ALLIED TREE
CONSULTANCY
Level 5 and 8 Arboriculturist

Arboricultural Impact Assessment Report

For the site address

Lots 3 and 4 (D.P. 35317),
No. 36-38 Birdwood Avenue,
PAGEWOOD, NSW

Prepared for

NSW Land and Housing Corporation,
Department of Planning, Industry and Environment

AUTHOR

Warwick Varley and Geoff Beisler

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1.0 Introduction

1.1 *Allied Tree Consultancy* (ATC) has been commissioned by *NSW Land and Housing Corporation* to prepare an Arboricultural Impact Assessment for the development proposal at No. 36-40 Birdwood Avenue, Pagewood. This proposal includes the construction of a seniors housing development. This report includes seventeen (17) trees located on, and adjacent to the lots, and discusses the viability of these trees based on the proposed works.

1.2 This report will address for these trees, the:

- species' identification, location, dimensions, and condition;
- SULE (Safe Useful Life Expectancy) and STARS (Significance of a Tree Assessment Rating System) rating;
- discussion and impact of the proposed works on each tree;
- tree protection zones and protection specifications for trees recommended for retention.

2.0 Standards

2.1 Allied Tree Consultancy provides an ethical and unbiased approach to all assignments, possessing no association with private utility arboriculture or organisations that may reflect a conflict of interest.

2.2 This report must be made available to all contractors during the tendering process so that any cost associated with the required works for the protection of trees can be accommodated.

2.3 It is the responsibility of the project manager to provide the requirements outlined in this report relative to the Protection Zones, Measures (Section 7.0) and Specifications (Section 8.0) to all contractors associated with the project before the initiation of work.

2.4 All tree-related work outlined in this report is to be conducted in accordance with the:

- Australian Standard – AS4373; Pruning of Amenity Trees.
- Guide to Managing Risks of Tree Trimming and Removal Work[1].
- All tree works must be carried out at a tertiary level (minimum Certificate-level 3) qualified and experienced (minimum five years) arboriculturist.
- For any works in the vicinity of electrical lines, the arboriculturist must possess the ISSC26 endorsement (Interim guide for operating cranes and plant in proximity to overhead powerlines).

[1] Safe Work Australia; July 2016; Guide to Managing Risks of Tree Trimming and Removal Work, Australia

2.5 As a minimum requirement, all trees recommended for retention in this report must have removed all dead, diseased, and crossing limbs and branch stubs to be pruned to the branch collar. This work must comply with the local government tree policy (Bayside Council) and Section 2.4.

2.6 Any tree stock subject to conditions for works carried out in this report must be supplied by a registered Nursery that adheres to the AS 2303; 2015[2].

- All tree stock must be of at least 'Advanced' size (minimum 75lt) unless otherwise requested.
- All tree stock requested must be planted with adequate protection. This may include tree guards (protect stem and crown) and if planted in a lawn area, a suitable barrier (planter ring) of an area, at least, $1m^2$ to prevent grass from growing within the area adjacent to the stem.

3.0 Disclosure Statement

Trees are living organisms and, for this reason, possess natural variability. This cannot be controlled. However, risks associated with trees can be managed. An arborist cannot guarantee that a tree will be safe under all circumstances, nor predict the time when a tree will fail. To live or work near a tree involves some degree of risk, and this evaluation does not preclude all the possibilities of failure.

4.0 Methodology

4.1 The following tree assessment was undertaken using criteria based on the guidelines issued by the International Society of Arboriculture.

4.2 The format of the report is summarised below;

4.2.1 **Plan 1;** Tree Location Relative to Site: This is an unscaled plan reproduced from the Survey Plan as referenced in Section 4.4.1, depicting the area of assessment.

4.2.2 **Table 1;** This table compiles the tree species, dimensions**,** brief assessment (history, structure, pest, disease or any other variables subject to the tree), significance, allocation of the zones of protection (i.e., Tree Protection Zone[3] ;TPZ and Structural Root Zone; SRZ) for each tree illustrated in Plan 1, Section 5.0. All measurements are in metres.

[2] Australian Standard; 2015, AS2303, Tree stock for landscape use, Australia

[3] Australian Standard, 4970; 2009 – Protection of Trees on Development Sites, Australia

4.2.3 Discussion relating to the site assessment and proposed works regarding the trees.

4.2.4 Protection Specification; Section 8.0 details the requirements for that area designated as the Tree Protection Zone (TPZ), for those trees recommended for retention.

4.3 The opinions expressed in this report, and the material, upon which they are based, were obtained from the following process and data supplied:

4.3.1 Site assessment on the 13th May 2021 using the method of the Visual Tree Assessment[4]. This has included a Level 2 risk assessment, being a *Basic Assessment*[5]. The assessment has been conducted by Geoff Beisler[6] on behalf of *Allied Tree Consultancy*.

4.3.2 Tree numbering has been retained for consistency and based on the prior arboricultural assessment/report[7] for the lot.

4.3.3 Trees included in this report are those that conform to the description of a prescribed tree by the local government policy.

