



**P1032A Broomehill Offset
Revegetation Implementation Plan
P1032A-01-00
Co-operative Bulk Handling Limited
July 2023**

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1 INTRODUCTION AND BACKGROUND

Co-operative Bulk Handling Group (CBH) is working through various aspects of native vegetation management associated with redevelopment of grain loading facilities at key sites including Broomehill in the Great Southern region. Tranen Revegetation Southwest (Tranen) was commissioned by CBH to prepare a Revegetation Implementation Plan (RIP) for an area of Wheatbelt Woodland vegetation, on three land parcels owned by CBH adjacent to the Broomehill bulk handling facilities (the site).

Purpose Permit CPS 9445-1 is the instrument guiding the plan for the site. There are three land parcels (Lots 530, 1260, and 148), all of which are to be part of a conservation covenant, with Lots 530 and 1260 being approved vegetation clearing offsets.

The total area covered by this plan is 8.01 hectares. The site location is shown in Appendix 1 and the site detail, showing management zones, treatment areas, and site extent is shown in Appendix 2.

1.1 Documentation

This plan is based partly on information provided by the client:

- CPS 9445-1 - Purpose Permit with Plan and Decision Report
- CBH (Oct 2022) Broomehill Offset Proposal Report
- GHD (Nov 2022) Broomehill Offset Site – Vegetation and Black Cockatoo assessment.
- Ecoscape (2021) CBH Broomehill Environmental Survey
- EndPlan / Ecoscape (Aug 2022) CBH Broomehill fixed rail out-loading facility (EPBC 2021/9038)

1.2 Objectives

The primary objective of the plan is to facilitate regeneration and improve the condition of Wheatbelt TEC Eucalypt Woodland in the designated offsets and conservation covenant woodlands adjacent to CBH's Broomehill bulk handling facilities.

The plan aims to put in place the mechanisms for native vegetation to become self-sustaining through a comprehensive and ongoing weed control program, as well as installing native plants in degraded and cleared areas in and around woodland remnants.

The plan also includes a local seed and cutting collection program to ensure local provenance species are propagated, and an ongoing maintenance schedule for 5 years based on site monitoring until completion criteria are met.

2 SITE DESCRIPTION

2.1 Climate

Broomehill has a Mediterranean climate with cool wet winters and warm dry summers. The long term (since 1900) average rainfall is 446 mm but since 1970 is around 423 mm (a decline that has occurred throughout southwest Australia (Commonwealth of Australia 2023)).

The decline in rainfall has implications for the revegetation implementation plan, potentially affecting survival of plantings and germinates, especially in the first and second summers, as well as creating a smaller window of activity for interventions in the wetter cooler months.

2.2 Landform, Soils, and Vegetation

The site is typical of wandoo woodland which generally occurs lower in the landscape on clay-based soils, in this case, sand over clay creating a duplex soil type. There is a small area of mallet woodland in the site indicating a slight rise in elevation and presence of lateritic gravel over clay.

Mallet and wandoo eucalypt species are known for accumulating quantities of highly hydrophobic organic matter under their canopies often precluding the growth of other species which has implications for the revegetation plan. The focus will be on establishing mid-storey small trees and understorey shrubs in gaps between remnants and isolated trees.

2.3 Dieback Status

No information has been collected or made available on the dieback status of the site. The site is within the 400+ mm zone regarded as the vulnerable zone for *Phytophthora* dieback (DBCA 2022) but is not a hotspot for the disease compared to the 750+ mm zone or areas such as the nearby Stirling Ranges with many vulnerable species.

2.4 Site Condition

Eucalypt Woodlands of the WA Wheatbelt are a nationally protected ecological community (DCCEEW 2021), fragmented and substantially cleared (RCC 2015), usually with a heavy weed burden, and often with little recruitment of trees and understorey vegetation, and while the Broomehill site varies in condition from good to completely degraded, this is largely the case for the overall site also. One feature of the site is a mid-stratum characterised by the woody weed, golden wattle (*Acacia pycnantha*)

The woodland remnants at the Broomehill offset have been assessed for condition based on EPA guidelines (Ecoscape 2022) and by further site assessment by Tranen. All remnants at the site are degraded or significantly altered by obvious signs of multiple disturbance, including partial clearing, fire, and grazing, and the dominance of aggressive weeds. However, all remnants within the site are regarded as retaining enough basic vegetation structure that rehabilitation remains viable.

