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Dear Janine,

Tree Construction Impact Statement 36-48 Kingsway, Dee Why

Background
Eco Logical Australia (ELA) was commissioned by Francis-Jones Morehen Thorp (FJMT) to prepare a Tree Construction Impact Statement for the proposed development of a Multipurpose Community Facility, carpark, and associated infrastructure to be located at 36 – 48 Kingsway, Dee Why (Lots 2-8 Sec 7 DP9125 and Part Lot 100 DP10482).

Site Description
The subject site is located within the Warringah Local Government Area (LGA), approximately 15 km north of the Sydney CBD It is bounded by Kingsway to the north, Fisher Road to the west, Civic Drive to the east, and a residential unit block and Council property to the south

The subject site is currently used for public car parking and primarily comprises a bitumen car park that is interspersed with planted garden beds separating parking bays There are currently 264 trees growing within formed beds around and within the car park. The trees are identified and described in an arborist's assessment by Eco Logical Australia (ELA) 2014a. In the arborist's assessment the following observations are made

- Most of the trees growing on the site appear to have been planted 20 to 25 years ago, with a few specimens aged over 40 years old, although these older specimens are also likely to have been planted
- The most common tree species are two eucalypt species which are indigenous to the Sydney basin, but not indigenous to the Warringah LGA. These are *Eucalyptus grandis* (Flooded Gum) and *E. microcorys* (Tallowwood)
- Species which occur on the site and are indigenous to the Warringah LGA include *E. punctata* (Grey Gum), *E. botryoides* (Bangalay), *Corymbia gummifera* (Red Bloodwood), *Casuarina glauca* (Swamp Oak), *Angophora costata* (Smooth-barked Apple) and *Banksia integrifolia* subsp *integrifolia* (Coast Banksia) (see ELA 2014b)
- Two specimens of the threatened species *Eucalyptus nicholii* (New England Black Peppermint) occur near the proposed building envelope
- It is apparent that a number of trees have been removed since the 2009 and 2010 surveys A Tree Plan, prepared by CMS Surveyors and dated 17 October 2011 and 5 December 2013, indicate the

occurrence of 318 trees. DA 91 (FJMT 2014) indicates the locations of those trees which have been previously removed

In the arborist's assessment (ELA 2014a), the trees are numbered according to the CMS Surveyors Tree Plan and are cross-referenced according to a previous assessment by Jason Goldstein in which the area is sub-divided into a series of Zones. In this Construction Impact Statement, both systems are used as references.

The proposed development and the trees

A series of sketches prepared by Francis-Jones Morehen Thorp (FJMT), dated 24 February 2014 and numbered DA 92 to DA 96.were used as a guide in order to relate the proposed building footprint and construction area to the locations of the trees. The trees within each Zone are discussed below

Zones which are located completely within the proposed building envelope:

- Zone 70 (Trees 218-220) – 4 trees
- Zone 71 (Trees 221-234) – 11 trees
- Zone 72 (Trees 296-311) – 10 trees
- Zone 73 (Trees 235-295) – 48 trees

All trees occurring within these four zones will require removal (see ELA 2014a for map of zones) It is recommended that tree removals be carried out according to the Draft Code of Practice, Safe Access in tree trimming and Arboriculture (Safe Work Australia 2011).

Zones which are located beyond the proposed building envelope:

- Line of Trees on eastern side of Civic Street· (Trees 1-11) – 11 trees, including Tree 7, which is an environmental weed and should be removed.
- Area upslope, to south-east of main car park. (Trees 312-324) – 11 trees, including one mature Smooth-barked Apple (Tree 312) and a line of early mature Smooth-barked Apple specimens (Trees 313-316) which are described as Significant Trees in DA 92 (FJMT 2014)

All trees (apart from Tree 7) occurring within these areas do not require removal, according to DA 94 (FJMT 2014) The recommendations for tree protection are outlined in ELA (2014a) as well as in the discussion of zones 62 and 63 of this statement

Street Tree planting, Fisher Road

These specimens are included in the numbering for Zone 66 Trees 71-73, 81, 86-89, 95 and 103 (10 trees) are all located in a line along the footpath DA 94 (FJMT 2014), based on a recommendation in ELA (2014a), indicates that these trees are proposed for removal It is recommended that tree removals be carried out according to the Draft Code of Practice; Safe Access in tree trimming and Arboriculture (Safe Work Australia 2011).

Street Tree planting, Kingsway

These specimens are included in the numbering for Zones 67, 68 and 69. Tree 138 is located in Zone 67, Trees 151, 165 and 184 are located in Zone 68 and Trees 205, 210 and 216 are located in Zone 69 (7 trees, including one necrotic specimen – Tree 184) are all located in a line along the footpath. The trees have been regularly topped, because they are located under wires DA 94 (FJMT 2014) does not indicate any of these street trees on the drawing entitled "Retained Trees" although the Landscape Concept Design in the PSYINC Presentation (FJMT 2013) does indicate that most of the existing street trees will be retained Although no details were available, it is understood that Tree 184 will require removal for the construction of a bus lay-by.

