but areas nearby pose a risk to the spreading of airborne weed seed into the site thus have required herbicide treatment.

Planting survival rates have been fair due to the site has experienced both dry and very wet conditions over a short period of time. To account for this, year two plantings will incorporate more species that can adapt to both conditions and the most adaptable species planted in greater numbers.

Table 19. List of tree and shrub species planted in 2023 Planting Area in 2023.

Species	Common Name	No.
Acacia Verticillata ssp. Verticillata	Prickly Moses	100
Acacia genistifolia	Spreading Wattle	100
Acacia mearnsii	Black Wattle	100
Acacia melanoxylon	Blackwood	100
Acacia paradoxa	Hedge Wattle	100
Acacia pycnantha	Golden Wattle	75
Acacia stricta	Straight Wattle	150
Allocasuarina littoralis	Black She-oak	100
Eucalyptus baxteri	Brown Stringybark	200
Eucalyptus dives	Broad-leafed Peppermint	200
Eucalyptus goniocalyx	Long Leafed Box, Bundy	200
Eucalyptus oblique	Messmate	100
Eucalyptus Radiata ssp. radiata	Narrow-leafed Peppermint	200
Eucalyptus viminalis ssp. viminalis	Manna Gum	100
Hakea decurrens ssp. Physocarpa	Bushy Needle wood	100
Hakea Ulcina	Furze Hakea	100

Future Management Recommendations

The recommendations for 2023 Planting Area include:

- Maintain control of broadleaf weeds with selective herbicide application by spray tanker for 2023 Planting Area and adjacent areas.
- Undertake year 2 planting with species selection favouring trees and shrubs that are tolerant of both wet and dry conditions.

Table 20. List of recommended species for 2023 Planting Area in 2024.

Species	Common Name
Acacia dealbata ssp. dealbata	Silver Wattle
Acacia myrtifolia	Myrtle Wattle
Acacia oxycedrus	Spike Wattle
Bursaria spinosa ssp. spinosa	Sweet Bursaria
Daviesia latifolia	Hop Bitter-pea
Eucalyptus oblique	Messmate
Eucalyptus viminalis ssp. viminalis	Manna Gum
Goodenia ovate	Hop Goodenia
Hakea nodosa	Yellow Hakea
Hakea teretifolia ssp. hirsuta	Dagger Hakea
Leptospermum continentale	Prickly Tea-tree
Leptospermum lanigerum	Woolly Tea-tree
Melicytus dentatus	Tree Violet

South East Extraction Backslope

This site borders South East Extraction to its west starting from the back end of the ridgeline to the track that borders the bottom of the hillside. Many sections of this site are steep with deep soft soil making planting and spray works difficult in wet conditions. This area accommodated the excess trees and shrubs ordered for the 2023 planting area that was reduced in size due to shortage of top soil.