3 IMPLEMENTATION STRATEGY

The site is separated into four management zones or parcels, each with its own implementation strategy based on remnant vegetation condition and type, site access and constraints, weed coverage, soil characteristics, and surface hydrology (i.e., waterlogged or dryland soils).

Indicative locations for each of the management zones are provided in Appendix 2. The recommended species and their corresponding quantities for planting in each zone or parcel are provided in Appendix 3.

The following section provides a summary of management zone specific site conditions, the overarching strategy for each management zone, and the primary works activities required. The activities and timing of activities are detailed in the indicative work schedule (Appendix 4).

The zones are as follows:

- Management Zone 1 – Wandoo Infill
- Management Zone 2 – Mallet
- Management Zone 3 – Wandoo Open
- Management Zone 4 – Wandoo Degraded

3.1 General

3.1.1 Signage

Signage advising that rehabilitation works are being progressively undertaken will be placed at obvious entry points into the site.

3.1.2 Herbivores

It is not known to what extent rabbits constrain revegetation at the Broomehill site so an assessment of rabbit presence is required at the earliest stage of plan implementation, as even low numbers can pose a threat to newly installed plants and germinants.

If rabbits are present, a control program using a qualified vertebrate pest control practitioner will occur over the summer before infill planting and/or other treatments.

Kangaroos may be a threat, but the site is close to town and to CBH facilities, so is unlikely to be a preferred grazing area. A standard post and netting fence should be enough to keep kangaroos from accessing the site.

3.1.3 Weeds

A weed management strategy is crucial to the success of all revegetation and remnant vegetation rehabilitation projects and wheatbelt woodland remnants are typically infested with a variety of aggressive bushland and pasture weeds.

Weed management will begin at least a year in advance of rehabilitation works to target a full-years cycle covering variable lifecycles and stages of growth when specific controls are best applied.

Weeds will be categorised into two categories (Table 1); those that can be effectively and practically eradicated from the site (Group 1 weeds) and those that can be controlled to a sufficiently low enough presence that native species can establish and outcompete weeds (Group 2). The level of control is reflected in the completion criteria (section 6.3).

Table 1 Weed Strategy

Group 1 weeds - eradicate
bridal creeper (<i>Asparagus asparagoides</i>)
golden wattle (<i>Acacia pycnantha</i>)
watsonia (<i>Watsonia meriana</i>)
<i>Plus, any weed species in low enough numbers that eradication is feasible</i>

Group 2 weeds - control
perennial veldt grass (<i>Ehrharta calycina</i>)
annual veldt grass (<i>Ehrharta longiflora</i>)
blowfly grass (<i>Briza maxima</i>)
wild oats (<i>Avena barbata</i>)

Herbicides are the primary tool for weed control and the selection and application of chemicals will consider the surrounding environment and constraints this may present. Where appropriate, selective herbicides (i.e., grass or broadleaf-specific) shall be favoured over general knockdown herbicides to keep off-target damage to a minimum.

Woody weeds may require stump treatment involving cutting and application of herbicide.

3.1.4 Fencing and Site Protection

It is a requirement of the Purpose Permit (CPS 9445-1) that Lot 1260 on Plan 409752 and Lot 530 on Plan 222197 (Mallet and Wandoo Infill zones) be fenced leaving a 15 cm gap at ground level. Although this may deter larger kangaroos, there may be constraints to revegetation and natural regeneration if rabbits are present, or if kangaroos dig underneath a fence of this type.

The revegetation contractor will use programmed monitoring to inspect the Purpose Permit fence and note any issues with herbivores, and it may be necessary to consider control or other exclusion contingencies should seedlings and germinates be affected.

The degraded wandoo zone (Lot 542) will also be fenced. This will define the area in which work is being undertaken, help to exclude people, dogs, motorbikes, and vehicles, but also assist with excluding herbivores.

If rabbits are determined to be a constraint to revegetation, a rabbit control program will be initiated followed by construction of a rabbit proof fence, which will require a wire mesh apron, 500mm high and outward facing to a minimum 300 mm with good ground contact.

