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tree care and consultancy

12 November 2009

Mr Ben MacGibbon
Waterbrook at Wahroonga Pty Ltd
c/o Murlan Consulting Pty Ltd
6 Ulong Avenue
GREENWICH NSW 2065

RE: Arboricultural Comment Relating to Potential Impacts on On-site Blue Gum High Forest of Proposed Construction: 35 Water St and 64 Billyard Ave, Wahroonga
Ref: 1622DA2BHydro2B

1. BACKGROUND

This Comment refers to the Blue Gum High Forest (BGHF) tree species only.

An area of Blue Gum High Forest (BGHF), a listed critically endangered ecological community under the NSW TSC Act, is located on the abovementioned development site. The extent of BGHF is mapped (Smith (2007)) on Tree Plan (adapted Site Strategy Plan, Taylor Brammer) attached to Arboricultural Impact Assessment, March 2009 prepared by Tree Wise Men® Australia Pty Ltd (TWM) for the Development Application. This BGHF mapping was accepted by the Court in LEC Appeal 11193 of 2006 (Clause 75 of Judgement NSWLEC 374).

We understand DECCW is concerned that the proposed construction will lead to indirect impacts on BGHF as a result of lowering of the water table and shadowing.

This arboricultural comment relates to on-site observations and professional experience relating to similar developments in the Sydney region.

2. IMPACTS

2.1 Direct Impacts

2.1.1 BGHF trees within the construction footprint (T116 and T203) or with critical root zones within construction footprints (T130) are proposed to be removed. The proposed offsets of BGHF trees to construction/excavation comply with accepted arboricultural standards including AS4970 – 2009, *Protection of trees on development sites,* facilitating long-term retention. All existing BGHF vegetation within the same offsets or beyond, will be retained and managed by the Project Arborist during construction and into the future as detailed in the Vegetation Management Plan prepared by Urban Bushland Management Consultants Pty Ltd April, 2007.

2.1.2 In addition to the three BGHF trees to be removed due to construction, three BGHF trees (T105, T323 and T371) are proposed to be removed for public safety reasons irrespective of construction given existing structural defects. These three trees have not been identified as having specific hollow-bearing habitat value. Photo A illustrates the fungal bracket in the lower trunk of T323. If these trees were to be retained, drastic crown reduction would be required to render them acceptably safe. Such pruning does not conform with AS4373 Pruning of Amenity Trees.

2.1.3 Tree protection recommendations contained at Section **4** of Arboricultural Impact Assessment (Ref: 1622DA2, Dec. 07) and at Attachment C of that document (Tree Protection Requirements (Generic)) will ensure tree protection during the construction phase.

2.2 Indirect Impacts

2.2.1 It is generally acknowledged that most of the roots of trees are contained in the upper 1 metre of the soil profile coinciding with the most aerated soil[1]. Root growth is opportunistic; that is roots proliferate in areas conducive for growth. Most fine roots are within the top 18 inches of the soil surface.[2] Forest trees tend to develop a high concentration of roots in the surface soil, perhaps because it is well aerated, contains a higher concentration of minerals than deeper soil horizons and is well watered by showers[3]. The location of tree roots in the soil profile for the subject site will be generally as described above. The Soil Landscape of the site is mapped as *Glenorie (gn)* which typically has moderately deep soils over Wianamatta Shales (Ashfield Formation). Localised lowering of the soil moisture levels adjacent basement construction, if it results will not lead to widespread vegetation decline.

2.2.2 The supplementary hydrogeology report date 2 October, 2009 prepared by D.F Dickson and Associates confirms that no water table or perched water tables were located in the area of, or to the depth of the proposed works. *"The clays were dry from the surface, and no free water or excess moisture was encountered, the weathered shale was also dry." And "We have advised in two previous reports, that the perched groundwater table noted by Grey does not exist…".* The absence of a watertable within the proposed basement zone reduces the likely indirect impacts on the adjacent vegetation as a result of the basement works.