4.3.4 All measurements, unless specified otherwise are taken from the tree centre.

4.3.5 Raw data from the preliminary assessment including the specimen's dimensions was compiled by the use of a diameter tape, height clinometer, angle finder, compass, steel probes, Teflon hammer, binoculars and recording instruments.

4.4 Documentation provided

The following documentation has been provided to Allied Tree Consultancy and utilised within the report.

4.4.1 Surveyor

Drawn by *Cardno, Hard and Forester*
Date: 21 February 2014
Reference: 116793001, Rev.00
Drawing No: Sheet 1 to 6
Note 1: See Section 4.5.1

[4] Mattheck, C. Breloer, H.,1994, The Body Language of Trees – A handbook for failure analysis The Stationary Office, London
[5] Dunster J.A., 2013, Tree Risk Assessment Manual, International Society of Arboriculture, 2013, USA
[6] Consulting Arborist, Diploma of Arboriculture (level 5)
[7] Redgum Horticulture, 8 April 2021, Arboricultural Preliminary Assessment, Ref. 6821

4.4.2 Design

Drawn by *CKDS P/L*
Date: 23 February 2023
Reference: 21160
Drawing No: A-0001 - A-8004, Issue B

4.4.3 Engineering (Stormwater)

Drawn by *Northrop P/L*
Date: 17 January 2023
Reference: NL213392
Drawing No: DA-C01.01 – DA-C04.01, Rev. 2

4.5 Limitations of the assessment/discussion process

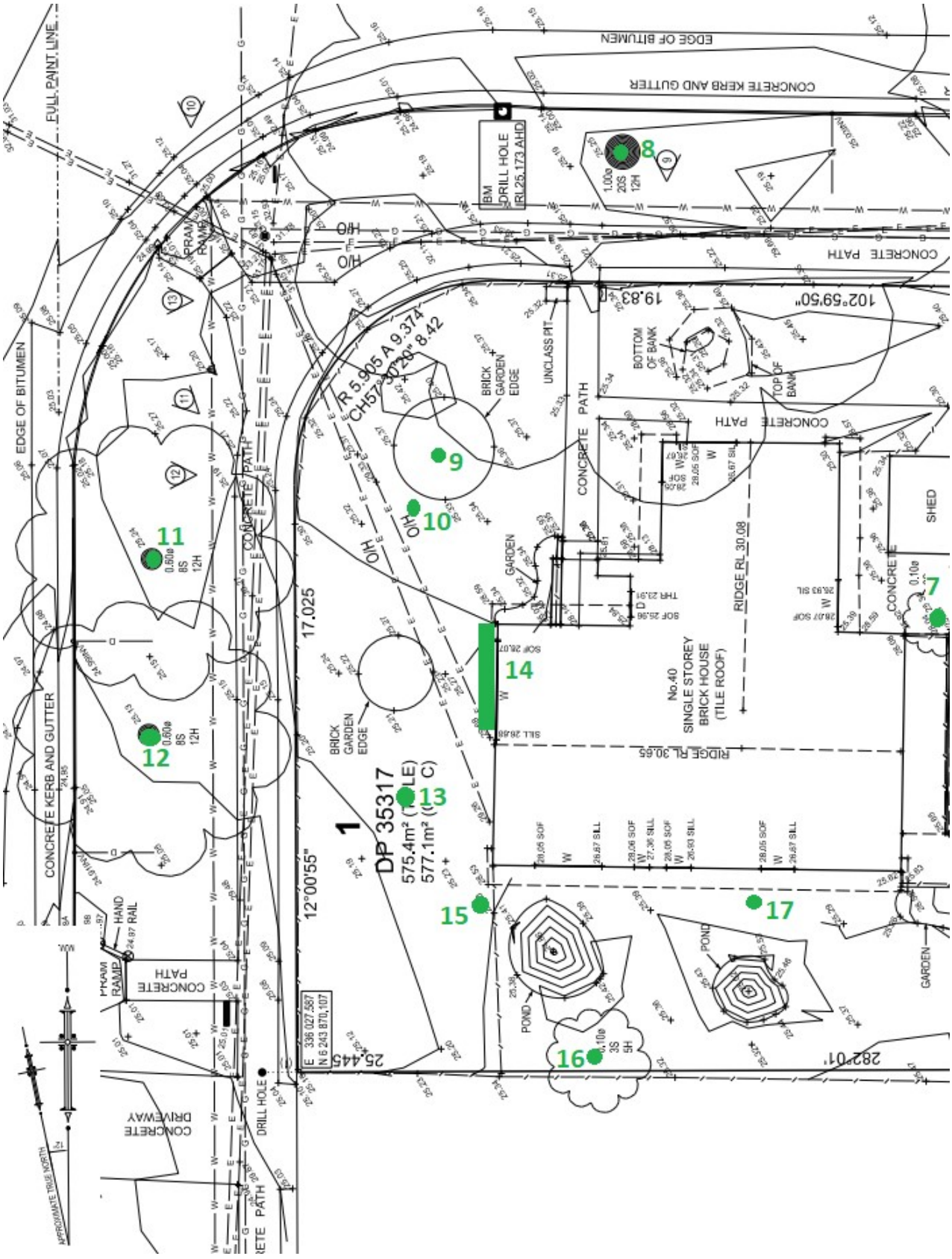
4.5.1 Trees No. 10, 13-15 and 17 have been omitted from the plans provided, however, are required for inclusion because they conform to the definition of a prescribed tree within the local government tree policy. The tree location has been plotted onto the Plan 1 by *Allied Tree Consultancy*. The tree location was established by measuring from known points and scaling onto the drawing. *Allied Tree Consultancy* is not a registered surveyor and, however, the accuracy of the survey is attempted; the true position of the trees may marginally deviate. Any such deviation provides the potential for changing the actual impact (encroachment) provided to a tree.