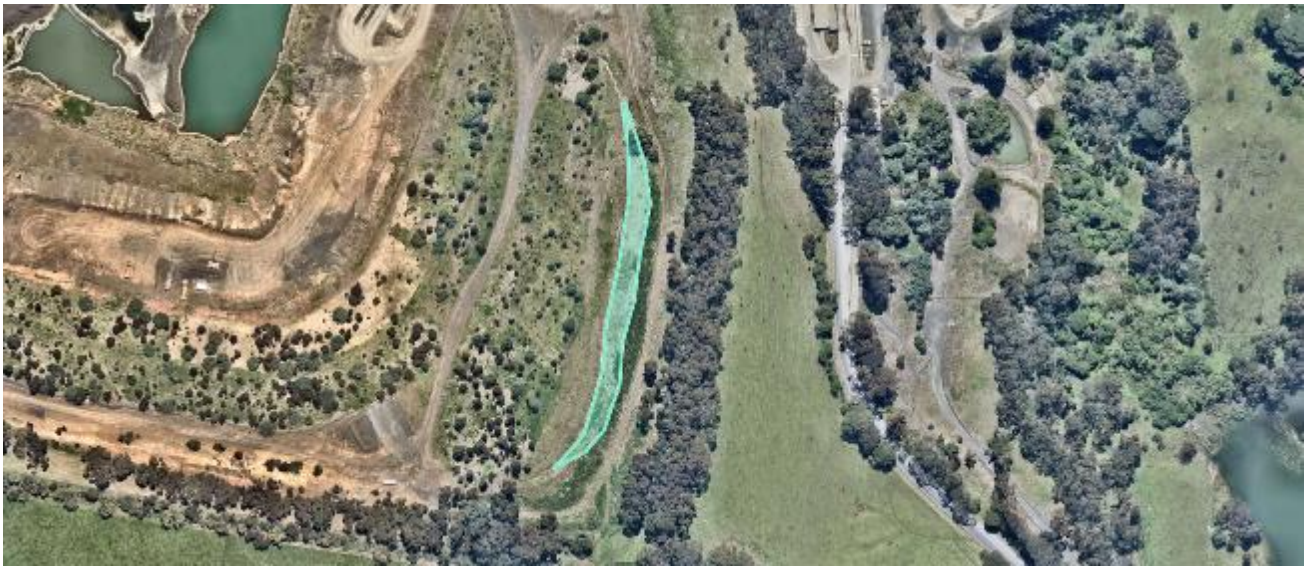

***Figure 15**. South East Extraction Backslope*

2023 Works

The top of the site consists of dry compacted clay soil with good coverage of Wallaby grass and moderately low levels weedy grass and broadleaf species. Below, a terrace on a gentle descending slope runs from near the southern end of the site to the east of Boot Hold Point at the far northern tip. Between the ridgeline above and the terrace below much of the slope is very steep which can be ascended and descended by foot with caution. Below the terrace is another slope the majority of which is also quite steep. Like the slope going back up the hill, this slope can be traversed by foot with caution.

The soil from the terrace to the base of the hillside is soft, moist, dark in colour and very fertile. This is an ideal location for deep rooted trees but also many broad leaf and weedy grass species grow incredibly fast here. There is a very high weed load in the soil from the terrace to the base of the hillside.

The terrace and part of the slope above and all below was covered in Toowoomba Canary grass *(Phalaris aquatica)*, Ox-Tongue *(Helminthia echioides)*, thistle species, blackberry and some isolated woody weeds and Pampas grass. First the terrace was brush cut to better access the site and to reduce the large amount of biomass. The cut material breaks down much faster as compared to being only sprayed.

After brush cutting was complete, the terrace and the slope between the ridgeline was sprayed with non-selective herbicide with caution to avoid spraying scattered Wallaby grass which is recruiting downwards from the ridgeline above. Below the terrace sections were also sprayed but only to halfway down the hill to expand the planting zone.

Several follow up weed spray runs were required prior to planting. Planting was undertaken at a relatively low density partly due to the high weed load and the increased risk of off-target damage. An initial low planting density also more easily allows navigation of the site for tanker spraying.

Post planting, exacerbated by unusually high amounts of rainfall over summer has resulted in very high amounts of weed growth continuing into the season, at times smothering plantings when delays between spray runs has occurred. Plantings, however, particularly eucalyptus species, are growing very fast.

Table 21. *List of tree and shrub species planted in South East Extraction Backslope in 2023.*

Species	Common Name	No.
Acacia dealbata ssp. dealbata	Silver Wattle	25
Acacia mearnsii	Black Wattle	25
Acacia melanoxylon	Blackwood	25
Acacia stricta	Straight Wattle	25
Eucalyptus fulgens	Green Scentbark	25
Eucalyptus oblique	Messmate	25
Eucalyptus viminalis ssp. viminalis	Manna Gum	25

Future Management Recommendations

The recommendations for SE Extraction Backslope include:

- Frequent control of all broadleaf and grassy weeds throughout the site with herbicide application via tanker.
- Herbicide spraying of blackberry by tanker spray across entire and site and control any significant blackberry stands in the immediate area
- Continue careful spray works from ridgeline and down the slope to protect recruiting native Wallaby grass.
- Maintenance of guards around plantings as frequent tanker spaying poses a higher risk of off-target damage
- Undertake additional plantings prioritising species that are well suited to moist deep soils with high fertility

Southern Hillside

This site runs from the south of the road bordering quarry administration, east of the workshop and west of a grazing paddock, going up the hillside to the track that runs along the base of South East Extraction Backslope. The site topography is a slope that contains a fair degree of remnant vegetation including Kangaroo Grass *(Themeda triandra)*, Austral Bracken *(Pteridium esculentum)*, Native Raspberry *(Rubus parvifolius)*, Common Tussock-grass *(Poa Labillardierei)* and large areas of Weeping grass *(Mircrolena Stipoides)*.