2.2.3 The period during construction when the soil profile will be exposed to the atmosphere will be relatively short. If soldier piling is to be used at 1.5-2.0 metres centres with concrete infill, the maximum period of soil profile exposure to the atmosphere will be days only (pers. comm. David Dickson). The soil moisture impacts on adjacent vegetation can be monitored and managed with mulching and temporary irrigation under the supervision of the Project Arborist. The slow horizontal moisture movement through the soil (drying of the excavation face) has been detailed in Dickson report (2 October, 2009). If contiguous piling (e.g. secant piling) is to be used, there will be no exposed root zone excavation.

[1] Harris, Richard W, Clark, James R, Matheny, Nelda P. (2004). Arboriculture: integrated management of landscape trees, shrubs and vines. Regents / Prentice Hall. Pg 27. *"Roots of most plants, including trees, grow primarily in the top meter (3ft) of soil."*

[2] Matheny, Nelda and Clark, James. 1998. Trees and Development – A technical guide to preservation of trees during land development. ISA Champaign, USA. Pg 16.

[3] Kozlowski, T.T and Pallardy, S.G (1997). Physiology of Woody Plants (Second Edition). Academic Press, San Diego, USA

2.2.4 Potential soil moisture fluctuations associated with the basement construction are likely to be in the same order of magnitude as those associated with natural fluctuations in soil moisture. The subject site has recently experienced drought conditions and a cessation in grounds maintenance without any observable tree decline. BGHF decline is not generally observed during drought periods. Indeed as the BGHF is an indigenous vegetation community, it has evolved to cope with such fluctuations. We are not aware that BGHF has a particular intolerance to temporary soil water fluctuation.

2.2.5 The soil moisture available to plants and trees on the site is not solely from the underlying water table. Soil water is contained within the soil matrix above the water table and is recharged by rainfall, irrigation, overland inflows and lateral soil water movement. The soil moisture available to plants is that between *field capacity* (when the soil is saturated) and *permanent wilt point* (when plants wilt and die). At *field capacity* the soil cannot absorb further water and overland flows can be observed. Subsoil drains are likely to flow, removing free water moving down with gravity. At *permanent wilt point* water is still contained within the soil profile but is bound too tightly to the soil particles for the plant to extract.

2.2.6 Any localised deficits in soil moisture due to the proposed construction can be compensated for with construction-phase mulching and irrigation and post construction reticulation measures as detailed at *SK 15-9-2 Infiltration, 20-9-09* of the Dickson report (2 October, 2009).

2.2.7 A detailed Vegetation Management Plan for the BGHF (April, 2007) on the site has been prepared by UBM Ecological Consultants Pty Ltd. We note the following statements:

> *"It is anticipated that the existing drainage pattern between the landscaped portion of the landscaped grounds and the existing BGHF Habitat (MZ 1 & 2) would remain essentially unchanged." (pg. 32) and*

> *"3. Nor is there to be any significant change in local hydrological patterns into or from those areas identified for the reconstruction of BGHF Habitat (see Figures 2.1 and 3.5)." (pg 33)*

2.2.8 For the purpose of this Comment, non-BGHF trees proposed to be removed from BGHF areas (a request of Smith) have been regarded as indirect impacts being clear of construction.

A summary and mapping of these non-BGHF tree removals and transplants is contained on LS. DA. 05a/H prepared by Taylor Brammer. The additional trees to be removed (marked as orange) or transplanted (marked as purple) are to be read in conjunction with the Tree Schedule attached to the Arboricultural Impact Assessment (Ref: 1622DAHosp2Final, March, 2009).

Some non-BGHF tree species, such as Tree 148 a Hoop Pine, *Araucaria cunninghamii*, have been retained in BGHF areas given their significant landscape heritage or screening values. Some non-BGHF species are similarly retained in re-vegetation BGHF areas for their heritage or screening values.

