



NEW ACLAND COAL MINE

CONSERVATION ZONE MONITORING AND REHABILITATION MONTHLY REPORT

JULY 2023

**Prepared for
New Hope Group Pty Ltd**

**Biodiversity Assessment and Management Pty Ltd
PO Box 1376
CLEVELAND 4163
August 2023**

Specialised ecological knowledge that reduces your risk

3 August 2023

Marnie Dugmore
 Senior Environmental Advisor
 New Acland Coal Mine
 New Hope Group Pty Ltd
MDugmore@newhopegroup.com.au

Dear Marnie,

RE: Conservation Zone Monitoring and Rehabilitation Monthly Report – July 2023

BAAM was commissioned by New Hope Group to monitor rehabilitation progress in the Bottle Tree Hill and Lagoon Creek conservation zones at New Acland Coal Mine. The following report describes the monitoring and rehabilitation activities undertaken during the July 2023 monitoring event.




Works during this period focused on establishing additional monitoring plots in natural regeneration and revegetation areas in the central and southern portions of the Lagoon Creek conservation zone, location of large prickly pear within the conservation zones, and preparing a plan of works for the rehabilitation of the demolished house block on Bottle Tree Hill.

Please do not hesitate to contact BAAM if you require further information.

Yours sincerely,



Emma Green
Project Ecologist
Biodiversity Assessment and Management Pty Ltd

File No	Author	Reviewer
0412-005d	 	

1.0 CONSERVATION ZONE MONITORING APPROACH

During the initial (June 2023) monitoring event, BAAM surveyed and demarcated (with star pickets) previously established monitoring sites at Bottle Tree Hill (BTH01, BTH02 and BTH03) and in the northern section of the Lagoon Creek conservation zone (LC01, LC02, LC03, LC04, and LC05).

During the July 2023 monitoring event, an additional six, new transects were established; one within a planned revegetation area at Bottle Tree Hill (BTH04), and another five along Lagoon Creek (LC06 – LC10). Coordinates (WGS84 datum) of all transects are given in **Table 1** and locations depicted on **Figure 1**.

Table 1. Conservation zone monitoring transect locations

Site ID	Rehab Zone	Transect Coordinates (WGS84)		
		Start (0m)	Middle (50m)	End (100m)
Bottle Tree Hill (RE 11.8.3/11.8.5)				
BTH01	Natural regen (RE 11.8.3/11.8.5)	-27.301818 151.706814	-27.302707 151.706786	-27.302256 151.70682
BTH02	Remnant/reference (RE 11.8.5)	-27.304344 151.710391	-27.304218 151.710855	-27.304032 151.7113
BTH03	Remnant/reference (RE 11.8.3)	-27.304706 151.709417	-27.304561 151.708933	-27.304483 151.708464
BTH04	New reveg (RE 11.8.3)	-27.304121 151.707166	-27.304388 151.707541	-27.304714 151.707923
Lagoon Creek (RE 11.3.17)				
LC01	Old reveg	-27.29519 151.737771	-27.294749 151.737871	-27.294332 151.738069
LC02	Natural regen	-27.303457 151.728275	-27.303352 151.728768	-27.303222 151.729243
LC03	Remnant/reference	-27.288424 151.73787	-27.288864 151.737757	-27.289319 151.737693
LC04	Old reveg	-27.300182 151.733716	-27.299775 151.733935	-27.299352 151.734115
LC05	Natural regen	-27.30707 151.72118	-27.30707 151.721674	-27.307001 151.722178
LC06	Natural regen	-27.329755 151.663551	-27.330126 151.663289	-27.330491 151.663007
LC07	Old reveg	-27.32449 151.680264	-27.324664 151.679811	-27.324851 151.679344
LC08	Old reveg	-27.311887 151.716591	-27.311491 151.716819	-27.311081 151.716886
LC09	Natural regen	-27.321313 151.695788	-27.321327 151.695278	-27.321401 151.694779
LC10	Natural regen	-27.292905 151.737227	-27.293356 151.737212	-27.29382 151.737219

All transects were surveyed using the BioCondition methodology. Data collected at all 14 monitoring transects will be presented in the Annual Conservation Zone Management Report.

In general, the existing revegetation and natural regeneration areas along the central and southern portions of Lagoon Creek are performing well with little concern for active management at this stage, whereas results at transects located at Bottle Tree Hill and in the northern section of Lagoon Creek could be improved.



