MARGOT BLUES
CONSULTING ARBORIST

ASSESSMENT REPORT

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1   Executive Summary

Margot Blues Consulting Arborist has been engaged by Mr Gareth Debney Bushland Management Coordinator North Sydney Council to conduct a visual tree assessment and subsequent reporting on a preselected cohort of trees within the Balls Head Nature Reserve.

Grant funding had been obtained to undertake a trial termite control programme to determine their impact upon tree vigour. The subterranean termite species *Nasutitermes walkeri* was the only species targeted. The formal trial was to be conducted over two years comprising an initial tree inspection, to establish a baseline of tree health prior to termite treatment, termite eradication and followed up inspections at 12 and 24months post treatment.

The scope of works was to visually assess a predetermined cohort of fifty nine (59) trees categorising their canopies into three groups these being poor, fair and good for future comparison purposes. Inspection occurred on the 11 September 2015 and was based on elements of VTA (Visual Tree Assessment) methodology outlined by Mattheck & Breloer (2006). Assessment of trees was from ground level only and did not include any destructive investigations. Tree height and canopy width were estimated. Trees 46, 47 & 48 all *Corymbia gummifera* were not located therefore no data is recorded against these trees.

Termite treatment to eight (8) nests within the cohort plus an additional tree occurred on 13th September with follow up inspections occurring 20th October, 2015 and 15th January, 2016. Control was successful in all instances originating from the initial treatment.

A summary of results were:-

	Corymbia gummifera	*Eucalyptus piperita*	*Eucalyptus resinifera*	Total
Total trees assessed	33	2	21	56
Maturity				
Mature	24 trees	2 trees	19 trees	45
Semi mature	6 trees	Nil	2 trees	8
Immature	3 trees	Nil	Nil	3
Vigour (crown density)				
Good	13 trees		11 trees	24
Fair	14trees	1 tree	9 trees	24
Poor	6 trees	1 tree	1 tree	8
Termites				
Arboreal nests	4	1	2	8 (Plus 1 additional)
Active leads	20 Trees	1 tree	18 Trees	39
Inactive leads	6 trees	Nil	1 tree	7
Nil	2 trees	Nil	Nil	2

Table 1: Results and categorisation of tree cohort.

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3   Introduction

Margot Blues Consulting Arborist has been engaged by Mr Gareth Debney Bushland Management Coordinator North Sydney Council to conduct a visual tree assessment and subsequent report on a preselected cohort of trees within the Balls Head Nature Reserve herein referred to as the Reserve. The Council has secured grant funding to undertake a termite trial control programme to determine termite effect on tree population and post eradication, the ongoing changes to tree health. The trial is to run over a twelve month period with volunteers continuing to report on tree health for a number of years post formal trial completion. As a condition of funding procurement, Sydney Coastal Councils Group (SCCG) has requested an independent Consulting Arborist undertake the assessment.

The assignment's aim was to establish a baseline of tree health prior to termite treatment – see table 1. These trees will be similarly assessed at 12 and 24 months post termite eradication to determine if noticeable improvement in their health and vigour has occurred. The Reserve seemingly had a very high representation of the subterranean termite species *Nasutitermes walkerii* with a range of nest sizes from extremely large to newly developing. Only this termite species was targeted for the purpose of this trial.

Inspection occurred on the 11th September 2015 and was based on elements of VTA (Visual Tree Assessment) methodology outlined by Mattheck & Breloer (2006). Assessment of trees was from ground level only and did not include any destructive investigations. Tree height and canopy width were estimated.

With the exception of one tree, all trees inspected were east of the upper bitumen loop road. Only a few trees occurred towards the crest with the remainder on the eastern lower slope. The species inspected were *Corymbia gummifera* (33); *Eucalyptus resinifera* (20) *Eucalyptus piperita* (2) *Eucalyptus microcorys*. The location and hence inspection of three trees did not occur as I could not locate them, these being trees 46, 47 & 48.

Termite treatment applied to trees containing arboreal termite nests was conducted on Saturday 12th September 2015. Follow up inspection post treatment occurred 20th October, 2015 and again 15th January, 2016. Eradication of treated nests had been successful. Spot checks of termite leads on trees surrounding the nests were inactive.

4   Methodology

4.1   Tree Cohort

Tree selection and numbering had been predetermined by North Sydney Council. Trees had been tagged with ribbon and GPS co-ordinates obtained via the internet. Some location difficulty resulted as ribbons had dislodged from trees (human intervention).

Fifty nine (59) trees all rough barked and locally indigenous formed the cohort. The majority were mature.