4.5.2 The assessment has considered only those target zones that are apparent to the author and the visually apparent tree conditions, during the time of assessment.

4.5.3 Any tree regardless of apparent defects would fail if the forces applied to exceed the strength of the tree or its parts, for example, extreme storm conditions.

4.5.4 The assessment has been limited to that part of the tree which is visible, existing from the ground level to the crown. Root decay can exist and in some circumstances provide no symptoms of the presence. This assessment responds to all the symptoms provided by a tree, however, cannot provide a conclusive recommendation regarding any tree that may have extensive root decay that leads to windthrow without the appropriate symptoms.

5.0 Plan 1; Area of assessment illustrating tree location



Not to scale

Source: Adapted from *Cardno, Hard and Forester,* Plan 1*,* see Section 4.4.1

5.1 Plan 2; Area of assessment illustrating tree location

Not to scale
Trees labelled A and B: see Section 7.0.
Note: Tree numbering: see Section 4.3.2.
Source: Adapted from *Cardno, Hard and Forester,* Plan 2*,* see Section 4.4.1

6.0 Table 1 – Tree Species Data

Terminology/references provided in Appendix A.

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
1	*Cinnamomum camphora* Camphor Laurel	10	1.05[B,C]	14 x 14	M	D	Sym	A	**1B**	**Medium**	**12.60**	**3.38**
Assessment This tree presents as typical for the species. Crown ingress into the lot of No. 38, is approximately 7500mm between 1.5m and 8m											**DEVELOPMENT IMPACT** See Section 7.1.3	
2	*Photinia robusta* Photinia	4	0.19 0.19[B]	5 x 6	M	I	N	A	**2A**	**Medium**	**3.22**	**1.91**
Assessment This tree presents as typical for the species.											**DEVELOPMENT IMPACT** See Section 7.1.2	
3	*Araucaria columnaris* Cook Pine	17	0.71	8 x 8	M	D	Sym	A	**1B**	**Medium**	**8.52**	**2.87**
Assessment This tree presents as typical for the species. Minor conflict is evident with the roof of the adjacent dwelling. Codominant at 4m.											**DEVELOPMENT IMPACT** See Section 7.1.2	
4	*Grevillia robusta* Silky Oak	11 (Average)	0.27 0.44[C]	7 x 6 (Each)	M	C	S	A	**2A**	**Low**	**6.19**	**2.51**
Assessment This is two trees, side by side, as indicated in the survey supplied. The more northerly of the two appears to have previously been lopped. Vine is encroaching, a cactus is conflicting.											**DEVELOPMENT IMPACT** See Section 7.1.1	
5	*Cupressus sempervirens* Mediterranean Cypress[A]	10	0.44[B]	4 x 4	M	D	Sym	A	**2A**	**Medium**	**5.28**	**2.34**