***Figure 16**. Southern Hillside*

2023 Works

A number of adult hawthorn were chain-sawed with the majority of the woody materia chipped along with fallen branches from planted adult Tasmanian Blue gums from the bottom section of the site. Blackberry stands were sprayed with herbicide and brush cut with a blade to remove dead canes. Broadleaf weeds were sprayed with selective herbicide with particular care to limit off-target damage to Austral Bracken *(Pteridium esculentum)*.

Lower levels of disturbance are likely due to the slope having enabled the majority of the site to retain a fair amount of native vegetation. Maintaining native vegetation, reducing weed prevalence (mainly blackberry), woody weeds, and thistles are the current focus of ongoing works.

Reducing the requirement for long term need for maintenance works, in particular brush cutting, of grassy weeds along the main access road bordering the site is a priority expressed by quarry management. To achieve this goal, a number of Silver Wattles were planted in the lower sections of the site, having their dripline expected to shade-out large perennial weedy grass species in a number of years.

Green Scentbark *(Eucalyptus fulgens)* an endangered endemic Victorian species with remnant individuals already present at the quarry have been planted across the site. Naturelinks has been made aware that there is a hybridisation risk between this species and broad-leafed Peppermint *(Eucalyptus dives)* which features predominantly in Naturelinks plantings for the drier parts of the quarry. Now aware, Naturelinks will make sure the two species are not planted within close proximity. Luckily, we believe this has coincidentally so far been avoided due to the two species

having different environmental preferences. Locally rare Powelltown Correa *(Correa reflexa var. lobatus)* have also been planted in the area.

Table 20. *List of tree and shrub species planted in Southern Hillside in 2023.*

Species	Common Name	No.
Correa reflexa var. lobatus	Powelltown Correa	25
Eucalyptus fulgens	Green Scentbark	25

Future Management Recommendations

The recommendations for Southern Hillside include:

- Control of blackberry by application of herbicide
- Control of grassy weeds through herbicide application with an effort to protect and promote recruitment of native grass species
- Control of broadleaf weeds across the site with care taken to limit off target damage to Austral bracken
- Maintain seasonal brush cutting regime along quarry entrance road, collection and removal of woody debris to reduce fire risk and for aesthetic purposes.
- Undertake additional plantings prioritising species suited fertile deep soils

Table 21. *List of recommended species for planting Southern Hillside in 2024.*

Species	Common Name
Banksia spinulosa var. cunninghamii	Hairpin Banksia
Corea reflexa var. lobatus	Poweltown Corea
Epacris impressa	Common Heath
Pimelea flava ssp. flava	Yellow Rice-flower
Polyscias sambucifolia ssp. l	Elderberry Panax
Pomaderris aspera	Hazel Pomaderris

Chilean Needle Grass monitoring and control

Chilean Needle Grass is a highly invasive grassy weed that poses a serious threat to the environment and agriculture. While this species is common through the north and west of Melbourne, this species currently has a limited range in the outer eastern suburbs. The Eradication of Chilean Needle Grass in locales where it is yet to fully establish should be a priority whenever possible. If this can be achieved is yet to be known, but Naturelinks believes this is possible and recommends all reasonable efforts be taken to achieve this outcome.

Surveyed Chillean Needle grasss infesttion marked in (blue), areas of high infestation marked in (red).

A large infestation was discovered a number of years ago in a paddock beyond the quarry boundary fence-line, but still within quarry owned land. Naturelinks has concluded that this is the likely source of Chilean Needle Grass found and still spreading within southern revegetation zones under their management. This infestation had been sprayed several times but was not known for certain if this infestation extended further than the single paddock. Naturelinks conducted a survey to answer this question and while doing so, sprayed all plants discovered with herbicide.

This survey and spray took a total of five days with multiple staff and hundreds of litres of herbicide (glyphosate). The infestation did indeed extend beyond what was previously known but the parameters of this weeds spread has been determined with fair confidence in map located above.

The surveys and spray works were conducted over several months, most plants were sprayed before any had a chance to release viable seed but these areas will need to be re-treated for a number of years. Chilean Needle Grass seed can survive in the soil for a number of years. There does exist one option that would make the management, reduction of and eventual eradication of the species more likely. Naturelinks recommends the use of the herbicide Tussock (active ingredient Flupropanate), this chemical will kill plants and prevent germination from existing seed for a number of years. This chemical has been engineered to specifically target the genus of grasses which Chilean Needle Grass belong (Nassella).