Fencing is a far better and more cost-effective plant protection strategy than individual tree guards that are costly to install and must be removed before the first summer. Fencing has the added advantage of allowing existing native trees and shrubs to naturally regenerate if herbivores are excluded.

3.1.5 Access Tracks

Existing tracks are to be retained for fire access under the Offset conditions. The Offset area has no internal tracks but a firebreak suitable to fire fighting vehicles will be constructed and maintained around the inside of the perimeter fence and will be serviced by two gates as shown in Appendix 2.

The Wandoo Degraded Zone (Lot 148) has an existing track which will be adequate for site maintenance and access and will be serviced by a single gate.

3.2 Wandoo Infill (Zone 1)

This zone is the largest zone at the site covering 4.72 hectares. The existing vegetation community is classified as *Eucalyptus wandoo* open woodland, with a mid-stratum of scattered *Allocasuarina huegeliana* and the woody weed, golden wattle (*Acacia pycnantha*). The understorey comprises scattered native shrubs and grass-like species, dominated by perennial veldt grass.



Figure 1 Wandoo Infill Zone

The aim for the Wandoo infill Zone, which is relatively intact woodland, is to undertake weed control, with a focus on removing *Acacia pycnantha* and controlling perennial veldt grass, while avoiding off-target damage to native shrubs, sedges, and any other remnant understorey species.

Infill planting will be undertaken in gaps, degraded patches, and in and around remnant trees to increase the dominance and diversity of native species in the overstorey and understorey, creating self-sustaining vegetation capable of competing with weeds.

Following a full year of weed control, the surface will be prepared for planting using hand-held power augers to break subsoil compaction and promote rapid root growth. Augered holes will be 150 mm in diameter and 300 mm in depth.

Tubestock will be planted into augered holes at an average density of 1 plant per 20m². However, this density will vary depending on gap sizes and presence of existing trees and

native understorey species. Maximum density of planted seedlings in any patch or clearing will be 1 plant per m².

A single 20g native fertiliser tablet will be installed with each seedling (except for species in the Proteaceae family) to provide immediate nutrients to establishing plants.

3.3 Mallet (Zone 2)

This zone covering 1.30 ha is dominated by mallet. It is not clear whether it is *Eucalyptus astringens* (Brown Mallet) or *E. gardneri* (Blue Mallet), because the available flora surveys differ. Regardless, the ecology and management approach are the same.



Figure 2 Mallet Zone

There are very few understorey species in mallet vegetation naturally, so that this zone will require little intervention except for some limited in fill planting of seedlings to ensure a new cohort of trees is established as mature trees senesce.

Once the species is confirmed, suitable gaps will be identified, and auger holes will be installed 150 mm in diameter and 300 mm in depth for limited infill planting of seedling mallet trees and will include a 10 g fertiliser tablet, except for Proteaceae species.

3.4 Wandoo Open (Zone 3)

This zone comprises 1.09 ha of semi-degraded open wandoo woodland which provides the opportunity for a higher level of infill planting of both overstorey, and understorey species, compared to the larger Wandoo Infill Zone.



Figure 3 Wandoo Open Zone

The focus for this zone is restoring the overstorey of wandoo and mid-stratum of *Allocasuarina* and other species and creating a more species-rich understorey.

Following a full year of weed control (3 events), the surface will be prepared for planting using hand-held power augers to break compaction and allow rapid root growth; an important factor in first-summer survival. Augered holes will be 150 mm in diameter and 300 mm in depth. A follow-up weed control event will occur pre-planting as the disturbance will trigger weed growth.

Tubestock will be planted into augered holes at an average density of 1 plant per 5m². However, this density will vary depending on gap sizes and presence of existing trees and native understorey species. Maximum density of planted seedlings in any patch or clearing will be 1 plant per m².

A single 10g native fertiliser tablet will be installed with each seedling (except for species in the Proteaceae family) to provide immediate nutrients to establishing plants.

3.5 Wandoo Degraded (Zone 4)

This zone is regarded as complete degraded with an understorey dominated by woody weeds (*Acacia pycnantha*) and so can be reworked and revegetated to restore wheatbelt woodland vegetation (Figure 4).



