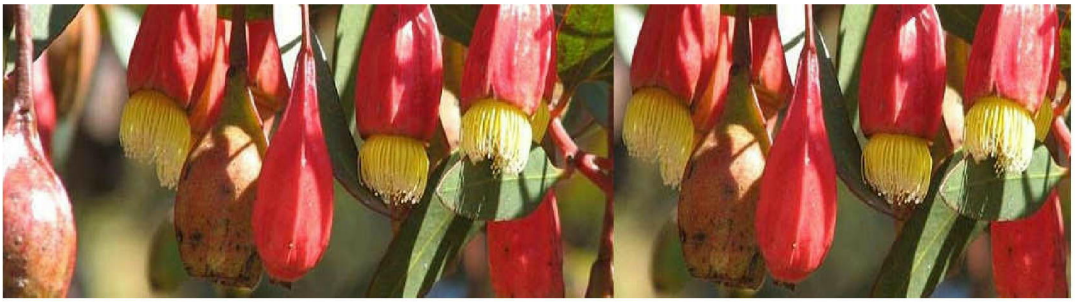
Birds Tree Consultancy

Consulting Arborist AQF5 • Horticultural Consultancy • Project Management • Resistograph Testing



ARBORICULTURAL DEVELOPMENT IMPACT ASSESSMENT REPORT

1 Edna Street, Kingswood NSW

REVISION C

5 July 2018

Prepared for
Designcorp Architects

Prepared by

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MEMBER OF INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS

Executive Summary

This Arboricultural Development Impact Assessment Report has been commissioned by Designcorp Architects to report on trees at the site of 1 Edna Street, Kingswood NSW. It has been commissioned to outline the health, condition and stability of these trees as well as their viability for retention within the context of the proposed development. The scope of this report includes all trees within areas that may be impacted by the proposed development. This Development Impact Assessment is based on Issue E drawings dated May 18.

The subject site is 1 Edna Street, Kingswood NSW. The subject trees are located within or adjacent to the boundaries of this site. The site is proposed for redevelopment involving the demolition of the existing property and construction of new buildings including earthworks, landscaping, paving and carparks. Trees 2, 3, 4 and 5 are located on the neighbouring property and are to be retained and protected.

The subject trees are in good health and condition and are preserved by Penrith City Council Tree Preservation Order.

Trees 2, 3, 4 and 5 are located on the neighbouring property and are to be retained and protected.

The Tree Protection Zones (TPZ) of Tree 2 is encroached by the proposed construction and required earthworks by a major encroachment as defined by *AS4970-2009 Protection of Trees on Development Sites.* This total encroachment is the overall footprint of the encroachment however the proposed construction methods will reduce the impact on this tree. The TPZ of Tree 4 is encroached by slightly greater than a minor encroachment and will remain viable to be retained. The viability of the retention of Trees 2, 3 and 4 are conditional on the following:

- All excavation within the TPZ is to be carried out using non-destruction methods such as using an Air-Knife. High pressure water and Vacuum/Sucker Trucks are not suitable as the high pressure water will delaminate roots.
- No roots greater than 20mm to be cut or damaged within the TPZ of the subject trees.
- All excavation within the TPZ to be carried out under the supervision of site Arborist (AQF Level 5).
- Pavement design is to be permeable such as EcoTrihex to allow percolation of water and air and gaseous exchange within the TPZ.
- No retaining wall within the TPZ of the subject trees.
- The Stormwater pit is to be moved from within the TPZ of Tree 3 to outside the TPZ.
- The Rainwater tank is to be installed above ground and no excavation for pipework within the TPZ of the subject trees.
- Total encroachment within the TPZ of the subject trees including over excavation for shoring etc is to be a maximum offset of 1m from the outside of the basement.

The TPZ of Tree 1 is encroached by the proposed construction and required earthworks by a major encroachment as defined by AS4970-2009 Protection of Trees

on Development Sites due to the proposed pedestrian footpath. This tree is not viable to be retained and will be required to be removed. We recommend that supplementary compensatory planting of two small native trees be carried out within the landscape plan.

All other trees are viable to be retained and are to be protected as defined below.