2.2.9 Any possible "edge effects" associated with development adjacent to vegetation including temporary soil moisture changes, elevated nutrient inflows and weed invasion will be satisfactorily addressed with the implementation of the VMP (Section 6, Implementation and Review).

2.2.10 There are many examples of tree/construction interfaces which demonstrate that trees and vegetation communities can be retained adjacent to construction, which may have temporarily lowered water tables. These include:

- Near vertical shotcrete walling adjacent to the M2 Motorway near the intersection with Pennant Hills Road. There is tall open forest (formerly BGHF) retained at the top of 10 - 15 metres tall walling (Photo B). This location is on the same *Glenorie* Soil Landscape which supports BGHF within the nearby Cumberland State Forest.
- Rock cuts along the M5 Motorway north of Sydney where vegetation grows to the edge of shear rock faces.
- Street trees in Sydney's CBD where multi-storey basements are constructed to property boundaries within 2 metres of mature trees.
- Trees within Hyde Park where railway tunnelling has been constructed beneath.
- Mature Sydney Blue Gums, on the newly developed multi-storey development site on the corner of Marian Street and Pacific Highway, Killara (Photo C).
- Observation Park, Beecroft (Photo D) where intact BGHF exists immediately adjacent to the Pacific Highway. Excavation for the westbound lane widening in the 1990s occurred within the dripline of several of the mature BGHF trees which still stand today.
- Recently completed multi- storey development at 1 Newhaven Place, St Ives. Although this site contains Sydney Turpentine Ironbark Forest (STIF) it demonstrates mature Turpentines surviving within 3 metres of basement construction (Photos E and F). Aerial Photo G shows the proximity of the construction to the existing STIF forest.
- Commercial development adjacent to Sydney Blue Gum, McIntyre Street, Pymble illustrating tolerance of this species to close construction (Photo H).

2.2.11 The "edge effects" often observed in bushland interfaces with residential development are usually associated with uncontrolled stormwater flows, additional nutrient loading from paved surfaces, altered fire regime, dumping of weed propagules and increased light levels. These influences will be managed on the subject site as part of the VMP enabling BGHF to be managed into the future.

2.2.12 We concur with the comment contained at *7.3, iii, Hydrology* of the Cumberland Ecology Draft Report, 6 September, 2007:

> *"The construction and use of buildings on the property for over 100 years is likely to have had an impact on soils by providing nutrients via rainfall runoff that are in excess and are unnatural for indigenous species."*
>
> *"Increased nutrient status"* is listed as a threat to the survival of the community in the NSW Scientific Committee, Final Determination for BGHF.

Possible excess nutrient flows into the BGHF area will be managed under the VMP.

2.2.13 The DECCW letter of 2 October, 2009 responds to the latest consultant's reports and raises various concerns regarding BGHF mapped areas, buffers and indirect impacts. We defer to the letter by Cumberland Ecology dated 9 October, 2009 in response to the BGHF mapped area debate. We concur with the conclusions contained within this letter.

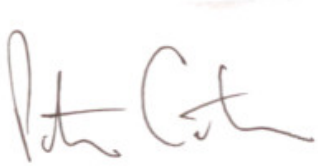
In relation to potential impacts of shadowing, we also concur with the conclusions contained in the letter by Cumberland Ecology dated 9 October, 2009 and letter of UBM dated 7 October, 2009.

The list of species contained within BGHF includes many shade-tolerant ferns and shrubs. The ambient light levels within the shadowed areas of the proposed building will be adequate to support such species. The abundance of such species may increase relative to other, less shade tolerant, but the vegetation will still be defined as BGHF. As with other isolated BGHF patches in urban areas the abundance of species will vary due to available light levels. Generally increased light levels are the problem due to vegetation clearing. Increased light levels are noted under the DECCW definition of indirect impacts[4]. Weed germination is known to be encouraged by clearing.