Figure 4 Wandoo Degraded Zone

The area of 0.89 ha will have rubbish and debris removed, with coarse woody material and habitat logs retained. Any old mounds will be re-profiled with earth moving equipment.

Hand-held power augers will be used for surface preparation following the effective removal and control of weeds. Augered holes will be 150 mm in diameter and 300 mm in depth. A follow-up weed control event will occur pre-planting as the disturbance will trigger weed growth.

Tubestock will be planted into augered holes at an average density of 1 plant per 2m². However, this density will vary depending on presence of existing trees and native understorey species. Maximum density of planted seedlings in any patch or clearing will be 1 plant per m².

A single 10g native fertiliser tablet will be installed with each seedling (except for species in the Proteaceae family) to provide immediate nutrients to establishing plants.

4 ADVANCE PLANNING AND MANAGEMENT

4.1 Vegetation Retention

All existing native vegetation will be protected, and operators must have considerable experience in identifying native species which is integral to spot spraying. Infill planting in degraded remnants will be by hand-held power augers to minimise disturbance to existing tree roots.

4.2 Native Seed, Cutting and Transplant Recovery

All living material to be used in the plan will be sourced from a 100 km radius around Broomehill. Should the range need to be extended due to the availability of suitable material, approval will be sought through the client from the relevant government authority.

There will be a seed and cutting collection event in the first and second summers of the plan, in and around Broomehill, to provide seed and cuttings for nurseries to propagate.

4.3 Dieback Management

A Dieback Management Plan has not been developed for the site, but indicator species both within and surrounding the site do not appear affected by *Phytophthora*. The site will be treated as dieback uninterpretable, and all personnel, machinery and vehicles are to be cleaned down prior to arriving onsite to prevent any foreign soil or seeds entering the site.

5 IMPLEMENTATION METHODOLOGY

The following section outlines the technical specifications, dimensions and general methodology for the implementation of the works.

5.1 Weed Control

In the earlier stages of weed control, any woody weeds should be removed, and stump treated if required, and the most aggressive species targeted.

In some instances, alternative control methods such as manual removal will be used, for example, large *Acacia pycnantha* will be cut and the material left *in situ* as this species doesn't resprout. Smaller saplings and seedlings will be removed with hand tools or manually pulled. During each winter of the plan, and prior to the normal spring flowering time, any *Acacia pycnantha* seedlings or plants will be pulled or sprayed.

Some of the common herbicides likely be used at the site are listed in Table 2.

Table 2 General herbicide groups and applications

Herbicide	Use
Glyphosate Biactive	Broadleaf and grasses
Fluazifop	Grass specific
Metsulfuron-methyl	Geophytes (e.g., bridle creeper, Watsonia)

All herbicide application records are to be kept as required under Department of Health WA regulations. Only herbicides authorised for use in Australia are to be used and all operators will be experienced and accredited.

Bridle Creeper will be targeted for eradication across the site (see completion criteria) and will be sprayed using 0.2 g metsulfuron methyl + Pulse® in 15 L water (or 2.5 - 5g /ha + Pulse®) or similar and applied when flowering July to September.

Any *Watsonia* sp. on site will be located and controlled using the same herbicide prescription as Bridle Creeper or, alternatively, with 2,2-DPA Dalapon (2,2 dichloropropionic acid) at 5 g/L+ Pulse® each September for the duration of the plan as required. DPA can assist minimise off-target damage to native germinates.

Veldt grass and other less competitive grasses will be sprayed with Fusilade® Forte 13 ml/L or 6.5 L/ha + wetting agent or similar product on actively growing and unstressed plants June to August. Care will be taken to avoid off-target damage to native grasses and sedges and monitoring will inform if off-target damage is occurring.

There will be a pre-install weed control event following surface preparation for planting and seeding, as soil disturbance associated with surface preparation is likely to trigger weed germination and growth. Post-installation, there will be two weed control events per year, and more if required, for the duration of the plan. Bi-annual monitoring will be used to guide decisions on weed control and ensure completion targets are met and maintained.

Grass selective herbicides will be useful at the Broomehill site to reduce the competitive dominance of perennial veldt grass without damaging planted seedlings and germinates. These herbicides are highly selective for susceptible grasses and have been found to have little impact on most native monocots or dicots in Banksia woodland on the Swan Coastal Plain, although some native grasses have been found to be susceptible (Brown and Brooks 2002).