Recommendations for tree retention or removal are summarised as follows:

Tree no.	Species	Recommendations	Comments
1.	*Callistemon viminalis*	Remove	Not viable to be retained due to encroachment within the Tree Protection Zone by the proposed footpath. Recommend compensatory planting of 2 small native trees.
2.	*Alectryon coriaceus*	Retain	Viable to be retained based on construction methods outlined in 5.0.
3.	*Callistemon viminalis*	Retain	Viable to be retained based on construction methods outlined in 5.0.
4.	*Melaleuca stypheloides*	Retain	Viable to be retained based on construction methods outlined in 5.0.
5.	*Alectryon coriaceus*	Retain	Viable to be retained based on construction methods outlined in 5.0.

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1.0 Scope of Works

This Arboricultural Development Impact Assessment Report has been commissioned by Designcorp Architects to report on trees at the site of 1 Edna Street, Kingswood NSW. It has been commissioned to outline the health, condition and stability of these trees as well as their viability for retention within the context of the proposed development. The scope of this report includes all trees within areas that may be impacted by the proposed development.

On the 29th of May 2018, Glenn Bird of Birds Tree Consultancy attended site and inspected the subject trees from the ground. There was no aerial inspection carried out. A Visual Tree Assessment was undertaken in accordance with Visual Tree Assessment (VTA) guidelines (Mattheck and Breloer, 1994). Tree heights were measured using a Nikon Forestry 550 Heightmeter.

2.0 Site Analysis

2.1 Site

The subject site is 1 Edna Street, Kingswood NSW. The subject trees are located within or adjacent to the boundaries of this site. The site is proposed for redevelopment involving the demolition of the existing property and construction of new buildings including earthworks, landscaping, paving and carparks.

2.2 Topography

The site is flat. The area in the vicinity of all trees is flat.

2.3 Identification

Trees are as identified in the attached inspection forms in Appendix A and shown in Tree location Plan A01 in Appendix B.

2.4 Soils

Soil material and horizons were not tested for this report.

3.0 Existing Trees

The following trees were inspected from the ground and the following items identified. Please refer also to the attached inspection data in Appendix A.

3.1 Tree 1. *Callistemon viminalis*

This mature tree is approximately 4.2m tall with a canopy spread of 4m It has multiple co-dominant trunks from the base with an aggregate diameter at breast height (DBH) of 240mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.2 Tree 2. *Alectryon coriaceus*

This mature tree is located on the neighbouring property and it is approximately 11m tall with a canopy spread of 8m. It has multiple (5)

co-dominant trunks from 1m above the base with an aggregate DBH of 600mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.3 Tree 3. *Callistemon viminalis*

This mature tree is located on the neighbouring property and it is approximately 8m tall with a canopy spread of 7m. It has a single trunk with a DBH of 260mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.4 Tree 4. *Melaleuca stypheloides*

This mature tree is located on the neighbouring property and it is approximately 11m tall with a canopy spread of 8m. It has a single trunk with a DBH of 480mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

3.5 Tree 5. *Alectryon coriaceus*

This mature tree is located on the neighbouring property and it is approximately 5m tall with a canopy spread of 3m. It has multiple co-dominant trunks from the base with an aggregate DBH of 200mm. This tree is in good health and condition with minimal deadwood and epicormic growth.

4.0 Impact of Development

4.1 Tree Protection Zone

Tree Protection Zones (TPZs) have been defined for the subject trees in order to define the encroachment of the proposed development in accordance with *AS4970-2009*. The TPZs required have been taken as a circular area with a radius 12 x the diameter at breast height of the tree. This requirement is in line with Australian Standard AS 4970-2009 Protection of Trees on Development Sites. This standard defines a maximum of 10% encroachment to be minimal encroachment. Any encroachment over 10% requires the site arborist to give consideration as to the viability of the tree due to the proposed development.

This Development Impact Assessment is based on Issue E drawings dated May 18 and the following assumptions and instructions provided by the Architect:

1. No retaining wall within the TPZ of the subject trees.
2. The Stormwater pit is to be moved from within the TPZ of Tree 3 to outside the TPZ.
3. The Rainwater tank is to be installed above ground and no excavation for pipework within the TPZ of the subject trees.
4. Total encroachment within the TPZ of the subject trees including over excavation for shoring etc is to be a maximum offset of 1m from the outside of the basement.
5. All excavation within the TPZ of Tree 2 for the permeable paving and sub base is to be carried out manually by means of an Air Knife. “Non

Destructive" methods such as high pressure water jet or sucker trunk are not permissible.