4.2   Termite Treatment

The termiticide Termidore® was applied to trees only containing arboreal nests. Concentration rates were in accordance with labelling instructions. The external mud leads were flooded and where possible application beneath the bark was applied – a number of trees had "crumbly" bark where it had detached from the sapwood through termite activity. The efficacy of the current termiticide arsenal is chemical contact with as many individuals as possible. The mode of action is not a direct kill but rather a low lethal dose where the chemical is transmitted back to the queen. No trees were drilled.

Nine nest were treated – 8 within the selected cohort and the 9th *Eucalyptus microcorys* located south of tree 13. This tree supported a very large active nest with significant damage occurring to surrounding trees.

The nest heights were measured using a laser distance measure.

4.3   VTA

The assessment of each tree was based on Visual Tree Assessment (VTA) a methodology described by Mattheck & Breloer (1994) and occurred from ground level only. The following characteristics examined for each trees were:-

1. Tree species including Botanical and Common Name.
2. Approximate height
3. Canopy spread associated with each quadrant (N, S, E, W). The figures are an estimation based on pacing where possible.
4. Trunk diameter measured at 1.4m off ground level
5. General description of the tree using visual assessment
6. Health & vigour (assessment of foliage, size, colour, extension growth, the presence of disease or pest infection, canopy density, presence of deadwood, dieback and epicormic growth as indicators)
7. Condition (visual evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators)
8. Suitability of the tree to the site in its existing location.

Comprehensive information recorded on each tree can be found in appendix 1.

For the purpose of this study, the determination of each tree's "health & vigour" was based on canopy density. Point 6, immediately preceding, outlines the assessment criteria used to obtain the baseline classification for each tree. For comparison purposes, tree reassessment will occur at 12 and 24 months post termite treatment. Photographs representing each canopy grouping can be seen in section 4.3 following.

Modern arboricultural practices use a synthesis of both biotic and abiotic characteristics when determining overall tree health and vigour – inclusive of points 6 & 7 above.

4.4   **Canopy Classification**

The following photographs give visual indication to canopy ratings assigned to each trees.

Image 1: Poor canopy

Image 2: Fair canopy

Image 3: Good canopy.

5 Results and Observations

5.1 Balls Head - description

Balls Head is a small undeveloped parcel of land extending into and surrounded by waters of Sydney Harbour. Surrounding areas are heavily built up with limited natural bushland in close proximity.

The immediate foreshores are steep with flattening occurring at the crest. The western shore displays exposed very steep sandstone outcrops; limited pockets of open soil. There is a noticeable species transition towards the crest of the Reserve. To the east rough barks dominate (*Corymbia gummifera* and *Eucalyptus resinifera)* to smooth barks (*Angophora costata)* towards the top of the crest and then westwards.

Chapman and Murphy 1989 describe the landscape as *"Hawkesbury"- rugged, rolling to very steep hills on Hawkesbury Sandstone. Local relief 40-200m, slopes >25%. Rock outcrop >50%. Narrow crests and ridges, narrow incised valleys, steep sideslopes with rocky benches, broken scarps and boulders. Mostly uncleared eucalypt open-woodland (dry sclerophyll forest) and tall open forest (wet sclerophyll forests). Soils are shallow and discontinuous.*
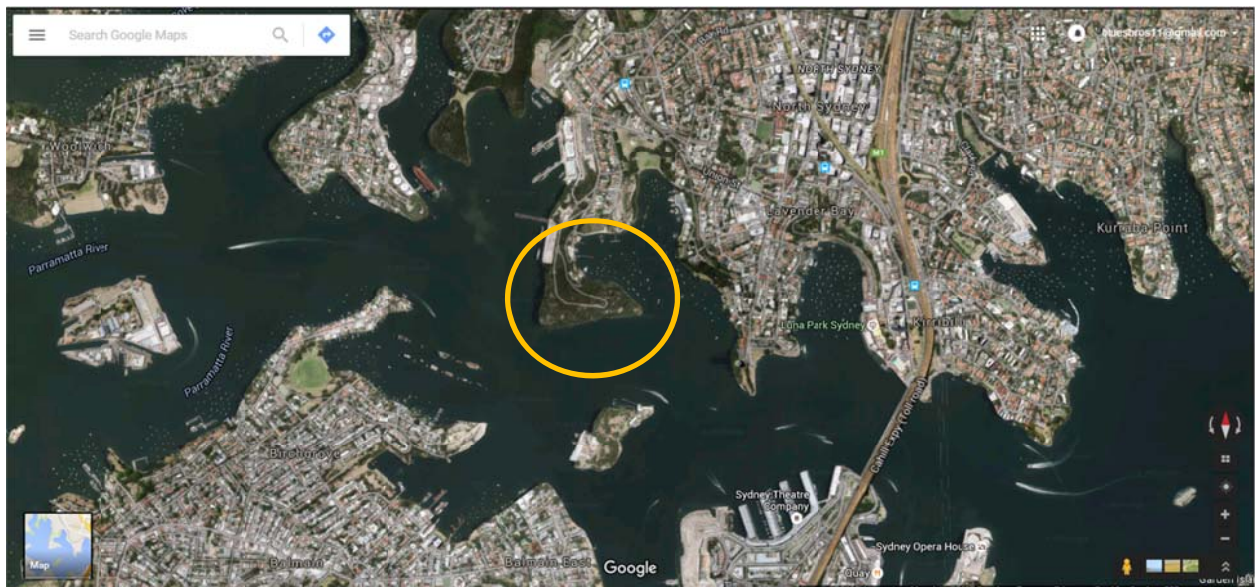