The downsides are that it will kill other grass species, is slow acting, and can take more than several months to effectively kill plants depending on site conditions. The chemical is harmful to humans and animals and more toxic than the herbicides currently used at the quarry. Before spraying takes place, any paddocks where this chemical is used will need to be de-stocked. Post spraying, a withholding period is required between two weeks and four months depending on how much herbicide is sprayed and in what manner.

Attached to this report are the product label and SDS.

Fauna considerations and concerns

Only fauna of high conservation value or that may pose a negative environmental impact are mentioned here. A full list of fauna observed by Naturelinks staff have been added as attachments.

Introduced species

- Sambar deer (Rusa unicolor) are observed to adversely impact some sites. Naturelinks recommend that deer be controlled, to prevent further damage to existing and future revegetation and existing native vegetation.
- European Hare (Lepus europaeus) is occasionally seen and currently appear to have a minor impact. Hares can impact on revegetation due to their propensity to graze on establishing plants, and their ability to reach above tree guards by standing on their hind legs. Controlling hares along with rabbits (see below) should be undertaken if an increase in damage is observed.
- European Rabbit (Oryctolagus cuniculus) are occasionally seen but currently seem to have only a minor impact. Rabbits have been observed that are in poor health, and they seem not to be aware of close human presence. They appear to be visually impaired, and may in fact be diseased which may be due to myxamotosis or Rabbit Haemorrhagic Disease (RHD). Monitoring of rabbit damage will be undertaken and if an increase occurs, control may be recommended.
- Red fox (Vulpes vulpes) are occasionally seen or their tracks observed. Their full environmental impact remains uncertain. Impacts on marsupials, native birds and other wildlife is a recognised problem with foxes. Possible control in conjunction with deer or rabbit/ hare treatment could occur, but the impact of foxes is not affecting revegetation works.

Indigenous species

- Eastern grey kangaroo *(Macropus giganteus)* a decade ago were rarely seen but are now abundant. Collision with guarded trees and shrubs is a big issue in most managed areas. Fence repair may reduce this issue, in particular in Phase A & B. Grazing does not yet appear to be a serious problem.
- At least One Peregrine Falcon had been observed nesting in the box in 2022.
- Gang-Gang Cockatoo *(Callocephalon fimbriatum)*, have been observed at the quarry for a number of years. Recently the species' conservation status has been elevated to Endangered. In 2023 they were regularly seen and heard both at the Net Gain site and around the Quarry.

Aspects and Impacts Assessment

Table 19. Aspects and Impacts Assessment – Mt Shamrock

Activity	Aspect	Impacts	Controls
Working onsite	Naturelinks-owned vehicles, trailers, powered plant (electric / petrol), hand tools and PPE (footwear etc.) entering and exiting site	Spread weed seed, pathogens & weed propagules into and out of site	• All Naturelinks employees are to be trained on Hygiene HSEP • Crew leaders are to clean down all vehicles, trailers, powered plant (electric / petrol), hand tools and PPE (footwear etc.) before entering site • Crew leaders are to complete site-specific inspection before entering site "HSE Daily Inspection Checklist - Holcim - Mt Shamrock" which includes questions about hygiene • Before exiting the site, crew leaders are to complete site-specific inspection "HSE Exit Inspection Checklist - Holcim - Mt Shamrock" • If vehicles, trailers, powered plant (electric / petrol), hand tools and / or PPE (footwear etc.) need to be cleaned contact site contact to be provided with access to wash down area • See Table 14: List of noxious weeds in West Gippsland region **Detailed Controls by area** **Landslip** *Noxious weeds West Gippsland region present or potential:* Blackberry, Slender Thistle, Spear Thistle, Variegated Thistle *Actions taken to reduce risk:* Walk into site from adjacent paddock eliminating contamination risk for vehicle from weed seed. Manually clean all petrol-driven plant and hand tools of loose soil and visible weed seed. More thorough cleaning to be undertaken in designated quarry wash down area as required. **Paddock replacement** *Noxious weeds West Gippsland region present or potential:* Blackberry, Ragwort (potential), Slender Thistle, Spear Thistle, Variegated Thistle *Actions taken to reduce risk*: Avoid driving in areas where seeding thistles are present, manually clean all petrol driven plant and hand tools of loose soil and visible weed seed. More thorough clean to be undertaken in designated wash down quarry area as required. Do not remove Ragwort from site; any hand-weeded ragwort is to be left *in situ*; any seed head with viable seed is to be

buried where possible.