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
Assessment This tree presents as typical for the species.											**DEVELOPMENT IMPACT** See Section 7.1.3	
6	*Callistemon viminalis* Weeping Red Bottlebrush	5	0.70[B,C]	6 x 7	M	D	Sym	A	**2A**	**Medium**	**8.40**	**2.85**
Assessment This council owned street tree presents as typical for the species. The southern side has been lopped for service line clearance.											**DEVELOPMENT IMPACT** See Section 7.1.2	
7	*Grevillia robusta* Silky Oak	10	0.29[C]	5 x 5	M	D	Sym	A	**3B**	**Low**	**3.48**	**1.97**
Assessment This tree presents as typical for the species, however is conflicting with the adjacent dwelling- this tree is not compatible with retention in this location.											**DEVELOPMENT IMPACT** See Section 7.1.1	
8	*Lophostemon confertus* Brush Box	9	0.77[B]	8 x 9	M	D	Sym	A	**1B**	**Medium**	**9.24**	**2.97**
Assessment This council owned street tree presents as typical for the species. Excessive crown lift pruning has been undertaken for service line clearance. An inclusion is located at 1m, the bark is included.											**DEVELOPMENT IMPACT** See Section 7.1.1	
9	*Grevillia robusta* Silky Oak	5	0.18	4 x 4	Y	C	Sym	A	**2D**	**Low**	**2.16**	**1.61**
Assessment This tree presents as typical for the species, however exudate on the stem suggests borer infestation.											**DEVELOPMENT IMPACT** See Section 7.1.1	
10	*Casuarina glauca* Swamp Sheoak	7	0.10	1 x 1	Y	C	Sym	A	**3B**	**Low**	**1.20**	**1.26**
Assessment This is two trees side by side. The more westerly is located immediately adjacent the house, and as such is not suited to retention. The easterly tree is composed of multiple thin stems, and appears to be coppiced regrowth; it is growing into/ conflicting with the service line above, further suggesting previous removal at the base. These two trees are not compatible with retention in their locations.											**DEVELOPMENT IMPACT** See Section 7.1.1	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
11	*Casuarina cunninghamiana* River Oak[A]	11	0.45	9 x 7	M	C	NW	A,B	**2D**	**Medium**	**5.40**	**2.37**
Assessment This council owned street tree presents as typical for the species, however some twiggy decline is evident, western side.											**DEVELOPMENT IMPACT** See Section 7.1.1	
12	*Casuarina cunninghamiana* River Oak[A]	14	0.49	8 x 9	M	C	Sym	A	**1B**	**Medium**	**5.88**	**2.45**
Assessment This council owned street tree presents as typical for the species.											**DEVELOPMENT IMPACT** See Section 7.1.1	
13	*Cinnamomum camphora* Camphor Laurel	5	0.14[B,C]	3 x 3	Y	C	Sym	A	**3B**	**Low**	**1.68**	**1.45**
Assessment This juvenile tree is located approximately 1900mm from the dwelling, and shall conflict with the adjacent dwelling and the service lines to west. This tree is not compatible with retention in this location.											**DEVELOPMENT IMPACT** See Section 7.1.1	
14	*Grevillia robusta* Silky Oak	7	0.09	1 x 1	Y	C	Sym	A	**3B**	**Low**	**1.08**	**1.20**
Assessment This is a linear of three specimens, located immediately adjacent the dwelling. They are impacting the dwelling and the service lines/ connections to dwelling. These trees are not compatible with retention in their locations.											**DEVELOPMENT IMPACT** See Section 7.1.1	
15	*Eucalyptus tereticornis* Forest Red Gum[A]	7	0.26[C]	6 x 6	Y	D	Sym	A	**3D**	**Low**	**3.12**	**1.88**
Assessment This tree offered insufficient vegetative material to confirm the identification. Furthermore vine is encroaching, and thick vegetation limits the assessment. This tree is impacting the dwelling, and will impact service lines. .. This tree would require significant and ongoing crown modifications to mature in this location, and as such appears to be retainable only in the short-medium term as best.											**DEVELOPMENT IMPACT** See Section 7.1.1	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
16	*Grevillia robusta* Silky Oak	9	0.29[C]	4 x 5	M	C	Sym	A	**2A**	**Medium**	**3.48**	**1.97**
Assessment This tree presents as typical for the species. Greatly limited assessment due to lack of access.											**DEVELOPMENT IMPACT** See Section 7.1.1	
17	*Grevillia robusta* Silky Oak	7	0.21[C]	5 x 4	M	D	Sym	A	**2D**	**Low**	**2.52**	**1.72**
Assessment This tree presents as typical for the species, however conflict with the adjacent dwelling is inevitable- this tree is not with retention in this location.											**DEVELOPMENT IMPACT** See Section 7.1.1	

A. Incomplete identification of species due to insufficiently available plant material
B. Diameter taken below 1.4m due to low stem bifurcation
C. Estimate due to the overgrown area and/or limited access
D. Deciduous species, void of foliage at the time of assessment
E. Level 3 assessment required to determine the accurate rating

7.0 Site Assessment

The area of assessment comprises the lots, those being No.s 36-40 Birdwood Avenue. Each lot is described relative to the landscape, structures and trees.

No. 36 Birdwood Avenue; this residential lot appears to have a slight gradient, southerly aspect. Neighbouring palms are located to the south, however not located on the drawing supplied. As the monocot root system combined with required setbacks indicates minimal TPZ could be impacted, these have not been included. The single-story dwellings are located centrally on the lot. A detached garage is located to the southwest of the dwelling, serviced by a concrete driveway.

No. 38 Birdwood Avenue; this residential lot appears to have a slight gradient, southerly aspect. The single-story dwelling is located centrally on the lot. The concrete driveway located adjacent to the dwelling (eastern side) terminates- no garage is present. The concrete footpath servicing the rear of the dwelling, immediately adjacent to tree No. 3 presents degradation/ cracking- this appears to be in relation o the root mass/ SRZ of this tree.

No. 40 Birdwood Avenue; this lot is unmaintained and has extensive weed stock and dense vegetation, this combined with the lack of access has greatly limited the assessment. The lot appears level. The single-story dwelling is located centrally on the lot. Vehicular access to this corner lot is from Birdwood avenue- this services a carport-type structure, on the eastern side of the dwelling. Multiple specimens less than 3m in height are located on the lot. Multiple specimens are in conflict with the dwelling and associated infrastructure, and such do not appear to be retainable in their locations. Two adjacent Silky Oaks (*Grevilia robusta*) located in the southeastern corner, have both been labeled as tree No. 4, as this is how they were indicated on the drawing supplied.

The trees labeled as A and B, which have been included on the survey drawing (Plan 1) however excluded from this report because of the failure to conform to the description of a prescribed tree based on the Bayside City Councils Development Control Plan.

Tree A: trees located on the survey however are absent

Tree B: trees less than 3m in height.

