FLORA AND FAUNA MANAGEMENT PLAN

ANNUAL MONITORING SUMMER 2018

CONSULTING & ENVIRONMENTAL SERVICES

ENVIRONMENTAL SCIENCE AND SOIL SCIENCE SERVICES FOR THE BLUE MOUNTAINS/ CENTRAL WEST DISTRICTS

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Cover Letter

Office@Hillcrest 2A Eskbank Street, Lithgow NSW 2790,
E: info@cessoils.com.au
T: 0407 990 613
www.cessoils.com.au

CONSULTING & ENVIRONMENTAL SERVICES

21st March 2018

Ron Goldbery,
3 Karingal Court,
Marsfield NSW 2122
E: rongoldbery@optusnet.com.au

Newnes Kaolin & Sand Mine Annual Flora and Fauna Monitoring Study 2018

Dear Dr Goldbery,

Consulting and Environmental Services Pty Ltd in collaboration with Woodlands & Wetlands Pty Ltd report the results of our field assessment for flora and fauna undertaken within an annual monitoring program for the year ending February 2018.

The field assessment conducted over 17th and 18th February 2018 has established the third of the annual monitoring to support the Flora and Fauna management plan for the Newnes Kaolin mine. The survey of flora and fauna on the project site and the adjacent National Park is part of the project management strategy to undertake a series of 'easily repeatable surveys that will gather a comprehensive set of data each time" (RPS, 2012, PR103669, Revised Final p 34).

This letter reference is Consulting & Environmental Services Ref: C&ES-005-180217 Monitoring Report FF_Dated 21/03/18. Our review specifically addresses the development of impact assessment criteria as noted by condition 30b of the project conditions of consent as outlined within the Flora and Fauna Management Plan PR103669; Revised Final / September 2012.

Our 2018 monitoring provides the record of the forest vegetation and its re-establishment before the Newnes Kaolin mine is in operation. This year in 2018, the understory development had advanced to the stage that plant species and abundance were quantifiable for future species-richness assessment. Similarly, the total stand health score has reached an average of 17.5, which is an increase from the value at 15.6 we reported in the baseline dataset of March 2016. Further detail of methodology and the results summary are provided as Attachment A to this letter.

Yours faithfully,

Jane. T. Aiken.

Dr Jane T. Aiken, PhD, BSc (Hons 1), BSc, MSusAgr, CPSS.

ATTACHMENT A

SUMMARY METHODOLOGY AND RESULTS

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1.0 Introduction

Annual monitoring of flora and fauna is a review to specifically addresses the development of impact assessment criteria as noted by condition 30b of the project conditions of consent as outlined within the Flora and Fauna Management Plan PR103669; Revised Final / September 2012.

2.0 Methodology

Data collection using the standard set of environmental management proformas record flora and fauna at each of the ten sites inspected as 400 m^2 plots.

An evaluation of flora species presence was undertaken using the modified Braun-Blanquet methodology, closely inspected using the original survey (RPS Australia, 2012) as a guide to likely species. In addition to recording presence/ absence as per the initial survey (RPA Australia, 2012), each species identified as being present in the original, pre-bush fire survey was 'scored' on abundance in March 2017 using the following criteria. NE-not evident, R- rare: one or two specimens, O- occasional: a few isolated specimens, C- common: occurs throughout the plot, A-Abundant: numerous individuals throughout the plot, and D-The major species present at the time of the survey.

At each site, a photograph was taken viewing N, S, E, and W from the plot centre geo-reference location. Additional photographs recorded ground cover and canopy cover.

Faunal habitat was recorded by topographic position, plot quality, ecological resources, species diversity, ground-cover by trees and shrubs, canopy, geology and soils. The presence of birds, invertebrates, and vertebrate species was noted.

Ground cover at each site was recorded using a toe-point transect, which traversed diagonally from corner to corner of the 20 m x 20 m monitoring quadrat. Along the toe-point transect at every two-metre interval, the data collected included the type of ground cover and its proportion about a 50 cm x 50 cm quadrat. Through this process, a model was developed to quantify the ground cover for all the monitoring sites over the three years monitoring since baseline in 2016.

The method is called the Ground Cover Value (GCV) and developed for this project. GCV provides a computation to account for the re-establishment of a fire damaged understorey. The attributes in the measurement include the amount of bare soil, the ground with the exposed rock of < 100 mm size and bedrock; the organic matter comprising charcoal, leaf litter, the timber and bark and the various herbs, forbs and shrubs of the emergent vegetation layer. Consequently, the successional attributes of a monitoring site are identified within the subsequent years of records.