If any of the street trees are to be retained they should be individually fenced, according to specifications in ELA (2014a) and *AS 4970 – 2007* Details relating to tree protection are outlined below in this tree construction impact statement

Zones which are located partially within the proposed building envelope or within the construction area:

- Zone 61 (Trees 36-38) – 3 trees
- Zone 62 and 63 (Trees 39 -55) – 13 trees
- Zone 65 (Trees 235-295) – 10 trees
- Zone 66 (Trees 71-114) – 28 trees
- Zone 67 (Trees 115-168) – 27 trees
- Zone 68 (Trees 143 193) – 36 trees
- Zone 69 (194 -217) – 17 trees

Each Zone is discussed separately below

Zone 61

Two trees in Zone 61 (Trees 37 and 38) are environmental weeds and are proposed for removal Tree 36, although indigenous, is probably self-recruited and is over-mature and in poor form and vigour, so should also be removed. DA 94 does not indicate any trees proposed for retention in Zone 61.

Zone 62 and 63

DA 94 (FJMT 2014) indicates that up to three trees at the eastern end of a line of Tallowwoods (trees 39-41) and one tree at the western end (Tree 55) are proposed for removal, because of their bias towards the proposed construction area and the extension of long laterals into the proposed construction area ELA (2014a) proposes that all trees in the line along the fence (Trees 42-52) be removed because it is likely that the trees would not survive in the long term, and their removal post-construction would be difficult, as well as disruptive to any new plantings.

If any of these trees are proposed for retention, the following protection measures are recommended

- A fence, according to the specifications outlined in ELA (2014a) and *AS 4970 – 2007* is to be installed as a continuous line along the full extent of the trees proposed for retention The fence should be retained until the completion of construction.
- Any laterals which extend into the construction area are to be pruned back to the leader, according to specifications in ELA (2014a) and *AS 4373 - 2009.*
- As much of the TPZ is to be covered with an organic mulch according to *AS 4454 - 2012*
- If large supporting roots or extensive masses of fine roots are severed during excavation, a qualified arborist should carry out an inspection and determine whether the root loss would compromise the health and/or the stability of any of the trees proposed for retention.
- The TPZ should not be disturbed by additional planting until the fence has been removed ELA (2014a) makes the following recommendation "The Landscape Plan for the development should be prepared with reference to the protection and continued healthy growth of any retained trees. Plants growing over the root zones of retained native trees should be limited to native grass, forb and sedge species, such as, *Gahnia erythrocarpa, Lomandra longifolia, Lomandra filiformis, Patersonia glabrata, Caustis flexuosa, Cyathochaeta diandra* and *Hovea linearis* which have low water requirements and do not have vigorous root systems Hybrids and cultivars of these native species are not acceptable because of the likelihood of hybridisation with adjacent native species "
- The trees should be monitored by a qualified arborist monthly during construction, then bi-annually for the following two years.

Zone 65

It is understood that a substation is proposed to be installed in this area (Mr Kim Stewart pers comm), in which case all ten trees would probably require removal DA 94 (FJMT 2014) does, however indicate the proposed retention of two trees It is unlikely that these two specimens could be adequately protected if a substation is to be built on this site, therefore it is recommended that all trees growing in Zone 65 be removed. It is recommended that tree removals be carried out according to the Draft Code of Practice, Safe Access in tree trimming and arboriculture (Safe Work Australia 2011).

Zones 66 and 67

DA 94 (FJMT 2014) indicates the proposed removal of all trees in Zone 66 but the retention at least 12 trees in Zone 67. As the sketch indicates that no building will take place adjacent to these trees, it is recommended that all existing healthy trees be retained. The trees should be fenced as one discrete unit The recommendations for tree protection outlined in Zones 62 and 63 above are also applicable to these trees

Zones 68 and 69

DA 94 (FJMT 2014) indicates the proposed retention of eleven trees in Zones 68 and 69 The following factors would need to be considered if these trees are to be retained and protected. These trees will be affected by the following factors:

- Loss of the southern portion of their root plates,
- Damage to their root systems during removal of adjacent trees,
- Reduction of platform as a result of pruning of laterals which extend into the construction area,
- Altered moisture regime; and
- Damage to laterals and leaders by accelerated winds, caused by vortex effect from building

There may be difficulties, moreover, in the context of the eventual tree height, although one solution would be to remove the Tallowwoods and Flooded Gums and only retain the Grey Gums, which would not grow to the same heights.

