

Appendix K - Environmental Management

Flora and Fauna

Flora

The excavation area first two stages of the pit is cleared and will be returned to pasture and productive agricultural land of pasture.

Clearing Permit CPS 3435/1 is lodged and there will be no further impact on flora outside what is permitted by Clearing Permit CPS 3435/1

Populations of *Chamelaucium lullfutzii* (Gingin Wax) and any other Declared Rare Flora have been fenced off and the fencing will be maintained.

Fauna

The excavation areas are predominantly disused equine pasture, and scattered regrowth has occurred over the last 15 years.

There will be no further impact on fauna outside what is permitted by Clearing Permit CPS 3435/1.

Weed Management

The weed management will continue to form part of the normal farm management to prevent the introduction and or spread of significant environmental weeds. Weed management is to be used to minimise impact on adjoining remnant vegetation and on adjoining properties as well as maintaining the agricultural capability of the farm for the end use of the land.

The management is based on the Guidelines, Department of Environment and Energy, Arrive Clean, Leave Clean, which relates to the management of weeds and plant diseases.

Weeds can be Declared under the nomination, and control of weeds falls under the lists of Declared Pests under the Biosecurity Agriculture Management Act 2007, Agriculture and Related Resources Protection Act 1976 or Weeds of National Significance, (Commonwealth Biosecurity Act 2015). Other weeds are not Declared but may be classified as Environmental Weeds because they are well known for impacting on vegetation.

Similar management is used to manage plant diseases. Generally, if the actions on weeds are taken the risk of spread of plant pathogens is also reduced.

The land is stocked and it has been noted in other locations that once stock are removed the weed species tend to increase and spread. It is likely that grazing removes the weed seedlings but once that pressure is removed the weeds can grow to maturity and seed.

Therefore, areas where stock are removed may require greater weed management than for normal pasture management.

Inspections conducted to monitor the presence and introduction of weeds will be carried out twice per year, in spring and autumn when weeds are best treated with herbicide.

Weeds are most readily treated when actively growing before they set seed, by treating from the edges of the infestation back to the densest infestation.

Item	Description
Environmental Objectives	There will be no additional weed species or extensions or density of the existing loading of exotic plants.
Legislation and Guidelines	Biosecurity and Agriculture Management Act 2007.

Item	Management	Timing	Area
Management of Weeds	<p>Weeds are most likely to impact on;</p> <ul style="list-style-type: none"> Disturbed areas such as overburden dumps, topsoil stockpiles. Edges of access roads and the stockpile and processing area. Pasture where stock are removed. Edges of firebreaks. <p>The main sources of weeds are likely to be;</p> <ul style="list-style-type: none"> Weeds spread through the movement of topsoil during land clearing and construction earthworks which produces soft moist soils where weeds can gain a fast hold. Spread of existing weeds currently on site. Rubbish dumped by the public. Materials or waste brought to site by employees. Soil and seeds from vehicles arriving at site. This often applies to trucks that have carried something else such as grain, or vehicles to be used in earthworks. Wind blown seed from surrounding land as would apply to Cotton Bush. Birds and other vectors. This is more common than is oftengiven credit for. eg Solanum species and Blackberries.. 	All times	All areas
	<p>Development of the Pit</p> <p>A pre-topsoil clearing inspection will be carried out to delineate weed impacted areas and devise a treatment method for each infestation. Preferably treat weeds prior to commencing earthworks.</p> <p>All vehicles and equipment to be used on site, will be clean and free from soil or plant material when arriving at site.</p> <p>Vehicles accessing the site, whether they be road trucks or light vehicles, will be required to be clean prior to leaving developed areas. Dirty vehicles will not be permitted to enter the site.</p>	Prior to clearing	Access Road, stockpile and other construction areas
	<p>Operations and Closure</p> <p>No soil and vegetation will be brought to the site apart from that to be used in rehabilitation and that is to be weed free.</p> <p>A dedicated sweep out and treatment station for trucks will be provided if required, where any weed germinations from the truck sweep out are able to be identified and dealt with by mechanical removal or spraying.</p> <p>Plants and seeds to be used in rehabilitation will be free from weeds.</p>	Operations	All Areas
Monitoring if Weeds	<p>Monitoring</p> <p>Inspect clearing, disturbance activities, topsoil dumps prior to rehabilitation and revegetated areas.</p> <p>Visually inspect operational and adjoining areas and revegetation at least twice annually. These inspections will utilise experienced staff or on site staff who have</p>	<p>Operations twice yearly. Prior to closure.</p> <p>Revegetation twice yearly for three years following closure.</p>	All areas