6. No roots 30mm or greater in diameter are to be damaged within the TPZ of the subject trees 2, 3, 4 or 5.

Tree no.	Species	TPZ Radius (m)	Encroachment (%)
1.	*Callistemon viminalis*	2.88	50
2.	*Alectryon coriaceus*	7.2	21
3.	*Callistemon viminalis*	3.12	0
4.	*Melaleuca stypheloides*	5.76	13
5.	*Alectryon coriaceus*	2.4	0

4.2 Development Impact

4.2.1. Tree 1 — *Callistemon viminalis*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed pedestrian footpath by 50% which is significantly greater than the minor encroachment as defined by AS 4970-2009. Due to the proposed pedestrian footpath, tis tree will not be viable to be retained and will be required to be removed.

4.2.2. Tree 2 — *Alectryon coriaceus*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 21% which is greater than the minor encroachment as defined by AS 4970-2009. This total encroachment is the overall footprint of the encroachment however the proposed construction methods include non destructive hand and air knife excavation and permeable paving which will reduce the impact on this tree. Based on these revised construction methods, this tree will remain viable to be retained.

4.2.3. Tree 3 — *Callistemon viminalis*

Based on instruction from the Architect that the stormwater pit and retaining walls are removed from within the TPZ of this tree, the Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will not be encroached by the proposed development and accordingly this tree will remain viable to be retained.

4.2.4. Tree 4 — *Melaleuca stypheloides*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will be encroached by the proposed development by 13% which is slightly greater than the minor encroachment as defined by AS 4970-2009. Based consideration under clause 3.3.4 of *AS4970-2009* of this species tolerance to root disturbance, this tree will remain viable to be retained. This assessment is based on a maximum encroachment within the TPZ based on a maximum offset from the basement of 1m.

4.2.5. Tree 5 *Alectryon coriaceus*

The Tree Protection Zone (TPZ) of this tree in accordance with *AS 4970-2009 Protection of Trees on Development Sites* will not be further encroached by the proposed development. This tree will be viable to be retained under the proposed development.

5.0 Recommendations

The subject trees are in good health and condition and are preserved by Penrith City Council Tree Preservation Order.

Trees 2, 3, 4 and 5 are located on the neighbouring property and are to be retained and protected.

The Tree Protection Zones (TPZ) of Tree 2 is encroached by the proposed construction and required earthworks by a major encroachment as defined by *AS4970-2009 Protection of Trees on Development Sites.* This total encroachment is the overall footprint of the encroachment however the proposed construction methods will reduce the impact on this tree. The TPZ of Tree 4 is encroached by slightly greater than a minor encroachment and will remain viable to be retained. The viability of the retention of Trees 2, 3 and 4 are conditional on the following:

- All excavation within the TPZ is to be carried out using non-destruction methods such as using an Air-Knife. High pressure water and Vacuum/Sucker Trucks are not suitable as the high pressure water will delaminate roots.
- No roots greater than 20mm to be cut or damaged within the TPZ of the subject trees.
- All excavation within the TPZ to be carried out under the supervision of site Arborist (AQF Level 5).
- Pavement design is to be permeable such as EcoTrihex to allow percolation of water and air and gaseous exchange within the TPZ.
- No retaining wall within the TPZ of the subject trees.
- The Stormwater pit is to be moved from within the TPZ of Tree 3 to outside the TPZ.
- The Rainwater tank is to be installed above ground and no excavation for pipework within the TPZ of the subject trees.
- Total encroachment within the TPZ of the subject trees including over excavation for shoring etc is to be a maximum offset of 1m from the outside of the basement.

The TPZ of Tree 1 is encroached by the proposed construction and required earthworks by a major encroachment as defined by AS4970-2009 Protection of Trees on Development Sites due to the proposed pedestrian footpath. This tree is not viable to be retained and will be required to be removed. We recommend that supplementary compensatory planting of two small native trees be carried out within the landscape plan.

All other trees are viable to be retained and are to be protected as defined below.

Recommendations for tree retention or removal are summarised as follows:

Tree no.	Species	Recommendations	Comments
6.	*Callistemon viminalis*	Remove	Not viable to be retained due to encroachment within the Tree Protection Zone by the proposed footpath. Recommend compensatory planting of 2 small native trees.
7.	*Alectryon coriaceus*	Retain	Viable to be retained based on construction methods outlined in 5.0.
8.	*Callistemon viminalis*	Retain	Viable to be retained based on construction methods outlined in 5.0.
9.	*Melaleuca stypheloides*	Retain	Viable to be retained based on construction methods outlined in 5.0.
10.	*Alectryon coriaceus*	Retain	Viable to be retained based on construction methods outlined in 5.0.