7.1 Proposed development

The proposed development consists of the demolition of existing site structures and the construction of a seniors housing development, drive access, and drainage infrastructure. The proposed design is limited to lots, No. 36-38 Birdwood Avenue.

This application has been subject to a Preliminary Arboricultural Assessment Report for the purpose of identifying trees that are considered significant for the intent of retaining and designing around. This report has included the lots, No. 36-40 Birdwood Avenue.

Neighbours trees: Trees No. 6, 8, 11 and 12 are located in the adjacent lot, therefore constitute ownership by a second party. Any proposed works within the zones of protection for these trees must not adversely impact these zones, and the trees shall be retained and protected from any site works unless permission for removal is granted by the tree owner and Bayside Council.

The calculations included in the following discussion have not considered;

- subsurface utilities that have not been included in the design,
- Work methods related to subsurface utilities, for example concrete encasing or replacement of existing lines
- or work methods related to construction (stockpiling, site sheds, scaffolding) unless otherwise specified.
- Public infrastructure including footpaths, new kerb/guttering, subsurface utilities on Birdwood Avenue.

These may also increase the encroachment and tree impact and therefore the opportunity for tree retention.

This report discusses the impact of the proposed design on the trees. Seventeen (17) trees have been listed within this report based upon the vicinity of the proposed works. This has included any tree where any part of the zones of protection; Tree Protection Zone (TPZ) and Structural Root Zone (SRZ), encroach into the area proposed for work. Recommendations based on the tree significance and condition, together with the impact on these trees regarding the proposed development (based on the documents contained in Section 4.4) and mitigation where available follow.

7.1.1 Trees and zones of protection (TPZ/SRZ) outside of the proposed design

Trees No. 4, and 7-17.

None of the proposed works conflict with the location of these trees or respective zones of protection. These trees can be retained without impact by the proposed design.

7.1.2 Trees directly conflicting with the design

Trees No. 2, 3 and 6

These trees are located in the footprint of the proposed design and would require removal based on this premise alone. The conflict is summarised as follows;

Trees No. 2; within the footprint of the proposed bio basin (stormwater).
Tree No. 3; within the footprint of the proposed building
Tree No. 6; within the footprint of the proposed crossover

7.1.3 Trees subject to a major encroachment

Trees No. 1 and 5

These trees are not directly located in the footprint of the proposed design, however, are located close and adjacent to the design footprint and subject to a *major encroachment*, that is, in excess of 10% of the TPZ. The extent and type of encroachment for each tree are discussed and the relative implications.

Tree No. 1: Encroachment: 32%; based on drawing CSK01 (1), the encroachment consists of excavation for the stormwater and building design. The building design offers a major encroachment for which the tree could be retained. Although the site limitations have assigned the stormwater infrastructure to an area close to the tree, for which the excavation required for the Bio basin and infiltration pit, significantly increases the encroachment to an extent that the impact on the SRZ will not allow for the long-term viability of the tree. In addition, pruning is required to crown lift the tree to allow for parking, although the works for the stormwater will require an increased pruning to allow for the practical construction of these structures, and in turn, refer to an accumulative encroachment to the impact.

Tree No. 5: Encroachment: 29%; based on drawing 1101, the encroachment is divided between the retaining wall (12 percentage points) and the concrete pathway servicing the design (17 percentage points). These structures reside within the SRZ, and this will present excessive root removal (TPZ and SRZ) that could not sustain the tree. The existing design will not accommodate this tree.

7.2 Compensatory Planting

Based upon the tree loss relative to the existing tree number and in particular impact on the streetscape. Compensatory planting is recommended to be included in the landscape plan. At least six (6) trees are recommended to be included within the landscape plan for this lot. The tree species chosen must produce a mature height of at least 10m. The stock must be of at least 'Advanced' size (minimum 100 lt) and supplied by a registered Nursery that adheres to Australian Standard 2303[8]. Trees must be planted with adequate protection. This may include tree guards (protect stem and crown) and if planted in a lawn area, a suitable barrier (planter ring) of an area at least $1m^2$ to prevent grass from growing within the area adjacent to the stem.

[8] Standards Australia, AS 2303: 2018, Tree stock for landscape use, Australia

7.3 Sub-surface utilities

No drawings have been provided for the proposed route of sub-surface utilities, other than stormwater. Any trenching, other than what has been allowed for should be avoided within the area of the TPZ's for any tree nominated for retention. Any proposed route shall be re-routed outside of the TPZ. Under boring may be required if a limitation for the route of a service is restricted to an area that falls within the TPZ from any tree. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

7.4 Protection measures

Based on the loss of all trees within the area of development, that is No. 36-38 Birdwood Avenue, no protection measure will be required. All surrounding trees occur sufficient distance from the works proposed to be unaffected by the development of No. 36-38.

8.0 Protection Specification

The retention and protection of these trees requires the remaining Tree Protection Zone (TPZ) not subject to encroachment to conform to the conditions outlined below. These conditions provide the limitations of work permitted within the area of the Tree Protection Zone (TPZ) and must be adhered to unless otherwise stated.

Any engineering drawings issued as part of the construction certificate must conform with these requirements.