Spray operators must be able to identify weed species from native grasses like *Neurachne alopecuroidea* and *Austrostipa elegantissima*, which occur on the site, and monitoring (section 5.2) will be used to identify any adverse effects from the weed control program.

5.2 Vegetation Retention

All existing native vegetation will be protected, and spot spraying operators must have experience in identifying native sedges, grasses, herbs, and shrubs among weeds. Infill planting in and amongst degraded remnants will be by hand-held power augers to minimise disturbance to existing tree roots.

5.3 Surface Preparation

Weed control over the pre-planting year will improve access and allow surface preparation to be undertaken.

Infill planting in and around remnant trees will be undertaken using hand-held powered augers to break compaction and open sub-soil for root growth of planted tubestock.

In areas away from remnant trees and vegetation, and where access is suitable, a machine such as a tractor can be used to rip and scarify. Rip lines will be 2 metres apart and 300mm to 500 mm in depth. Machine preparation may be possible in the Wandoo Degraded MZ on Lot 148.

It may also be feasible to use an auger mounted on a tractor, mini excavator, or Posi-track type machine to prepare the surface where access allows this technique, and this can be applied across all zones where feasible, and where damage to existing understorey plants can be avoided.

5.4 Species Selection and Plant Allocations

Appendix 3 is an indicative list of species recommended for the Broomehill site, with proportions of each species to be planted in each management zone. It is expected these percentages and quantities will vary as the plan progresses but should be used as a guide or target to attain.

The species proportions aim to maximise diversity, especially of understorey species, but still be practical in terms of what is likely to be available and likely to succeed. Species have been selected based on the consultant's report of plants identified at the site (GHD 2022) (Ecoscape 2021), on herbarium records (DBCA 2023) from in and around Broomehill, nursery lists such as from Katanning Landcare Nursery, commercial seed suppliers, and on revegetation industry experience of what species and species groupings are likely to establish successfully.

It is expected there will be around 26 species planted over the site. Most species will be grown from seed, but five species would have to be grown from cuttings or division. It is estimated that around 9,250 tubes or cells would be planted over the site.

5.5 Seedling Propagation

All seedlings will be preferentially sourced from NIASA certified nurseries, the exception being local suppliers within reasonable proximity of the site. All tubestock shall be either forestry tubes or deep cells.

5.6 Seedling Planting

Planting of tubestock will be performed ideally in June or July for optimum survival with an average density of 1 plant per 2m² in the Wandoo Degraded Zone, 1 plant per 5m² in the Wandoo Open Zone, and approximately 1 plant per 20m² in the Wandoo Infill Zone with a focus on understorey species. Site inspection of age class structure and clearings within the Mallet Zone will determine requirements but it is estimated that a planting density of 1 plant per 50m² is required.

Plant densities will vary considerably at the local patch scale based on site conditions and available space. Density will be higher in clear patches and lower in and amongst remnant trees and shrubs but will average to around the described densities for each zone.

Batching of plants on-site will ensure an appropriate species mix and distribution of overstorey and understorey plants.

Planting will use planting tubes (Pottiputki or similar) to ensure safety of operators and provide accurate and effective planting.

A single 10-gram fertiliser tablet will be installed next to each planted seedling, except for Proteaceae species.

5.7 Works Schedule

The implementation program is to commence in summer of year one with provenance seed and cutting collection, rubbish removal, rabbit control, and fencing of the site. The primary installation of seedlings is in winter of year two, followed by a regular cycle of weed control, infill planting, monitoring, and reporting.

An indicative works schedule has been developed for the revegetation works and is detailed in Appendix 4.

6 POST-INSTALLATION MANAGEMENT

6.1 Site Maintenance

This plan has been designed to maximise the chances of success by the early identification of potential issues, allowing timely solutions to be identified and implemented.

There are several factors outside of normal control which may influence the outcome such as adverse weather conditions (i.e., droughts and storms), unauthorised access, and pests and diseases. The monitoring shall identify these issues so that they can be dealt with in an appropriate manner.