6.0 Pre-Construction Tree Protection Measures

6.1 General

All tree protection works shall be carried out before excavation, grading and site works commence. Tree protection works shall be inspected and approved by a Consulting Arborist meeting AQF Level 5 prior to construction works commencing.

Storage of materials, mixing of materials, vehicle parking, disposal of liquids, machinery repairs and refueling, site office and sheds, and the lighting of fires, stockpiling of soil, rubble or any debris shall not be carried out within the TPZ of existing trees. No backfilling shall occur within the TPZ of existing trees. Trees shall not be removed or lopped unless specific instruction is given in writing by the Superintendent.

6.2 Identification

All trees to be protected shall be clearly identified and all TPZs surveyed.

6.3 Protective Fence

Fencing is to be erected around existing trees to be retained. In addition to this protective fencing within the site, Protective Fencing is to be installed to the full extent of the TPZs within the site. This fencing is to be erected prior to any materials being brought on site or before any site, civil works or construction works commence. The fence shall enclose a sufficient area so as to prevent damage to the TPZ as defined on Appendix D Tree Protection Plan and as defined in 5.1 above. Fence to comprise 1800mm high chain wire mesh fixed to 50mm diameter Galvanised steel posts. Panels should be securely fixed top and bottom to avoid separation. No storage of building materials, tools, paint, fuel or contaminants and the like shall occur within the fenced area.

6.4 Mulching

Install mulch to the extent of all tree protection fencing. Use a leaf mulch conforming to AS 4454 which is free of deleterious and extraneous matter such as soil, weeds, sticks and stones and consisting of a minimum of 90% recycled content compliant with AS 4454 (1999) and AS 4419 (1998). All trees marked as to be removed on the proposed development are to be chipped and reused for this purpose. Place mulch evenly and to a depth of 100mm.

6.5 Signage

Prior to works commencing, tree protection signage is to be attached to each tree protection zone, displayed in a prominent position and the sign repeated at 10 metres intervals or closer where the fence changes direction. Each sign shall contain in a clearly legible form, the following information:

Tree Protection Zone.

- This fence has been installed to prevent damage to the trees and their growing environment both above and below ground and access is restricted.
- No Access within Tree Protection Zone
- The name, address, and telephone number of the developer.

The name and telephone number of the Site Arborist.

7.0 Site Management Issues

7.1 Soil Compaction

Plant and pedestrian traffic during the construction period will cause significant soil compaction. This will be exacerbated by increased water expected on these soils as result of adjacent construction and weather. Compaction of the soil within the TPZ will reduce the voids between soil peds or particles therefore will reduce the gaseous exchange capacity of the root system which will slow critical metabolic processes such as respiration which produces Adenosine Triphosphate (ATP) which provides energy for the photosynthesis, which in turn provides photosynthates such as glucose. These photosynthates provide the carbohydrates required for tree extension growth, girth expansion, reproduction and pest and disease resistance. No pedestrian or plant access is permissible to the TPZ.

7.2 Site Access

Sufficient access is required to enable efficient construction. It is essential to delineate access zones or corridors which will provide suitable access without damaging the existing trees to be retained or causing compaction to the root zone.

7.3 Excavation within Tree Protection Area

No excavation is to be carried out within the TPZs of retained trees without the permission and supervision of the site arborist (AQF5)

7.4 Possible Contamination / Storage of Materials

The construction site will require the use of many chemicals and materials that are possible contaminants which if not managed will pose a risk to the existing trees. These possible contaminants include fuels, herbicides, solvents and the like. A site specific

Environmental Management Plan shall be provided and this specific risk identified and addressed.

8.0 Tree Protection Measures During Construction

8.1 Maintenance of Pre-Construction Tree Protection Measures

The Pre-Construction Tree Protection Measures identified in 5.0 above are to be maintained in good and serviceable condition throughout the construction period.

8.2 Possible Contaminants

Do not store or otherwise place bulk materials and harmful materials under or near trees. Do not place spoil from excavations within the TPZs. Prevent wind-blown materials such as cement from harming trees. All possible contaminants are to be stored in a designated and appropriate area with secure chemical spill measures such as a bund in place.