Figure 1. Conservation zone monitoring transect locations

Red points = existing transects
Yellow points = new transects

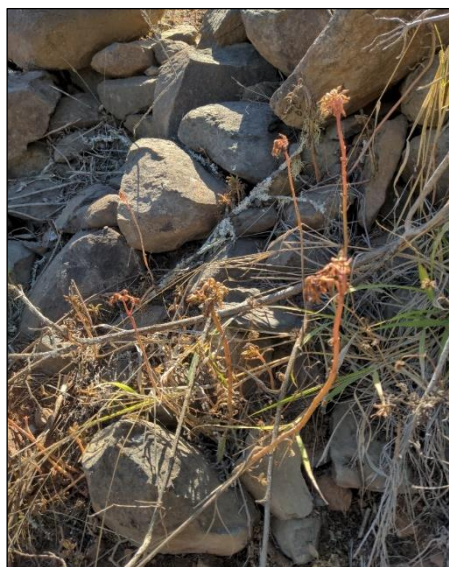
2.0 REHABILITATION AND MAINTENANCE WORKS UNDERTAKEN

2.1 WEED TREATMENT AT BOTTLE TREE HILL

Evidence of prior weed treatment around Bottle Tree Hill was observed during the June and July monitoring events, including successful stem injection of mature Prickly Pear *Opuntia tomentosa*, and foliar sprayed African Boxthorn *Lycium ferocissimum* and Mother of Millions *Bryophyllum delagoense*. Regrowth was occasionally seen on previously treated Prickly Pear, which will require retreatment to prevent re-establishment (see photo below). Boxthorn and Moher of Millions will also need to be monitored for regrowth, and re-treated as necessary.



Prickly Pear regrowth at Bottle Tree Hill



Foliar sprayed Mother of Millions

2.2 LOCATING PRICKLY PEAR

Large Prickly Pear observed along Lagoon Creek were located using a handheld GPS for treatment during the next field survey.

2.3 PLANNING BOTTLE TREE HILL REHABILITATION

Information was collected at Bottle Tree Hill to inform rehabilitation works to be carried out at the demolished house block, including requirements for weed treatment and assessment of species dominance to inform plant selection for revegetation.

3.0 PLANNED REHABILITATION AND MAINTENANCE WORKS

3.1 BOTTLE TREE HILL HOUSEBLOCK REHABILITATION

3.1.1 Current Site Condition

The demolished house block on the southern side of Bottle Tree Hill (highlighted orange in image over page) was inspected during the June monitoring event and found to require targeted rehabilitation. The approximately 2,000 m² area has been subject to significant disturbance, with the removal of a residential dwelling and associated structures leaving a bare pad devoid of vegetation and surrounded by ornamental and environmental weeds (see photos over page).



It is recommended this area is targeted for revegetation and weed management to limit the encroachment of weeds into the remnant protection area of Bottle Tree Hill and re-establish the pre-clearance vegetation community. The houseblock is located about 50 m west of the RE 11.8.3 reference site transect (BTH03), and the vegetation immediately surrounding the block is mostly contiguous with this community. As such, revegetation works will aim to restore the species assemblage and density reflective of RE 11.8.3 and BTH03.

3.1.2 Site Preparation

Preparing the site for revegetation will involve targeted weed removal around the perimeters of the bare pad to prevent further weed spread into the remnant protection area and future planting area. A minimum treatment buffer of 5m should be applied around the intended planting area. Weeds observed in the vicinity of the site include Cape Honeysuckle *Tecoma capensis*, African Boxthorn, Yellow Bells *Tecoma stans*, Easter Cassia *Senna pendula var. glabrata*, Brazilian Nightshade *Solanum seaforthianum*, Guinea Grass *Megathyrsus maximus*, Mother of Millions, Prickly Pear and other cactus species, non-native pines *Thuja sp.* and Peppercorn Trees *Schinus molle*.

Weed control will involve a combination of physical removal and herbicide treatment (**Table 2**). It is recommended woody weeds are treated via cut stump method where practical. Non-native pines and peppercorn trees should be felled with a chainsaw and cut into logs for dispersal through the site as coarse woody debris. Shrubby weeds and invasive grasses may be mulched to ground level and stumps sprayed with an appropriate herbicide mix. A follow-up foliar spray of new shoots may be undertaken 1-2 months following primary treatment. Where practical, fruits from hand-removed weeds should be removed from site. Applicable herbicide rates are available online from DAF and in *Weeds of Southern Queensland* (4th edn) produced by Weed Society of Queensland.

Table 2. Treatment methods for weeds located at Bottle Tree Hill

Botanical Name	Common Name	Qld Biosecurity Act Category/WoNS	Recommended treatment
<i>Lycium ferocissimum</i>	African boxthorn	Category 3 Restricted Matter; WoNS	Cut stump; basal bark; foliar spray
<i>Tecoma capensis</i>	Cape Honeysuckle	-	Basal bark; foliar spray fresh regrowth
<i>Tecoma stans</i>	Yellow Bells	Category 3 Restricted Matter	Cut stump; basal bark; hand pull smaller plants (shallow root system); foliar spray seedlings
<i>Senna pendula var. glabrata</i>	Easter Cassia	-	Cut stump; basal bark; hand pull smaller plants (shallow root system); foliar spray seedlings
<i>Solanum seaforthianum</i>	Brazilian Nightshade	-	Hand removal (dispose of fruit); foliar spray seedlings; cut stump very large vines
<i>Megathyrsus maximus</i>	Guinea Grass	-	Brushcut and foliar spray active regrowth; foliar spray immature plants
<i>Opuntia spp.</i>	Prickly Pear	Category 3 Restricted Matter; WoNS	Stem inject mature plants; foliar spray small plants; complete removal
<i>Bryophyllum delagoense</i>	Mother of Millions	Category 3 Restricted Matter	Foliar spray; complete removal of large plants.
<i>Schinus molle</i>	Peppercorn Tree		Cut stump, disperse logs through site (coarse woody debris)
<i>Thuja sp.</i>	Thuja Pine		Cut stump (no herbicide required), disperse logs through site (coarse woody debris)