	<p>been trained in the identification of the weed species occurring on site.</p> <p>Provide inspections of gutters, drains, access roads and surface water treatment areas where there is an increased risk of weed introductions.</p> <p>Edge vegetation, disturbed areas and areas of increased soil moisture will be regularly monitored and treated as appropriate.</p>		
Actions	<p>Treatment of Weed Infestations</p> <p>Weed management will form part of and supplement normal pasture management.</p> <p>Any significant weeds or weed infestations will be treated.</p> <p>Treatment of weeds will be undertaken prior to commencement of earthworks.</p> <p>Weed will also be pre-treated prior to the reestablishment of pasture.</p> <p>Illegally dumped rubbish is removed promptly.</p> <p>Weeds will be sprayed with broad spectrum spray prior to planting or seeding in weed affected soils and when they occur on pasture or in revegetation.</p> <p>Large plants such as Castor Oil plants and Declared Weeds will be periodically grubbed out or spot sprayed with an herbicide.</p> <p>Weed affected topsoils may need to be taken offsite or used in weed affected areas.</p> <p>Weed management will work from least affected areas to most affected.</p> <p>Declared weeds are to be treated promptly by mechanical action or spraying.</p>	<p>Prior to commencement of earthworks.</p> <p>Prior to the establishment of pasture. When weeds are present and as a minimum twice yearly.</p>	All areas

Die Back Management

Item	Description
Environmental Objectives	No specific dieback environmental objective is warranted because of the very low risk to as there are few susceptible trees and no nearby native vegetation.
Baseline Data	<p>DBCA 2017, Phytophthora Dieback Management Manual, Forest and Ecosystem Management FEM079.</p> <p>Dieback Working Group 2005, Management of Phytophthora Dieback in Extractive Industries.</p> <p>Dieback Working Group, 2000, Managing Phytophthora Dieback, Guidelines for Local Government.</p>

Item	Management	Timing	Area
Management of Dieback	<p>Any topsoil and overburden storage is to be located in dry areas around the pit perimeter.</p> <p>Quarry traffic is to be restricted to the designated access roads, pit and stockpile areas apart from clearing land and maintaining fire breaks.</p> <p>Trucks will only travel along the defined access road.</p> <p>On leaving the property most truck traffic will be confined to bitumen roads to their destination and return. That run is considered low risk for dieback and trucks will not require cleaning during the transport phase.</p> <p>As defined by best practice, Breera Resources will require vehicles used onsite or for transport to be clean and free from soil or plant material prior to arriving on site from an area known or thought to be dieback infected.</p> <p>Cleaning is to be conducted offsite and all drivers and plant operators are to be made aware of the need to have clean trucks and plant when initially arriving on or accessing the site.</p> <p>The site is to be secured from unwanted access by maintaining the existing perimeter fencing, gates.</p> <p>A hygienic site is maintained by not bringing any soil or plant material onto the site except for rehabilitation purposes or from known dieback free areas.</p> <p>All plants, seeds, and other materials used in rehabilitation, are to be sourced from dieback free areas.</p> <p>Illegally dumped rubbish or material will be promptly removed from site.</p> <p>Rehabilitated surfaces are to be free draining and not contain wet or waterlogged conditions.</p> <p>The Weed Management Policy will be complied with.</p>	All times	All areas
Monitoring if Dieback	No dieback monitoring is proposed or required for normal soil conditions.	Annual Review	

Appendix L - Rehabilitation Management

Objectives

The objective is to return the land to a condition capable of supporting agricultural activities, with pasture production rates equivalent to or better than pre-mining production rates. This will include dryland pasture with a variety of species. Rehabilitation of pasture is more successful at steeper batters (i.e. 1:4) as opposed to revegetation with native species.