1. Soil levels within the TPZ must remain the same. Any excavation within the TPZ must have been previously specified and allowed for by the project arborist:

   a) So it does not alter the drainage to the tree.

   b) Under specified circumstances,

   - Added fill soil does not exceed 100mm in depth over the natural grade. Construction methodologies exist that can allow grade increases in excess of 100mm, via the use of an impervious cover, an approved permeable material or permanent aeration system or other approved methods.

   - Excavation cannot exceed a depth of more than 50mm within the area of the TPZ, not including the SRZ. The grade within the SRZ cannot be reduced without the consent from a project arborist.

2. No form of material or structure, solid or liquid, is to be stored or disposed of within the TPZ.

3. No lighting of fires is permitted within the TPZ.

4. All drainage runoff, sediment, concrete, mortar slurry, paints, washings, toilet effluent, petroleum products, and any other toxic wastes must be prevented from entering the TPZ.

5. No activity that will cause excessive soil compaction is permitted within the TPZ. That is, machinery, excavators, etc. must refrain from entering the area of the TPZ unless measures have been taken, in consultation with the project arborist.

6. No site sheds, amenities or similar site structures are permitted to be located or extend into the area of the TPZ unless the project arborist provides prior consent.

7. No form of construction work or related activity such as the mixing of concrete, cutting, grinding, generator storage or cleaning of tools is permitted within the TPZ.

8. No part of any tree may be used as an anchorage point, nor should any noticeboard, telephone cable, rope, guy, framework, etc. be attached to any part of a tree.

9. (a) All excavation work within the TPZ will utilise methods to preserve root systems intact and undamaged. Examples of methods permitted are by hand tools, hydraulic, or pneumatic air excavation technology.

   (b) Any root unearthed which is less than 50mm in diameter must be cleanly cut and dusted with a fungicide, and not allowed to dry out, with minimum exposure to the air as possible.

   (c) Any root unearthed which is greater than 50mm in diameter must be located regarding their directional spread and potential impact. A project arborist will be required to assess the situation and determine future action regarding retaining the tree in a healthy state.

9.0 Summary of tree impact by design

The proposed development consists of the demolition of existing site structures and the construction of a seniors housing development, drive access, and drainage infrastructure. The proposed design is limited to lots, No. 36-38 Birdwood Avenue. Based on the design supplied, the following summary provides the impacts imposed on the trees included in this report.

9.1 Trees to be retained

Trees No. 4, and 7-17

These trees are not adversely impacted by the design, that is, they conform to an acceptable encroachment based on the nominated zones of protection (TPZ, SRZ) and the requirements of the Protection Specification, Section 8.0. The proposed design does not adversely affect these trees. These trees can be retained.

9.2 Trees that require removal

Trees No. 1, 2, 3, 5 and 6

The proposed design will conflict with the location of these trees and they are unable to be retained based on the design. These trees will require removal to accommodate the design, otherwise the design amended to accommodate any single tree.

9.3 Compensatory Planting

Compensatory planting is recommended to be included within the landscape plan. At least six (6) trees are recommended to be included within the landscape plan for this lot. The requirements of Section 7.2 shall be accommodated. .

9.4 Sub-surface utilities

No drawings have been provided for the proposed route of sub-surface utilities, other than stormwater. Any trenching, other than what has been allowed for should be avoided within the area of the TPZ's for any tree nominated for retention. Any proposed route shall be re-routed outside of the TPZ. Under boring may be required if a limitation for the route of a service is restricted to an area that falls within the TPZ from any tree. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

The opinions expressed in this report by the author have been provided within the capacity of a Consulting Arborist. Any further explanation or details can be provided by contacting the author.

Assessed and Prepared by Geoff Beisler
Consulting Arborist
Level 5 Arborist
ISA Tree Risk Assessment Qualification

Prepared and checked by Warwick Varley
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ISA Tree Risk Assessment Qualification
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10.0 Appendix A- Terminology Defined

Height
Is a measure of the vertical distance from the average ground level around the root crown to the top surface of the crown, and on palms - to the apical growth point.

DBH
Diameter at Breast Height – being the stem diameter in meters, measured at 1.4m from ground level, including the thickness of the bark.; Mult. refers to multiple stems, that is in excess of 4 stems.

Crown Spread
A two-dimension linear measurement (in metres) of the crown plan. The first figure is the north-south span, the second being the east-west measurement.

Age
Is the estimate of the specimen's age based upon the expected lifespan of the species. This is divided into three stages.

Young (Y)	Trees less than 20% of life expectancy.
Mature (M)	Trees aged between 20% to 80% life expectancy.
Over-mature (O)	Trees aged over 80% of life expectancy with probable symptoms of senescence.

