Arboricultural Consulting and Tree Management
13 Alexandra Crescent,
Bayview. NSW 2104
PO Box 151
Newport Beach NSW 2106
T 02 9918 9833
F 02 9919 9844
E cat@urbanforestryaustralia.com.au

ARBORICULTURAL ASSESSMENT – BUILDINGS C & D

s.96 Proposal for Approved Development:

Stage 1 Works, 120-128 Herring Road, Macquarie Park, NSW

Prepared for Toga Macquarie Developments Pty Ltd

45 Jones Street, Ultimo. NSW

Prepared by Catriona Mackenzie

10 August, 2012

Rev. 11/10/2012

INTRODUCTION

1. Development approval (LDA2012/114) was issued by City of Ryde ("Council") in August 2012 for construction of Buildings C & D and associated basement parking levels at 120-128 Herring Road, Macquarie Park ("Site"), As part of the development approval a number of trees ("the trees") identified on an approved Tree Management Plan were to be retained.

2. Prior to the commencement of approved works on the site, conflicts between the retention of the trees and the excavation and construction of the approved buildings and ancillary structures were identified by members of the project management team of Toga Group ("TG").

3. An on-site meeting on 1 August, 2012 was arranged between consulting arboriculturist Catriona Mackenzie of Urban Forestry Australia ("UFA") and TG Design Manager Donna Pye to consider the issues raised regarding construction and tree retention.

4. UFA undertook limited, ground level inspections of the potentially affected trees, a general assessment of the current site features, and reviewed documentation pertaining to the approved site development.

5. This report assesses the approved development in relation to concerns raised by TG in regards to the impacts of approved works on the safe and viable retention of Trees 2, 15 and 20. This report provides recommendations for the removal or retention of the trees based on the findings of UFA.

6. This report is not intended to replace or supersede the recommendations for protection of trees in the Tree Report by Treescan ("TS"), March 2010, prepared for the initial development application.

DOCUMENT REVIEW

7. I have reviewed the following documentation in preparation of this Report:
   - 7.1 Development Consent LDA2012/114, August, 2012, City of Ryde Council,
   - 7.2 Tree Management Plan ("TMP"), Dwg. L5, Rev. E, dated 05/03/10, Landscape Concept Plan L2 – L17, Rev. B, dated 22/05/12 and TMP. Dwg LP-3, Rev. C, dated 09.08.12, prepared by Turf Design Landscape Architects.
   - 7.3 Tree Report, dated March, 2010, prepared by Treescan.

OBSERVATIONS AND DISCUSSION

8. Tree 2 – *Angophora costata* (Smooth-barked Apple)

This tree was proposed for retention, however it has suffered a partial failure at the roots and now leans heavily to the southeast (Plate 1). The tree has subsequently had a limb removed as it was in contact with the ground and interfering with the existing playing field.

The tree is considered to be unstable and at risk of imminent whole tree failure. The tree must be removed as soon as practicable and certainly prior to any works commencing in its vicinity.

Plate 1
Tree 2 has recently suffered a partial root failure and now leans heavily southeast over the existing playing field. This tree must be removed as it may fail at any time.

9. Tree 15 – This is a twin-stemmed *Syncarpia glomulifera* (Turpentine) at the location of Tree 15 on plan. There is no Tree 16 on site. Tree 15 is a semi-mature Turpentine of approximately 500mm diameter at ground level. The trees Structural Root Zone (SRZ)[1] is a radial offset of 2.4m, and its Tree Protection Zone ("TPZ")[2] is an offset of 5.4m.

10. Tree 18 – This tree is shown as retained on the TMP L5E and LP-3E plans, yet is identified for removal in the tree schedule included on the same plans. However, this tree is dead (confirmed by the author during site visit 01/08/12) and would be removed regardless of the site development.

11. Tree 20 – *Eucalyptus botryoides* (Bangalay). This tree has lost a large portion of the root zone to excavation and associated disturbance. It will also lose up to 40% of the crown branches and foliage for the construction scaffolding. It may not survive the extent of damage incurred to its root zone in particular.

12. The TS report does not specifically address these trees in its assessment of potential development impacts and how they are to be protected from those impacts. The TS report notes in the last paragraph, page 3;

> *"Within the 6m setback from the eastern boundary there are a few semimature specimens of planted native trees which could possibly be retained. The root systems of these trees are not widespread and given care during initial excavation some could be retained……"*

13. There is no explanation as to how the author arrived at the conclusion the trees do not have widespread root systems, but does note only that trees could possibly be retained.

14. In the absence of any supporting material UFA has based its estimation of development impacts on the guidelines of Australian Standard 4970-2009 *Protection of trees on development sites* ("AS4970"). Under AS4970 encroachments less than 10% of the TPZ are considered to be minor. This 10% figure is taken to be a threshold and trigger where arboricultural investigations into TPZ encroachments beyond this figure need to be considered. The potential extent of impacts to these trees can be generally rated using table 1, below.