Image 4: Balls Head (yellow circle) showing isolation and development in adjoining suburbs. Accessed 19/10/2015.

5.2 Termites – *Nasutitermes walkeri*

5.2.1 Termite nests
- Nest were 6 metres or higher above ground.
- With the exception of T14 Eucalyptus piperita, all other nests orientated to the north/north east. T14 – nest occupied close to a 360 degrees of the main.
- No termite nests were observed within the smooth barked trees (*Angophora costata*) despite the presence of external leads accessing deadwood.

Photo 1: Typical shape of nest with orientation towards the N/NE.

5.2.2   Bark Changes

Trees affected by termites displayed bark changes and the changes appeared consistent with duration of termite activity. Trees with ascending shelter tubes on the outer bark were thought to have a short duration of infestation/occupation. These shelter tubes appeared not to have altered the inner bark i.e. the bark remained intact.

Trunks thought subjected to longer durations of termite activity had developed a "separation" of inner bark from the cambial area (outer sapwood) forming enclosed access for termite movement i.e. an alternative not requiring the construction of mud leads. The appearance of this separated bark was "crumbly" dull and papery and remained intact whilst termite activity was occurring. Post termite treatment, it was noted this dead bark easily fell from the trees. The degree of cambial injury incurred was not ascertained.

Whilst this "crumbly" bark was present on the entire trunk circumference, it was noted that the western side of the trunk appeared less affected that the remaining quadrants. This was particularly noticeable on the higher elevations where trunks were more exposed to the westerly sun.

Arboreal nests providing habitat for vertebrates and invertebrates. It was observed native bees had colonised the nest within T36 and Kookaburras were nesting in another termite nest in a tree outside the study group.

Photo 2 & 3: Mudding on the outer trunk (LHS photo) and crumbly dry bark removed (RHS photo).

5.3 **Tree Summary**

The cohort of trees assess occurred mid reserve extending east. T28 *Corymbia gummifera* was the only tree located west of the upper loop road. The following table summarises the findings of each tree group: age class, vigour and termite presence.

	Corymbia gummifera	*Eucalyptus piperita*	*Eucalyptus resinifera*	Total
Total trees assessed	33	2	21	56
Maturity				
Mature	24 trees:- T1, 3, 4, 15, 27, 28, 32, 33, 34, 35, 36, 27, 38, 39, 40, 41, 42, 43, 44, 45, 49, 55, 57, 59	2 trees:- T14 & T26	19 trees:- T2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 19, 20 21, 22, 23, 25, 58.	45
Semi mature	6 trees:- T29, 30, 31, 52, 53, 56	Nil	2 trees:- T18 & 24.	8
Immature	3 trees:- T50, 51, 54	Nil	Nil	3
Vigour (crown density)				
Good	13 trees:- T3, 4, 29, 34, 36, 37,41, 43, 44, 45, 55 57, 59		11 trees:- T5, 8, 9, 10, 12, 13, 16, 18, 20, 24, 25	24
Fair	14 trees:- T1, 28, 30, 31, 32, 33, 35, 38,39, 40,42, 49, 53, 56	1 tree:- T26	9 trees:- T6, 7, 11, 17, 19, 21, 22, 23, 58	24
Poor	T15, 27, 50,51, 52, 54	T14	T2	8 (plus 1 addit)
Termites				
Arboreal nests	T1, 27, 32, 36, 43	T14	T2, 58	8
Active leads	20 Trees T3, 4, 15, 29, 33, 34, 35, 37, 38, 39, 40, 41, 44, 45, 52, 53, 55, 56, 57, 59	T26	18 Trees T5, 6, 7, 8, 9, 10, 11,12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24	39
Inactive leads	T28, 30, 31, 49, 50, 54	Nil	T25	7
Nil	T42, 51	Nil	Nil	2

Table 1 (expanded): Total trees classified in accordance with species, maturity, vigour and termite presence. Note Trees 46, 47 & 48 all identified as *Corymbia gummifera* are not included.

Appendix 1: Tree Data Summary