Topsoil and Overburden Removal

Topsoil is an integral part of rehabilitation as it contains organic matter and a seed bank which assists in establishing vegetation when respread on disturbed areas.

Topsoil where available will be stripped and stockpiled separately, prior to commencing quarrying.

The soils will be stripped in a dry state to preserve soil structure and stripping will be undertaken in relatively still weather conditions. Management of the topsoil will involve the following:

Stockpiles will be located sufficiently distant from quarrying operations so that they will not be disturbed prior to being used in rehabilitation.

Soil stripping should be avoided during wet conditions.

The dimensions of the topsoil stockpiles will not exceed 2 m in height. This is to prevent topsoil becoming anaerobic and deteriorating in soil structure, organic matter, nutrients, seed resource and populations of beneficial soil micro-organisms.

Landform Reconstruction and Contouring

Landform reconstruction and contouring will involve the following:

The final landform will be formed to approximately 85m AHD.

Batters will be retained at 1:4 vertical to horizontal.

The topsoil and overburden will be spread over the surface where available to provide a substrate for agricultural soils.

Contours created to slow down water run-off.

Site Preparation

To ensure the success of the revegetation works, site preparation should occur well before planting is undertaken. This includes landform reconstruction and contouring measures as outlined and the implementation of a weed control programme. In the event that compacted areas are identified within the revegetation area, contour ripping may be required. Ripping loosens soil aggregates and provides a softer soil surface for the establishment of plant roots. Ripping also promotes aeration of soil, assisting in the breakdown of organic matter and water infiltration.

Weed Management

Weed Control

Pre-seeding weed control is only likely to be required where topsoils are used that contain weed species. Given the current land use, it is not anticipated that weed control will be other than normal agriculture practice. If required, weed control will only be conducted after overburden and topsoil have been spread and any seeds have been allowed to germinate.

Herbicides will be selected for the target species, taking into account the surrounding environment and the constraints this may present.

Based on the location and species of weeds present, the recommended weed treatments are detailed in Table 9. The timing for weed control is specified within Table 10.

Table 1. Weed control treatment.

Treatment	Suggested Constituents	Target Species
Glyphosate spray	2% Glyphosate including Pulse®, wetting agent and Chlorsulfuron	Broadleaf species e.g. <i>Pelargonium capitatum</i> Woody weeds e.g. <i>Zantedeschia aethiopica</i>
Selective grass spray	Fusilade and approved adjuvant (e.g. Pulse®)	Grass species e.g. <i>Ehrharta longifolia</i>

Weed Hygiene

The following weed hygiene practices will be employed:

Machinery will be checked prior to entering rehabilitation areas to ensure that weed seeds and propagules are not transported to this area.

Weed Management Plan

The following weed and disease controls will be implemented within the subject site to assist in the control of invasive species and enhance the outcomes of the proposed rehabilitation works.

Table 2. Management actions for weed control.

Parameter	Action	Timing
Surface Material	Assess weed potential within topsoil material prior to removal and separate weed affected topsoil for treatment or disposal.	Prior to and during topsoil removal
	Store significantly weedy surface material separately to clean surface material.	Surface material removal
	Stockpile all surface materials in the general vicinity of its origin.	Surface material removal
Hygiene Measures	Avoid moving surface material or fill material from weed infected areas to non-infested areas.	At all times
	All earthmoving and ground engaging equipment will be cleaned of vegetation, mud and soil prior to entry and exit of the subject site.	At all times
	No soil and vegetation should be brought to the site apart from that to be used in rehabilitation and plants used in rehabilitation should be free of weeds.	At all times
Access	Control access within the quarry area to reduce the spread of weeds, especially off-road vehicle access, to prevent disturbance to vegetation and weed invasion.	At all times
	Restrict access to areas outside the subject site to reduce the spread of weeds into or out of the site.	At all times
Weed Control	Chemical spraying is to be undertaken as per section 'Weed Control'	Refer to section 'Monitoring and Reporting'
Monitoring and Reporting	Monitoring and reporting work are required to ensure that the revegetation objectives are achieved.	