IMPACT LEVEL RATING	
-	0 – 0.9% of root zone impacted – ***no*** impact of significance
L	1 to 10% of root zone impacted – ***low*** level of impact
L - M	>10 to 15% of root zone impacted – ***low to moderate*** level of impact
M	>15 to 20% of root zone impacted – ***moderate*** level of impact
M – H	>20 to 25% of root zone impacted – ***moderate to high*** level of impact
H	>25 to 35% of root zone impacted – ***high*** level of impact
S	>35% of root zone impacted – ***significant*** level of impact

Table 1: Guideline to the rating of impacts on trees to be retained.
Note: The table has been developed by IACA to assist its members in the assessment of TPZ encroachments over the prescribed 10%. The figures are intended to be a general guide only as they may vary due to the specific conditions and constraints on a particular site, tree species tolerance to impacts, age, vigour, condition of the tree, etc.

15. In terms of construction access and safety there is a requirement for some batter of the excavation. In addition, an estimated 2m offset from the building will be required for construction scaffolding. The combination of over-excavation and scaffolding vastly increases the SRZ/TPZ encroachments and clearance pruning of the trees.

16. Tree 15 may be adversely affected by the works. Excavation batter and retaining wall (with >1.2m fill) would involve a substantial SRZ (which may affect tree anchorage) and TPZ encroachment, with a likely loss of the west stem and the entire crown on this side to accommodate the path and stairs. The TPZ encroachment is a conservative estimate of 27%, which is in the high impact range.

17. A number of fundamental conflicts were identified by UFA during the site meeting with TG, upon detailed review of approved development plans, and subsequent encroachment calculations.
    17.1 Tree 15 is suppressed in crown spread to the north due to a large group of trees in the adjoining site. Subsequently the tree has developed crown bias towards the approved building line.
    17.2 Excavation within the SRZ of the trees may lead to tree instability.
    17.3 Excavation encroachment into the TPZ of the trees is highly likely to lead to tree decline.
    17.4 Substantial pruning of the trees to accommodate the pile rig and construction scaffolding will potentially remove up to 30% - 40% of the current foliage on the trees. This will leave the trees severely stressed, with little ability to compensate for root loss from excavation.
    17.5 The approved building will be several times higher than the trees and essentially remove any direct light on to the south and west sides of the trees. This overshadowing, combined with significant tree root loss and substantial pruning and crown space competition with neighbouring trees will result in the trees having a substantially reduced capacity for sustained growth.

CONCLUSIONS

18. The TS assessment did not take into account the cumulative effects of development activities on the viability and retention of the trees. However, the TS report appears to recognise adverse impacts were likely as the report states the trees *"could possibly be retained".* The more detailed tree impact assessment by UFA identified greater impacts that significantly affect tree viability and retention.
19. Tree 2 (Smooth-barked Apple) is dangerous and should be removed.
20. Tree 18 is dead and would be removed.
21. Adequate tree crown and root protection areas conflict with practicable excavation offsets and construction access requirements. Subsequently, there is insufficient space to successfully retain Trees 15 and 20 in good vigour and sound anchorage.
22. The building overshadowing the trees, in conjunction with competition for crown space to the north will reduce the ability of the affected trees to photosynthesis and sustain further growth. Tree decline will inevitably follow.
23. Replacing the trees with appropriate species will be a better and safer long term landscape outcome for the development.

RECOMMENDATIONS

24. Tree 2 – Remove for safety reasons.
25. Tree 15 – Remove due to identified significant excavation and construction impacts resulting from the approved development.
26. Tree 18 – Remove, as this tree is dead.
27. Tree 20 – Remove due to identified significant excavation and construction impacts resulting from the approved development.
28. As trees will be removed along the east boundary, the 'Offset Restoration Planting' (Landscape Dwg L14/B) should be amended to provide at least one replacement canopy tree for every 30m[2].

Accredited member of INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS ®

MEMBER ISA

Australian Institute of Horticulture

Catriona Mackenzie
Consulting arboriculturist, horticulturist and landscape designer.
Principal consultant for Urban Forestry Australia.

End Notes -Terms and Definitions

[1] Structural Root Zone (SRZ) Refers to the radial distance in metres, measured from the centre of the tree stem, which defines the critical area required to maintain stability of the tree. Only thorough investigation into the location of structural roots within this area can identify whether any minor incursions into this protection zone are feasible.
Note: The SRZ is calculated on the diameter measured immediately above the root/stem buttress (DAB). Where this measurement is not taken in the field, it is calculated by adding 12.5% to the stem diameter at breast height (DBH).(Based on averages calculated from DBH and DAB measurements taken from 20 mature Brush Box and Camphor Laurel).
Note: The SRZ may not be symmetrical in shape/area where there is existing obstruction/confinement to lateral root growth, e.g. structures such as walls, rocky outcrops, etc).

[2] Tree Protection Zone (TPZ). Refers to the radial distance in metres, measured from the centre of the tree stem which defines the tree protection zone for a tree to be retained. The TPZ is a combination of the root area and crown area to be protected. This is generally the minimum distance from the center of the tree trunk where protective fencing or barriers are to be installed to create an exclusion zone. The TPZ surrounding a tree aids the tree's ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree's decline in health or death and the possibly damage to structural stability of the tree from root damage. To limit damage to the tree, protection within a specified distance of the tree's trunk must be maintained throughout the proposed development works. No excavation, stockpiling of building materials or the use of machinery is permitted within the TPZ. Note: In many circumstances the tree root zone does not occupy a symmetrically radial area from the trunk, but may be an irregular area due to the presence of obstructions to root or branch spread or inhospitable growing conditions.