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23rd October 2019

Joe Livolsi
NSW Facilities Manager
St John of God
Burwood & Richmond Hospital

Re – Arborist Inspection – Tree Risk Assessment

Reference is made to your request for an Arboricultural Risk Assessment at St John of God Richmond Hospital.

The assessment addresses the health, structure and hazard rating of trees located within the hospital grounds.

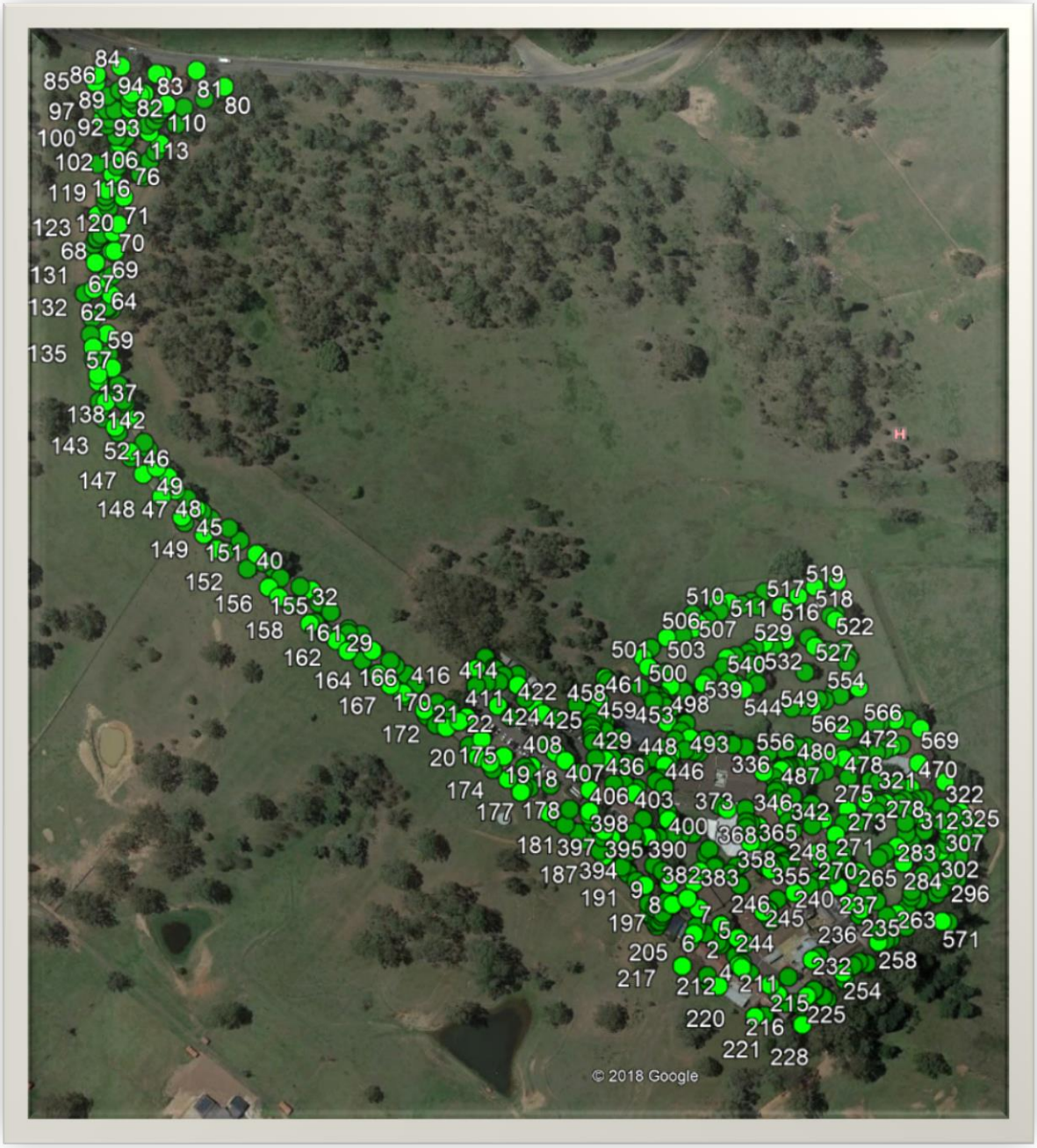
If you require any further information in relation to this report, please contact us on 0418 474 796.