8.3 Physical Damage

Prevent damage to tree. Do not attach stays, guys and the like to trees. No personnel, plant, machinery or materials are to be allowed within the tree protection fencing.

8.4 Compaction

No filling or compaction shall occur over tree roots zones within tree protection fenced areas. Where construction occurs close to or the TPZ of trees to be retained it shall be necessary to install protection to avoid compaction of the ground surface. This protection is to be planks supported clear of the ground fixed to scaffolding.

8.5 Trenching

No Trenching should be necessary within the TPZs or within tree protection fencing. No further trenching is to be carried out without the approval of the Superintendent. Should any further trenching be required within the TPZs identified, this work is to be carried out by hand and under the supervision of a qualified Arborist.

8.6 Irrigation/Watering

Contractor is to ensure that soil moisture levels are adequately maintained. Apply water at an appropriate rate suitable for the species during periods of little or no rainfall.

8.7 Site Sheds / Amenities/ Storage

Site sheds, site amenities, ablutions and site storage shall be in the area clear of all TPZ. Chemicals and potential contaminants are to be stored appropriately and this storage area is to be enclosed by a chemical spill bund to prevent the potential run off of contaminants in the event of a spillage or accident.

9.0 Environmental / Heritage/ Legislative Considerations

None of the subject trees are identified as threatened species or elements of endangered ecological communities within the Threatened Species Conservation Act 1995.

10.0 References

Mattheck, C. Breloer, K. 1993, The Body Language of Trees: A Handbook for Failure Analysis, 12th Impression 2010 The Stationery Office.
AS4970-2009 Protection of Trees on Development Sites: Standards Australia

11.0 Disclaimer

This Appraisal has been prepared for the exclusive use of the Client and Birds Tree Consultancy.
Birds Tree Consultancy accepts no responsibility for its use by other persons. The Client acknowledges that this Appraisal, and any opinions, advice or recommendations expressed or given in it, are based on the information supplied by the Client and on the data inspections, measurements and analysis carried out or obtained Birds Tree Consultancy and referred to in the Appraisal. The Client should rely on the Appraisal, and on its contents, only to that extent.

Every effort has been made in this report to include, assess and address all defects, structural weaknesses, instabilities and the like of the subject trees. All inspections were made from ground level using only visual means and no intrusive or destructive means of inspection were used. For many structural defects such as decay and inclusions, internal inspection is required by means of Resistograph or similar. No such investigation has been made in this case. Trees are living organisms and are subject to failure through a variety of causes not able to be identified by means of this inspection and report.

Appendix A - Tree Inspection Data

Birds Tree Consultancy

Consulting Arborist• Project Management • Horticultural Consultancy • Landscape Management