ELA (2014a) recommends that all trees be removed from these two zones, (apart from the street trees which are discussed in above), and that appropriate screening planting be carried out after completion of construction. If, however, trees are to be retained, the protection measures outlined in Zones 62 and 63 above are also applicable to these trees

Conclusion

The success of any tree retention on the site is rendered difficult because of the greatly altered conditions that will occur, as a result of the proposed development As stated in ELA (2014a), these include the following factors for consideration·

- "The Critical Root Zones of most of the trees are probably wider than the Australian Standards calculations, because of the shallow, sandy soils Therefore, there is greater potential for loss of a significant proportion of SRZ, either from excavation or from compaction by machinery;
- Lower branches will probably require removal to accommodate machinery access during excavation and construction The removal of branches tends to reduce a tree's stability by increasing mass damping during strong winds (see James, Haritos and Ades 2006, Sterken 2005),
- Stress factors would probably be increased as a result of factors such as alterations to light levels and moisture regime, as well as a reduction in activity from beneficial organisms and, possibly increased activity of harmful organisms, especially insects, fungi and bacteria, and

- Vortex effects created by the finished building may result in increased branch and stem failure (see Oke 1988) "

Moreover, details relating to the proposed landscape plantings were unavailable, therefore the impact of the planting of tree, shrub and ground-cover species appropriate to this development could not be considered in this discussion. ELA (2014b) propose that "It is recommended that landscaping following development include native canopy species indigenous to the Warringah LGA". ELA (2014a) states that

> The TPZ should not be disturbed by additional planting until the fence has been removed The Landscape Plan for the development should be prepared with reference to the protection and continued healthy growth of any retained trees Plants growing over the root zones of retained native trees should be limited to native grass, forb and sedge species, such as, *Gahnia erythrocarpa, Lomandra longifolia, Lomandra filiformis, Patersonia glabrata, Caustis flexuosa, Cyathochaeta diandra* and *Hovea linearis* which have low water requirements and do not have vigorous root systems Hybrids and cultivars of these native species are not acceptable because of the likelihood of hybridisation with adjacent native species

The reasons for these recommendations relate to the need to minimise harm to the trees that are proposed for retention, not only during excavation and construction, but also after completion of development Additional planting should not be carried out while the trees are recovering from excavation and resultant root loss. The retained trees need to produce new feeder roots within the TPZ, therefore any disturbance from digging and planting would hinder the retained trees' potential for rapid recovery. If the environmental conditions in which the retained trees are altered significantly, either by the planting of inappropriate species in close proximity or by the introduction of irrigation systems or by the addition of inappropriate fertilisers to accommodate the new plantings, then it is likely that the retained trees will enter a state of gradual decline.

The comment relating to avoiding the planting of cultivars is in recognition of the existence of adjacent patches of native vegetation, and the potential for cultivars to introduce genetic pollution into native bushland, therefore minimising indirect impacts to this vegetation

It is strongly recommended that, where trees are retained, the protection measures that are outlined in this Statement, as well as in ELA (2014a) and relevant Australian Standards be followed Supervision by a qualified arborist at critical stages, e g. installation of protective fencing, lateral pruning, excavation, and post-construction monitoring is essential, in order to ensure that the trees survive the impacts of the proposed development

Pruning of some laterals of retained trees may need to be carried out to accommodate the erection of scaffolding or vehicular access All pruning should be carried out by a qualified arborist according to *AS 4373 – 2007* No branches should be shortened back Any branch which requires pruning should be removed back to the main leader

During excavation, any tree root which is damaged should be pruned to a clean cut by a qualified arborist. If cut roots are exposed to the sun for extended periods, they should be protected by a hessian screen. All exposed roots are potentially connected to adjacent retained trees, because of the likelihood that root grafting has occurred within the root plates of adjacent trees, therefore all exposed roots should be protected and treated The arborist should be aware of the potential for infection by *Armillaria* spp. and *Phytophthora* spp, and should ensure that all pruning equipment is regularly cleaned according to *AS 4373 – 2007*

References

CMS Surveyors 2009 and 2013 Plan showing detail and levels over Lots 2-8 Section 7 in DP 9125 & Part Lot 100 in DP 1041823 being "Dee Why Carpark" No 36-48 Kingsway Dee Why NSW 2099

Eco Logical Australia 2014a Warringah Council Civic Centre Car Park, Zone 1 Arborist Report Report prepared for FJMT.

Eco Logical Australia 2014b. Flora and Fauna Assessment and Biodiversity Management Plan, 36-48 Kingsway, Dee Why Report prepared for FJMT.

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Goldstein, J 2010 *Arboricultural Assessment Report – Warringah Council Civic Centre Car Parks*

James, K R., Haritos, N. and Ades, P K. 2006 Mechanical Stability of trees under dynamic loads. *American Journal of Botany* 93(10), 1522-1530.

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