Phase A&B

Noxious weeds West Gippsland region present or potential: Blackberry, Chilean Needle Grass, Hawthorn, Ragwort (potential), Slender Thistle, Spear Thistle, Variegated Thistle

Actions taken to reduce risk: Site is only to be accessed from cleared track within quarry fence-line by using periodical access gates with the exception of two areas with double gates in which a cleared access area is maintained. Manually clean all petrol-driven plant and hand tools of loose soil and visible weed seed. More thorough clean to be undertaken in designated wash down quarry area as required. Do not remove Ragwort from site; any hand-weeded ragwort is to be left *in situ*; any seed head with viable seed is to be buried where possible.

Any Chilean Needle Grass discovered is to be sprayed immediately with herbicide where possible; no hand weeding of Chilean Needle Grass is to be undertaken. Avoid using any hand or petrol-driven plant in or near identifiable plants including planting.

1.2 hectare

Noxious weeds West Gippsland region present or potential: Spear Thistle, Stinkwort, Variegated Thistle

Actions taken to reduce risk: Manually clean all petrol-driven plant and hand tools of loose soil and visible weed seed. More thorough clean to be undertaken in designated wash down quarry area as required.

.8 Hectare

Noxious weeds West Gippsland region present or potential: Blackberry, Spear thistle, Stinkwort, Variegated Thistle

Actions taken to reduce risk: Manually clean all petrol-driven plant and hand tools of loose soil and visible weed seed. More thorough clean to be undertaken in designated wash down quarry area as required.

Southern Extraction

Noxious weeds West Gippsland region present or potential: Blackberry, Chilean Needle Grass, Spear Thistle,

Stinkwort, Variegated Thistle

Actions taken to reduce risk: Manually clean all petrol-driven plant and hand tools of loose soil and visible weed seed. More thorough clean to be undertaken in designated wash down quarry area as required. Any Chilean Needle Grass discovered is to be sprayed immediately with herbicide where possible; no hand weeding of Chilean Needle Grass is to be undertaken. Avoid using any hand or petrol-driven plant in or near identifiable plants including planting.

South East Extraction

Noxious weeds West Gippsland region present or potential: Blackberry, Chilean Needle Grass, Slender Thistle, Spear Thistle, Stinkwort, Variegated Thistle

Actions taken to reduce risk: Manually clean all petrol-driven plant and hand tools of loose soil and visible weed seed. More thorough clean to be undertaken in designated wash down quarry area as required. Any Chilean Needle Grass discovered is to be sprayed immediately with herbicide where possible; no hand weeding of Chilean Needle Grass is to be undertaken. Avoid using any hand or petrol-driven plant in or near identifiable plants including planting.

Extraction/Phase C

Noxious weeds West Gippsland region present or potential: Angled Onion (potential), Blackberry, Crack Willow, Flax-leaf Broom, Gorse, Hawthorn, Ragwort, Slender Thistle, Spear Thistle, Soursob, Stinkwort, Sweet Briar, Variegated Thistle

Actions taken to reduce risk: Manually clean all petrol-driven plant and hand tools of loose soil and visible weed seed. More thorough clean to be undertaken in designated wash down quarry area as required. Do not remove Ragwort from site, any hand-weeded ragwort is to be left *in situ*; any seed head with viable seed is to be buried where possible.

Do not leave designated access tracks with vehicle, do not drive over any flowing weeds growing on tracks. Clean any disturbed mud that may accumulate underneath the wheel arch before leaving site at designated wash down area.