It is recommended NAC lightly cultivates the soil present and remove large rocks to improve substrate condition for ease of planting. In addition, it is understood NAC has access to barley straw which may be used as mulch over the planting site. This is recommended to increase soil moisture retention and prevent weed invasion prior to and following the installation of tube stock. NAC will be responsible for all soil preparation works and mulch installation prior to planting commencement.

3.1.3 Plant Selection and Densities

The planting palette to be used in this area (refer **Table 3**) has been derived from site-specific data collected at Bottle Tree Hill and the RE 11.8.3 technical description. Where possible, dominant species in each stratum have been selected for planting, subject to commercial availability. Where desired species could not be sourced from commercial nurseries, alternative native species with similar ecological function known in the local landscape have been selected.

Tree and shrub species will be spaced approximately 1.5m apart and groundcover species will be spaced approximately 2m apart. At these densities, it is expected that a suitable canopy cover will be established and, in time, native vine species will migrate into the area through natural seed dispersal, thereby restoring the area to the pre-existing semi-evergreen vine thicket community.

Table 3 Tube stock planting palette for Bottle Tree Hill

Species	Quantity
Trees and shrubs (1.5m spacings)	
<i>Alphitonia excelsa</i>	80
<i>Atalaya hemiglauca</i>	160
<i>Brachychiton rupestris</i>	80
<i>Bursaria spinosa</i>	160
<i>Carissa spinarum syn. ovata</i>	240
<i>Ficus rubiginosa</i>	80
<i>Flindersia australis</i>	160
<i>Geijera parviflora</i>	160
<i>Geijera salicifolia</i>	240
TOTAL	1360
Groundcovers (2m spacings)	
<i>Cymbopogon refractus</i>	280
<i>Dianella caerulea</i>	160
<i>Heteropogon contortus</i>	280
<i>Themeda triandra</i>	280
TOTAL	1000

3.1.4 Planting

It is anticipated that planting will be carried out in one event between October and November 2023, pending plant stock availability. Plants will be pre-soaked prior to planting and installed in holes dug by speed-spade or auger. A suitable native plant fertiliser (e.g. DMR) and pre-soaked water crystals will be added to each plant hole to assist in establishment.

Immediately following planting, each plant will be watered (at least 1L per plant) and subsequent watering will occur according to the following watering schedule. Waterings can be adjusted depending on rainfall received during these periods.

- Week 1 – 3: at least twice a week
- Week 4 – 6: at least once per week
- Week 6 – 8: at least once
- Week 9 + as required (if desiccation is apparent).

3.1.5 Maintenance and monitoring

Maintenance requirements will be determined through monthly monitoring performed by BAAM until January 2024, following which NAC personnel (with input from BAAM) will be responsible for continuing monthly monitoring until 6 months have elapsed from the time of planting (as required in the CZMP). Monitoring will involve an assessment of seedling survival and determination of any infill planting requirements, as well as weed management, to ensure successful establishment.

3.2 LAGOON CREEK EROSION

Some areas of erosion were noted along Lagoon Creek during the monitoring survey, including one area near the newly established transect LC09 where erosion has led to the fall of large trees from the bank (see photo below). Gully head and bed erosion controls should be implemented in this area. Remediation by localised backfilling, re-shaping and stabilising the drainage path followed by revegetation should be undertaken to repair current erosion and prevent future erosion.



Lagoon Creek erosion causing tree fall near LC09

It is recommended a site-specific gully rehabilitation plan be implemented for Lagoon Creek, that includes both prevention and intervention. The local NRM body, Southern Queensland Landscapes (SQL), may be approached for assistance for erosion control as they have a regional land partnership and agricultural project funding that provides technical advice for both recovery works and future-proofing. Additionally, John Day and Bob Shepard have an excellent manual "Gully erosion - options for prevention and rehabilitation" that is relevant to local conditions and landscapes at NAC, available from Burnet Mary Regional Group (BMRG) or Fitzroy Basin Association (FBA) NRM bodies.

3.3 PRICKLY PEAR TREATMENT

Prickly Pear has been prioritised for treatment within the conservation zones. At this point, Prickly Pear appears to be mostly under control at Bottle Tree Hill, with prior successful treatment via stem injection evident; however, scattered, mature Prickly Pear were observed along sections of Lagoon Creek, which will be targeted for stem injection during the August monitoring event.



Previously treated Prickly Pear at Bottle Tree Hill



Mature Prickly Pear along Lagoon Creek