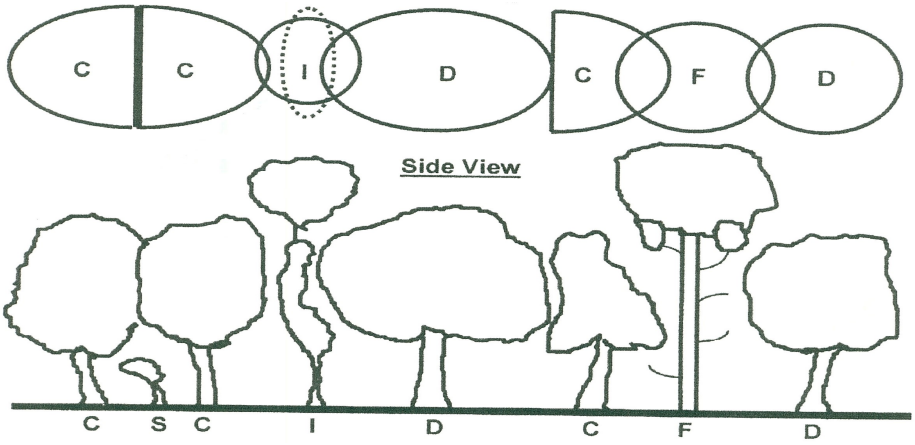
Crown Aspect
In relation to the root crown, this refers to the aspect the majority of the crown resides in. This will be either termed Symmetrical (Sym.) where the centre of the crown resides over the root crown or the cardinal direction the centre of the crown is biased towards, being either North (N), South (S), East (E) or West (W).

Vitality Rating
Is a rating of the health of the tree, irrespective and independent of the structural integrity, and defined by the 'ability for a tree to sustain its life processes' ((Draper, Richards, 2009). This is divided between three variables, and based on the assessment of symptoms including, but not limited to; leaf size, colour, crown density, woundwood development, adaptive growth formation, and epicormic growth.
A: Normal vitality, typical for the species
B: Below average vitality, possibly temporary loss of health, partial symptoms.
C: Poor vitality; obvious decline, potentially irreversible

Crown Class
Is the differing crown habits as influenced by the external variables within the surrounding environment. They are:

D	– *Dominant*	Crown is receiving uninterrupted light from above and sides, also known as emergent.
C	– *Codominant*	Crown is receiving light from above and one side of the crown.
I	– *Intermediate*	Crown is receiving light from above but not the sides of the crown.
S	– *Suppressed*	Crown has been shadowed by the surrounding elements and receives no light from above or sides.
F	– *Forest*	Characterised by an erect, straight stem (usually excurrent) with little stem taper and virtually no branching over the majority of the stem except for the top of the tree which has a small concentrated branch structure making up the crown.

Top View



D C, I & S, and side view, after (Matheny, N. & Clark, J. R. 1998, Trees Development, Published by International Society of Arboriculture, P.O. Box 3129, Champaign IL 61826-3129 USA, p.20, adapted from the Hazard Tree Assessment Program, Recreation and Park Department, City of San Francisco, California).

Levels of assessment

Level 1: Limited visual: a visual tree assessment to manage large populations of trees within a limited period and in order to identify obvious faults which would be considered imminent.

Level 2: Basic assessment: a standard performed assessment providing for a detailed visual assessment including all parts of the tree and surrounding environment and via the use of simple tools.

Level 3: Advanced assessment: specific type assessments conducted by either arborist who specialise with specific areas of assessment or via the use of specialised equipment. For example, aerial assessment by use of an EWP or rope/harness, or decay detection equipment.

TPZ; Tree Protection Zone

Is an area of protection required for maintaining the trees vitality and long-term viability. Measured in meters as a radius from the trees centre. The requirements of this zone are outlined within the Protection Specification, Section 8.0, and are to be adhered to unless otherwise stated.

The size of the Tree Protection Zone (TPZ) has been calculated from the *Australian Standard, 4970; 2009* – Protection of Trees on Development Sites

The TPZ does not provide the limit of root extension, however, offers an area of the root zone that requires predominate protection from development works. The allocated TPZ can be modified by some circumstances; however will require compensation equivalent to the area loss, elsewhere and adjacent to the TPZ.

SRZ; Structural Root Zone

Is the area around the tree containing the woody roots necessary for stability. Measured in meters as a radius from the trees centre. The requirements of this zone are outlined within the Protection Specification, Section 8.0, and are to be adhered to unless otherwise stated.

Protection Measures

These are required for the protection of trees during demolition/construction activities.
Protective barriers are required to be installed before the initiation of demolition and/or construction and are to be maintained up to the time of landscaping. Samples of the recommended protection measures are illustrated in Appendix B.

All other definitions are referenced from;

Draper D.B., Richards P.A., 2009, Dictionary for Managing Trees in Urban Environments
CSIRO Pub., Australia

Significance Rating, Significance of a Tree Assessment Rating System (S.T.A.R.S), IACA, 2010[9]

Tree Significance – Assessment Criteria

1. High Significance in landscape

- The tree is in good condition and good vitality;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions.

2. Medium Significance in landscape

- The tree is in fair-good condition and good or low vitality;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ.

3. Low Significance in landscape

- The tree is in fair-poor condition and good or low vitality;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences,

[9] IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.
Environmental Pest / Noxious Weed Species
- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.
Hazardous/Irreversible Decline
- The tree is structurally unsound and/or unstable and is considered potentially dangerous, - The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short-term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g.

Table 3; Tree Retention Value – Priority Matrix.