Net Gain

			Noxious weeds West Gippsland region present or potential: Angled Onion, Blackberry, Bridal creeper, Crack Willow, Flax-leaf Broom (nature strip only), Garden Asparagus, Hawthorn, Maderia Vine (nature strip only), Ragwort, Slender Thistle, Spear Thistle, St John's Wort, Stinkwort, Soursob Variegated Thistle *Actions taken to reduce risk:* Manually clean all petrol-driven plant and hand tools of loose soil and visible weed seed. More thorough clean to be undertaken in designated wash down quarry area as required. Do not remove Ragwort from site, any hand-weeded ragwort is to be left *in situ*; any seed head with viable seed is to be buried where possible. Park vehicle near main access gate only for northern section, leave car in nearby paddock or gate entrance for southern section. Limit all driving unless necessary in northern section. Clean any disturbed mud that may accumulate underneath the wheel arch before leaving site at designated wash down area.
Controlling weeds	Use of herbicide to control weeds	Incorrect use of herbicide on plant species Off-target damage Herbicide entering waterways	All employees who use herbicides are trained in its correct use and hold a Chemcert license, or are under direct supervision while in training, by a Chemcert holder. Restricted use chemicals are to be only used by those staff holding an Agricultural Chemical User's Permit (ACUP) • Herbicides are carefully selected to each species; see Table 13. List of herbicides used at Holcim – Mt Shamrock *Alternative methods to herbicide spraying to be considered by Holcim and quoted by Naturelinks* • Hand weeding: Useful for high quality areas and when working near sensitive species. Inefficient for large areas, time consuming. Cut and paint: used for woody weeds when not small. Can be used for small infestations of blackberry in high quality areas or around sensitive species. Can be labour intensive depending on scale. • Brush-cutting/slashing: Useful for biomass control and maintaining access to tracks and areas with high weed load. Can be used to target annual weedy grasses to prevent seeding depending on site conditions and season. Can be cost effective in the right circumstance. Grazing: Cattle or goats in areas with high weed load and low-quality native vegetation. Environmentally friendly, requires adequate fencing so not suitable to some situations. May require additional permits. Goats will likely be the

more effective particularly for control of blackberry.

- Fire: Historically this method has been ruled out by Quarry management. Naturelinks does have the relevant licenses, Insurance, training, equipment to undertake controlled burns.

Table 20. List of herbicides used at Holcim – Mt Shamrock

Herbicide	Usage	Species Controlled	Application	Notes
Weedmaster Duo **ACTIVE CONSTITUENT: 360 g/L Glyphosate**	Commonly used across the site Control of grass and broadleaf weed species via backpack spray and tanker spray. Occasionally combined with other herbicides for specific hard to kill weeds Control of woody weeds	Agapanthus, Blue Periwinkle, Holly, English Ivy, Ragwort, Madeira Vine, Willow sp., Pitiosporum, Hawthorn, Prunus sp, Chilean Needle grass, annual and perennial grasses, broadleaf weeds were off target damage risk is low.	Cut and paint of woody weeds (both with hand tools and chainsaw) Backpack spay and tanker spray application	Fast acting, non-selective, cost effective, is inactivated immediately in the soil and does not provide residual weed control
Kamba M **ACTIVE CONSTITUENTS: 340 g/L MCPA, 80g/L DICAMBA**	Commonly used across the site. For broadleaf specific weeds when off target damage to native grass species is to be avoided via backpack spray and tanker spray.	Broadleaf weed species	Backpack spray or tanker spray	Average field half life of dicamba is 14 days. Average field half life of MCPA is 7 days.

Associate Herbicide **ACTIVE CONSTITUENT: 600g/kg METSULFURON METHYL**	Occasionally used across the sites when targeting particularly hard-to-kill broadleaf weeds, some woody weeds and weeds with tuberous root systems, will not harm grass via backpack spray or tanker spray (rarely). Occasionally combined with other herbicides for specific hard to kill weeds	Bridal Creeper (Asparagus spp.), Angled Onion, Soursob (and other Oxalis spp.), Spanish Heath, Blackberry (occasionally only but can be used all year round)	Backpack spray or tanker spray	Associate will remain in the soil for a period of time. The persistence of Associate in the soil is dependent on various environmental conditions e.g. soil pH, temperature, soil moisture and organic matter. Wet, warm, acid soils high in organic matter favour breakdown of Associate in the soil. It should be noted that Associate does not provide a commercially acceptable level of soil residual weed control.