Rehabilitation

As previously discussed, it is proposed to return the extraction area to pasture. Ripping will be undertaken within the quarry to reduce the potential for surface erosion and promote a seed bed for establishing pasture. During this process, a number of measures will be utilised to ensure maximum efficiency with minimal disturbance. Any

ripping that occurs along slopes will have regular contour banks built across the tracks to prevent erosion from water runoff.

As far as possible, topsoil will be placed along the contour to help reduce erosion. Placing the topsoil in such a manner will reduce the down slope flow of water and increase water storage. The final landform will resemble the pre-mining landform where practicable (minus the excavated material). The overburden storage area will take into consideration the surrounding landform and as far as practicable match the surrounding features.

While no specific soil preparation is anticipated, the requirement for the application of lime, clay, organic matter, and/or fertiliser can be determined by soil testing once the landform has been rehabilitated.

For pasture revegetation it is essential that the species are matched to the soil types and rainfall. The location falls into the "Mediterranean climate" planting regime with sandy to gravelly soils. Suitable perennial legumes include birdsfoot trefoil, lucerne, strawberry clover and sulla. Perennial pasture includes perennial ryegrass, phalaris, cocksfoot and Rhodes grass. Annual pasture species include ryegrass, serradella and subterranean clover.

The actual species used will be determined by the individual season, nature of the rainfall in the preceding months and stocking/hay production proposed by the landholder which may change from time to time.

Seeding rates are 2 – 5 kg/ha depending on the species used; for example, ryegrass is seeded at 3 kg/ha whereas Rhodes grass is seeded at 4 kg/ha. Seed will be broadcast uniformly within the marked areas in overlapping passes using mechanical equipment to allow for complete and even seed coverage of the prepared area.

Maintenance

Maintenance will be undertaken following planting/seeding with all activities to be conducted in response to the maintenance inspections and monitoring (as discussed below). The key elements associated with maintenance works will include suppression of smothering weeds and infill planting. The requirement to implement revegetation maintenance and infill planting measures will be determined following each monitoring event.

Monitoring and Reporting

A program of monitoring of the rehabilitation works is required to ensure that the objectives are achieved.

Maintenance inspections will be undertaken annually in spring by the proponent to determine the requirement for maintenance measures.

During these inspections, the area will be assessed to determine pasture and weed coverage within areas that have been rehabilitated.

Completion Criteria

To achieve the rehabilitation objectives and ensure that future management is minimised, the measurable goals for rehabilitated areas are as follows:

- Self-sustaining crop cover with less than 5% bare ground.
- Reduce weed cover to less than 10% (noting that the pasture is not considered a 'weed'); and
- Rehabilitation surface remains flat and stable, with no evidence of surface erosion.

Maintenance will continue to be undertaken as required until this criterion has been achieved or as otherwise agreed with the Shire of Gingin. Following the successful completion of the revegetation program, the Shire will, upon application from the owner, refund the bond lodged against the implementation of the rehabilitation.

Scheduling

The rehabilitation will be undertaken on the completion of excavation of each stage. Accordingly, a definitive timeline for rehabilitation is not prescribed, but rather a commitment to establish pasture by the first August, following completion of the extraction works for each stage.

Rehabilitation works will be undertaken at the following specified times of year:

Spring/summer:

Excavated area to be graded to levels and contours conforming to the adjacent unaffected areas minus the thickness of the excavated material.

- Deep ripping along the contour at 10 m intervals.

- Embankment batters will be cut as specified.
- Stockpiled topsoil will be spread over the shaped surface.

Autumn:

Pre-seeding weed control.

Autumn/winter:

Seeding with appropriate agricultural seed mix.

If sufficient vegetation does not germinate following initial seeding, the area will be re-seeded.

Spring:

- Maintenance inspections to determine extent of maintenance requirements.
- Formal monitoring will be undertaken in areas that have been rehabilitated.

Decommissioning

Following completion of the extraction activities, the applicant will undertake the following actions to decommission the site:

- All buildings and infrastructure will be removed.
- Any hard stand surfaces will be removed and used to backfill the pit.
- Overburden will be used as backfill.
- The area will have the slopes and soils constructed to allow for the future proposed land use.