Inspection Data 29-May-18

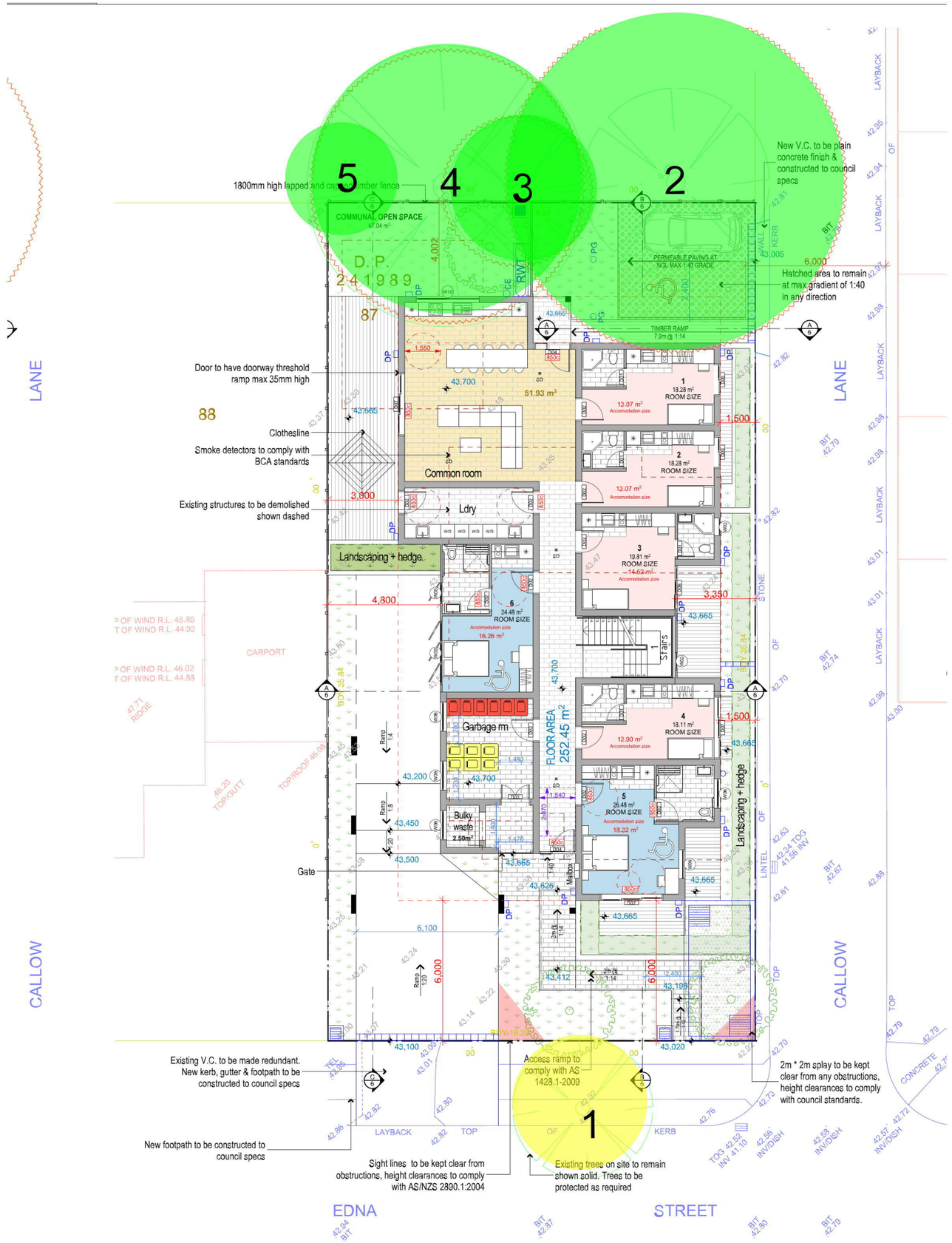
1 Edna Road Kingswood

Tree no.	Species	Height (m)	Spread(m)	DBH (mm)	TPZ Radius (m)	Maturity	Trunk (single, twin, multiple @)	Trunk lean	Form/Crown shape	Branching Habit	Crown Distribution	Stability	Branching Structure	Pruning History
1	Callistemon viminalis	4.2	4	240	2.88	Mature	Multiple @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence
2	Alectryon coriaceus	11	8	600	7.2	Mature	Multiple (5) @ 1000	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence
3	Callistemon viminalis	8	7	260	3.12	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence
4	Melaleuca stypheloides	11	8	480	5.76	Mature	Single	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence
5	Alectryon coriaceus	5	3	200	2.4	Mature	Multiple @ base	NIL	Normal	Normal	Balanced	Stable	Stable	No evidence

Tree no.	Species	Defects	Damage	Overall Health & Vigour	Canopy Density	Foliage	Deadwood	Epicormic Growth	Pest Infestation	Disease	Life expectancy	Env. & Landcape significance	Retention Value	Notes/Comments
1	Callistemon viminalis	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	
2	Alectryon coriaceus	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	1m from fence
3	Callistemon viminalis	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	
4	Melaleuca stypheloides	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	
5	Alectryon coriaceus	Nil	Nil	Good	Normal	Normal	<5%	<5%	No evidence	No evidence	15-40y	High	High	

Appendix B Tree Location Plans

Tree Protection Plans



Legend

- Tree to be Retained and Protected
- Tree not viable to be retained due to proposed development / Modifications Required
- Tree to be Removed or Exempt from Parramatta TPO
- Tree Protection Zone (TPZ) in accordance with AS4970-2009

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Project: 1 Edna Street Kingswood
Client: Designcorp
DWG: A01 REV C
Plan: Tree Location Plan
Date: 5 July 2018 Scale : 1:200 @ A3

Legend

- Tree to be Retained and Protected
- Tree not viable to be retained due to proposed development / Modifications Required
- Tree to be Removed or Exempt from Parramatta TPO
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Project: 1 Edna Street Kingswood
Client: Designcorp
DWG: A02 REV C
Plan: Tree Protection Zone Plan
Date: 5 July 2018 Scale : 1:200 @ A3