Maca 600 (most widely known by brand name Garlon) **ACTIVE CONSTITUENT: TRICLOPYR**	Control of Blackberry spp., Broom, young Hawthorn and Prunus spp, Briar Rose via pack spray or tanker spray	Blackberry spp., Broom, young Hawthorn and Prunus spp, Briar Rose	Backpack spray or tanker spray	Cost effective, very effective and fast acting on blackberry (Spring to mid-Autumn), avoid spraying near waterways, selective but will burn grass at high rate. Should not be used when temperature may exceed 30 degrees as this product can evaporate and move through the air and harm nearby vegetation.
Lontrel Advanced **ACTIVE CONSTITUENT: 600g/L CLOPYRALID**	Semi-selective broadleaf herbicide specifically designed for control of Asteraceae and Fabaceae (daisy and pea family) but also effective against some other broadleaf families while leaving other families unharmed, will not harm grass via pack spray and tanker spray (rarely).	Thistles, Fleabane, Bristly Ox-tongue, Stinkwort (*Dittrichia graveolens*), Cat's ear, Plantain, Aster weed, Broom spp., Vetch, Clover, Capeweed. Can harm *Acacia* species when sprayed in high volumes and herbicide can have a detrimental effect on these species (e.g., tanker spraying)	Backpack spray or tanker spray	Local understory species not harmed by overspray: Bidgee widgee and Sheep's Burr, Kidney Weed, Native raspberry, Australian Hounds-tongue. Withholding periods: Do not graze or cut for stock food for 7 days after application. Low toxicity to fish, birds, honeybees, livestock, earthworms and aquatic organisms. Was not used for the 2022 work period partially due to concerns raised by quarry audit. As alternative herbicides are available and the prevalence of weeds which Lontreal Advance and Apparent Chlopyralid use is preferred is currently low.

Apparent Clopyralid 300 **ACTIVE CONSTITUENT: 300g/L CLOPYRALID**	Semi-selective broadleaf herbicide specifically designed for control of Asteraceae and Fabaceae (daisy and pea family) but also effective against some other broadleaf families while leaving other families unharmed, will not harm grass via pack spray and tanker spray (rarely).	Thistles, Fleabane, Bristly Ox-tongue, Stinkwort (*Dittrichia graveolens*), Cat's ear, Plantain, Aster weed, Broom spp., Vetch, Clover, Capeweed. Can harm *Acacia* species when sprayed in high volumes and herbicide can have a detrimental effect on these species (e.g., tanker spraying)	Backpack spray or tanker spray	Local understory species not harmed by overspray: Bidgee Widgee and Sheep's Burr, Kidney Weed, Native raspberry, Australian Hounds-tongue. Selective herbicide, useful for herbicide rotation, relatively expensive, less harmful to waterways than alternatives with the exception of Associate, residual in soil and thatch. Withholding periods: Do not graze or cut for stock food for 7 days after application. Was not used for the 2022 work period partially due to concerns raised by quarry audit. As alternative herbicides are available and the prevalence of weeds which Lontreal Advance and Apparent Chlopyralid use is preferred is currently low.

Table 21. List of noxious weeds in West Gippsland region

Species	Type	Risk of Spreading	Method of potential seed or propagules dispersal by Naturelinks staff
Angled Onion	Restricted Weeds	Low	Loose Seed
Blackberry	Regionally Controlled Weeds	Medium	Fruit
Bridal Creeper	Restricted Weeds	Low	Fruit
Chilean Needle Grass	Restricted Weeds	High	Soil (may contain seed) Loose Seed
Flax-leaf Broom	Regionally Controlled Weeds	Medium	Loose Seed
Garden asparagus	Restricted Weeds	Low	Fruit
Gorse	Regionally Controlled Weeds	Low	Loose Seed
Hawthorn	Regionally Controlled Weeds	Low	Fruit
Ragwort	Regionally Controlled Weeds	High	Soil (may contain seed) Airborne Seed
Maderia Vine	Restricted Weeds	Medium	Vegetation
Slender Thistle	Regionally Controlled Weeds	Medium	Soil (may contain seed) Airborne Seed
Spear Thistle	Regionally Controlled Weeds	Medium	Soil (may contain seed) Airborne Seed
St John's Wort	Regionally Controlled Weeds	Low	Loose Seed
Stinkwort	Restricted Weeds	Medium	Soil (may contain seed) Airborne Seed
Sweet Briar	Regionally Controlled Weeds	Low	Fruit
Soursob	Restricted Weeds	Low	Soil (may contain seed) Loose Seed
Variegated Thistle	Regionally Controlled Weeds	Medium	Soil (may contain seed) Airborne Seed
Crack Willow	Restricted Weeds	Low	Vegetation

Attachments

- Provided in Excel spreadsheet: Indigenous Flora of Holcim Pakenham, Introduced and Weed Species, Mammals Observed, Reptile and Frog Observations, Bird Observations
- Tussock Herbicide Label
- Tussock Herbicide SDS
- Invertebrate survey Net Gain (2019)