		Significance				
		1. High Significance in Landscape	**2.** Medium Significance in Landscape	**3.** Low Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long **>40 years**					
	2. Medium **15-40 Years**					
	3. Short **<1-15 Years**					
	Dead					

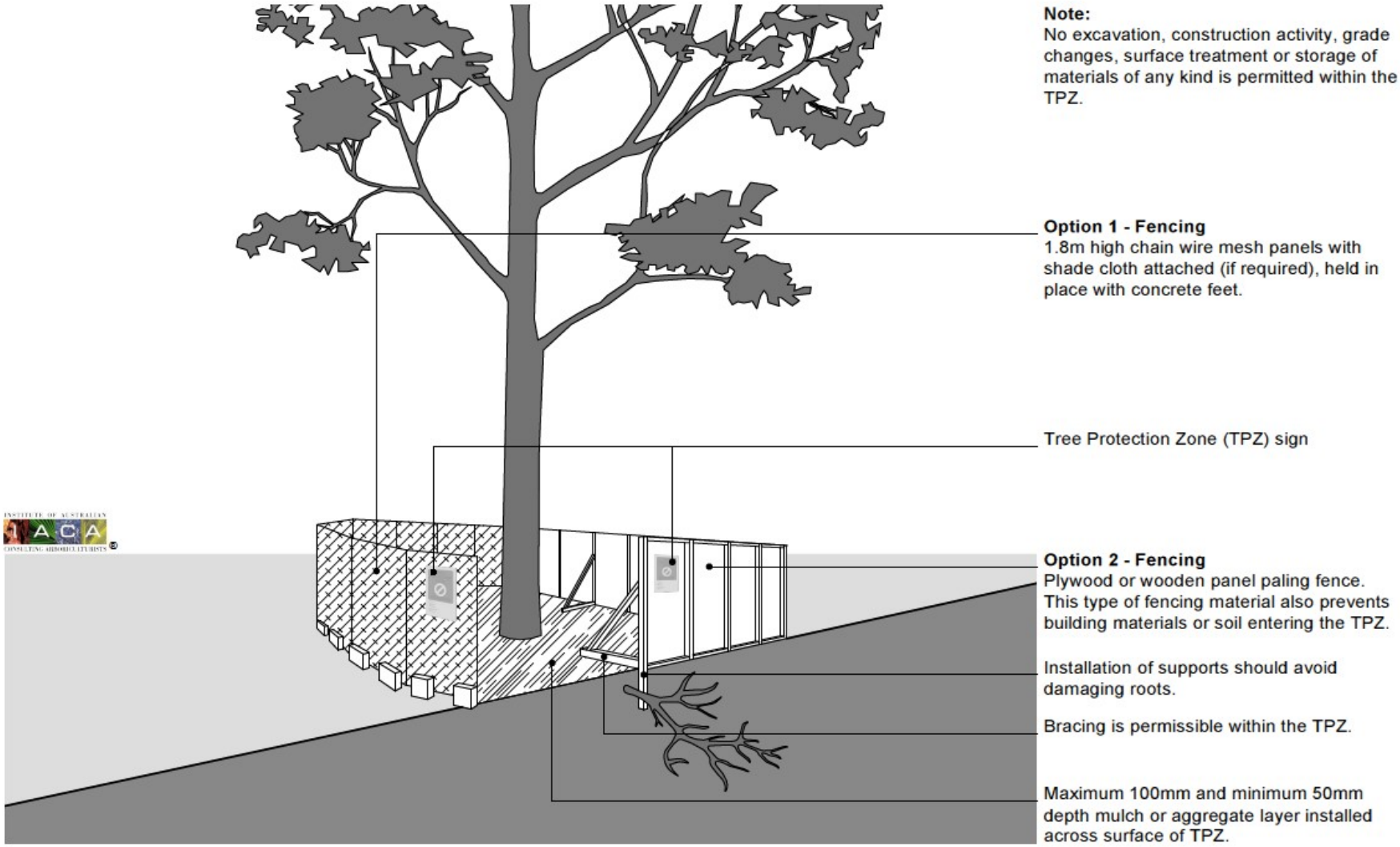
Legend for Matrix Assessment

	Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 *Protection of trees on development sites*. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

Safe Useful Life Expectancy – S.U.L.E (Barell 1995)

	1. Long	2. Medium	3. Short	4. Removal	5. Moved or Replaced
	Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 15 – 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 5 – 15 years with an acceptable level of risk.	Trees that should be removed within the next 5 years.	Trees which can be reliably moved or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live between 15 and 40 years.	Trees that may only live between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Small trees less than 5m in height.
B	Trees that could be made suitable for retention in the long term by remedial tree care.	Trees that may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees that may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees through instability on recent loss of adjacent trees.	Young trees less than 15 years old but over 5m in heights
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.	Trees that may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees that may live for more than 15 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Damaged trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been pruned to artificially control growth.
D		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial tree care and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	
E				Trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new plantings.	
F				Trees that are damaging or may cause damage to existing structures within 5 years.	
G				Trees that will become dangerous after removal of other trees for reasons given in (A) to (F).	

Appendix B- Protection measures;
Protective fence



Stem and Ground protection