3. CONCLUSION

The proposed development including Landscape Plans by Taylor Brammer, Vegetation Management Plan by UBM Ecological Consultants and Ecological Assessments by Cumberland Ecology and tree protection recommendation by Tree Wise Men® Australia Pty Ltd will allow for the retention and longterm preservation of Blue Gum High Forest on the site. The level of consideration of development impacts on BGHF is in our opinion, unprecedented for a development of this type. There is no reason why BGHF cannot be established and maintained within the areas mapped. The 10-20 metres wide "buffers" are not required given the proposed ongoing management of the landscapes. The proposed removal of seven (7) BGHF trees from the one hundred and twenty six (126) trees within the BGHF mapped areas of the site represents a responsive development layout, which in our opinion, is worthy of support.

Kind regards,



Peter Castor
DIRECTOR

Attachment A: Site Photos

[4] Page 3 Threatened species assessment guidelines – The assessment of significance, DECC Aug. 07

Attachment A: Site Photos

Photo A: Fungal bracket creating a structural defect in base of T323. Tree recommended for removal despite being clear of proposed construction.

Photo B: Mature BGHF tree species surviving adjacent to construction on corner of M2 and Pennant Hills Road. The strip drains and weep holes behind the shotcrete wall have had no impact of existing trees.

Photo C: Mature Sydney Blue Gums retained in close proximity to recently completed multi-storey development corner Pacific Highway and Marian Street Killara.

Photo D: BGHF trees in Observatory Park, Beecroft, surviving the 1990s westbound lane widening. Intact BGHF understorey exists due to ongoing vegetation management.

Photo E: Mature Turpentine within 3 metres of basement construction adjacent multi-storey development at 1 Newhaven Place St Ives.

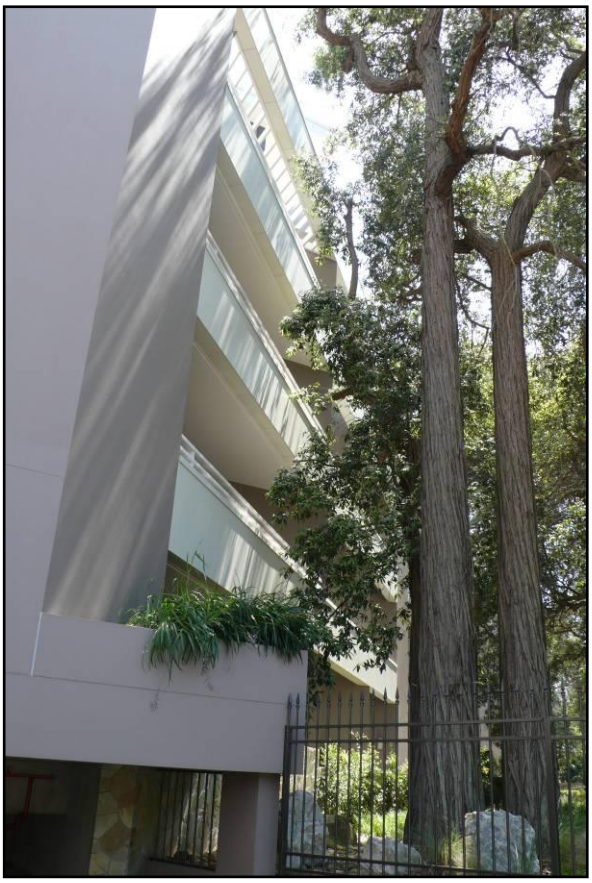


Photo F: Mature Turpentine within 3 metres of basement construction adjacent to multi-storey development at 1 Newhaven Place St Ives.

Photo G: Aerial photo of 1 Newhaven Place partially completed showing proximity of building to existing forest.

Photo H: Sydney Blue Gum growing in very close proximity to commercial building, McIntyre Street, Pymble illustrating tolerance of the species to construction activity.