The GCV model computes a Ground Cover Value. The premise of the calculation is that vegetation is layered and therefore percent cover values can add up to more than 100 percent. When the GCV is 1 or greater, then the site has a full cover on the fire-damaged soil.

Additional information on groundcover in February 2018 included the opportunity to sample for the evaluation of species richness. Sampling for species richness was possible because of the increase in diversity of species within each site. At each of the ten monitoring sites, four one metre quadrats located at a randomly identified 8 m distance from the centre of each, were sampled on the north, east, south, and western aspects.

In summary, the methodology for assessment in 2018 has provided for an additional species richness measurement within the scope of:

1. Evaluation of Canopy Tree Health for 2018. Stand health was assessed using the methodology of Grimes, (1978)
2. Quantification of change in ground cover using the Ground Cover Value to account for changing emergent species.
3. Recording avifauna presence during the assessment time at each of the ten plots.
4. Quantification of ground cover as species richness, which is a precursor of the establishing understory after the 2013 bushfire.

3.0 Result Summary

3.1 Ground Cover

Our initial comparison indicates that ground cover value (GCV) increased for sites 2, 3, 4, 6, 7, 8, 9 and 10. Sites 1 and 5 GCV remain at the equivalent of their 2016 and 2017 value. Site 1 and Site 5 were not burnt in the October State Mine Gully 2013 bushfire.

3.2 Evaluation of canopy tree health

Virtually all the trees had suffered fire damage. Many had fallen over, leaving charred stumps. Fire damage was evident over the entire trunks of most trees. This made species identification difficult. However, it also provided an opportunity to assess strand health some 41 months after the fire.

Stand health was assessed using the methodology of Grimes, (1978).

Tree health was scored for:

A- Crown position
B- Crown size
C- Crown density
D- The occurrence of dead branches
E- Epicormic growth

The results of the 2018 evaluation are shown below indicating that the average total stand health score is 17.5 with a maximum rating of 27.

Plot number		Crown position	Crown size	Crown density	The occurrence of dead branches	The occurrence of epicormic growth	Total stand health score
		Score of 1 to 5	Score of 1 to 5	Score of 1 to 9	Score of 1 to 5	Score of 1 to 3	Max score is 27
1		4	3	7	3	1.5	18.5
2		4	3	6	2	2	17
3		3	2.5	6	1	2	14.5
4		4	3	7	2	1.5	17.5
5		5	4	8	2	3	22
6		4	3	6	2	1	16
7		4	2	6	3	2	17
8		3	3	6	2	1.5	15.5
9		3	4	6	2.5	2	17.5
10		4	4	6	2.5	2	18.5
Average		3.8	3.2	6.4	2.2	1.9	17.5

3.3 Avian Habitat and Understorey Development

The resultant increase in canopy cover is noted with the corresponding record of avian fauna calls and feathers on the ground. In the 2017 report, we noted evidence of birds feeding, particularly of the Banksia florets at site 9. In 2018 at the monitoring site 10, the observations included black and white feathers and at site 4, a green-black feather (parrot). Together with the variety of bird calls heard but not seen at the sites 1, 3, 4, 5, 6 and 10, the regeneration of the forest canopy cover is also indicated by the diversity present from other ecological groups. The beetle (Coleoptera), spider (Araneae), fly (Diptera), butterfly (Lepidoptera), ant (Formicidae), termite (Isoptera), bug (Hemiptera), mantid (Mantodea) and the grasshopper (Orthoptera) were observed while sampling and recording the ground cover observations.

3.4 Grazing and Revegetation

In addition to the observation in 2017 for site 10 herbage grazing was evident, in 2018, there is also the observation at site 9 of both wombat scat and grazing the Choretrum sourbush

3.5 Weeds

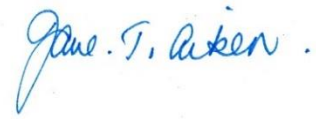
No weeds were observed at any of the ten monitoring sites.

Close

Annual monitoring of the flora and fauna management plan is to provide for the ongoing assessment of impacts from future mine operations. However, within this monitoring program, the baseline data represents eight of the ten monitoring sites with significant fire damage from the October 2013 bushfire.

Our 2018 monitoring provides the record of the forest vegetation in re-establishment being before the Newnes Kaolin mine is in operation. This year, the understory development had advanced to the stage that plant species and abundance were quantified using a one-metre quadrat.

Yours faithfully,



Dr Jane T. Aiken PhD, BSc(Hons), BSc, MSusAgr, CPSS.

21st March 2018.