- Maintenance activities may include:
 - On-going weed management (spring/summer, autumn/winter);
 - Re-planting in areas of poor response (winter);
 - Fence inspection / repair (quarterly); and
 - Disease and pest control (as required).
- Weeds will almost certainly continue to have an impact on the rehabilitation progress and their management shall be the principal maintenance activity.
- The extent of weed control required for autumn and spring weeds, and outside of these seasons, shall be determined through site monitoring.
- Remedial planting operations will be undertaken if seedlings are not progressing towards the defined success targets.
- In some instances, it may be more cost effective to re-start the revegetation operation rather than continuing in problematic areas.

6.2 Monitoring and Reporting

- Each management zone will be monitored bi-annually (spring and autumn) for the first 3 years, and annually (spring), for the remaining 2 years (or until required) after installation. The timing of these assessments may be adjusted to suit seasonal conditions.
- Each management zone will be monitored separately by establishing 5m x 5m quadrats as determined by relative area (Table 3). Quadrats are not required in MZ 2 (Mallet) but this zone will be monitored by site traverse:

Table 3 – Number of quadrats per management zone

Rehabilitation Zone	5m x 5m quadrats
MZ 1 (Wandoo Infill)	10
MZ 2 (Mallet)	0
MZ 3 (Wandoo Open)	3
MZ 4 (Wandoo Degraded)	2

- Each quadrat shall be clearly marked with fence droppers and an ID tag placed on the NW corner of the quadrat and will be GPS marked and mapped. A photo of the quadrat shall be taken from the NW corner.
- The following quantitative and qualitative data will be recorded within each quadrat:

Table 4 – Data to be recorded at monitoring sites.

Quantitative Data	Qualitative Data
Density (stems / m ²) installed plants	The health of native vegetation
Native species present (species diversity)	Soil movement
Estimated native foliage cover (% cover)	Fauna and pest activity
Estimated total weed cover (% cover)	Comparison of quadrats to remainder of site

- Monitoring of weed cover and installed native cover (when stem counts become problematic as plants grow and spread) will be undertaken using the following cover class estimates:

< 5 %	5 - 10%	11 - 20%	21 - 50%	51 - 80%	> 80%.
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- A visual assessment of the entire site through site traverses is to be undertaken as part of each monitoring event to provide a broader picture of success and identify the progress of areas that are not captured by the quadrat data.
- A summary report is to be provided to CBH for each monitoring event to document the findings and provide recommendations for any additional or contingency actions required to achieve the completion targets.

6.3 Completion Criteria

Table 5 below shows the completion criteria for the mitigation and rehabilitation plan. It is based primarily on the success of weed control and installed plants but will also capture any natural regeneration over the site.

Table 5- Completion Criteria

Aspect	Completion Criteria	Primary Assessment Method
Vegetation – Species Composition	≥60% of species installed represented in each management zone after 5 years	Quadrat / site traverse: Species count
Vegetation – Density	1,500 stems installed per hectare across the site and/or 70 percent cover of installed plants.	Quadrat: installed stem density count / estimated cover where stem counts difficult
Vegetation – Condition	Vegetation is self-sustaining (i.e., evidence of plant maturity, flowering and seed set observed).	Observation within quadrats and site traverse
Weed Management	≤20% weed cover of grassy and pasture weeds. No declared weeds or exotic woody weeds present onsite	Quadrat estimates of cover/ site traverse
Site Maintenance	Fencing fit for purpose. No rubbish on site	Site traverse

7 CONTINGENCY MANAGEMENT ACTIONS

Contingency actions are only required if progress towards completion criteria is not being achieved. Contingency actions therefore would only be undertaken during the post-installation phase of the works.

Unpredictable factors like extreme weather, bushfire, issues with herbivore management, vandalism, and other unforeseen events, can impact on meeting the completion criteria.

The primary method of developing contingency actions shall be from both formal and informal monitoring. A report is to be provided for each monitoring event to document the findings and provide recommendations for any additional actions or contingency plans required to achieve the project targets. These contingency measures may include:

- On-going weed management,
- Re-planting in areas of poor response.
- Fence repair; and
- Disease and pest control.

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Appendix 1 Site Location

Appendix 2 Management Zones and Access

Appendix 3 Species Allocations and Quantities

Appendix 4 Indicative Works Schedule