Yours sincerely

Hugh Taylor
Director - Australian Tree Consultants
Member Arboriculture Australia
Diploma Horticulture – Arboriculture (Level 5)
Arborist/ Tree Surgeon/ Horticulturist
Certificate IV Occupational Health & Safety
QTRA No 2650

St John of God Richmond Hospital

Tree Risk Assessment



23rd October 2019

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AUSTRALIAN TREE CONSULTANTS PTY LTD

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Electronic Files (not contained within written report)

Excel Files - Tree Master Data, Trees by Risk, Recommended Tree Removals

KMZ file – to be loaded into Google Earth

INTRODUCTION

The NSW Facilities Manager of St John of God Richmond Hospital has commissioned Australian Tree Consultants Pty Ltd to provide an Arboricultural Risk Assessment of trees within the hospital grounds.

The site was inspected by Hugh Taylor AQF Level 5 Consulting Arborist and Thomas Taylor Environmental Scientist in October 2019. The inspections were undertaken on trees within the hospital precinct that had the potential to impact upon patients, visitors, staff, grounds and infrastructure.

The aim is to provide an assessment of the health, structure and life expectancy of trees included in the assessment, make recommendations for remedial actions required including tree removals and prioritize continuing remediation and maintenance works for those trees recommended for further retention.

METHODOLOGY

A Visual Tree Assessment (VTA) inspection was undertaken from ground level. Tree height, canopy spread and trunk diameter at breast height (DBH) and at base (DAB) were estimated. Data collected included species, height, canopy spread, DBH, health, structure, age, total life expectancy, % of deadwood, tree defects and tree significance.

Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) as well as Tree Retention Values were also calculated for each tree as construction works may be undertaken.

Tree locations were obtained by the use of our GEO 7X GNSS sub cm survey system. Co-ordinates are in GDA map zone 56. Trees were numbered and tagged with a small plastic tag.

Hazard Rating

As a result of the Visual Tree Assessment a Hazard Rating has been assigned to each tree assessed. The risk of the tree is determined by three factors, Probability of Risk, Risk Consequence and Occupancy Rate. This incorporates an assessment of the size of the part that may fail, the target for the part that may fail and the site usage within the zone of impact.

The Hazard Rating system undertaken is based on accepted WHS/OH&S principals and is detailed in Appendix (A) Tree Hazard Classification. Risk is classified into seven categories from lowest to highest risk. These categories are:- Negligible Risk, Very Low Risk, Low Risk, Medium Risk, High Risk, Urgent Risk and Critical Risk.

Recommended Arborist Actions

Recommended remedial Arborist work actions are also listed for each individually tagged tree or groups of trees in the electronic Excel data sheets. Recommended actions include removal of deadwood, tree removal, pruning, plant health care, mulching under trees and regular monitoring.

Aerial inspections and further reporting and scientific testing (Picus Sonic Tomograph testing) may also be recommended for select trees before a decision can be made on the final outcome of the management of these trees.

Recommended Arborist work actions have been made to reduce and eliminate current risk ratings and to help prioritize continuing remediation and maintenance works to promote a healthy sustainable tree population.

Electronic Files

All tree data collected is referenced to the given tag number in the electronic Excel data sheets. Tree data can also be uploaded into Google Earth via the KMZ file, and when the tree icon is clicked the tree data will appear.

OBSERVATIONS / DISCUSSION

Trees within St John of God Hospital Richmond precinct that had the potential to impact upon patients, visitors, staff, grounds and infrastructure were assessed. A site plan of the location of all trees assessed is included as an Appendix – Map 1.

572 trees were tagged (this includes individual trees and groups of trees that were given one tag).

In total, **634 trees** have been reviewed and recorded for this report.

Tree Age:

- Juvenile 37 trees
- Semi mature 122 trees
- Mature 445 trees
- Senescent 30 trees

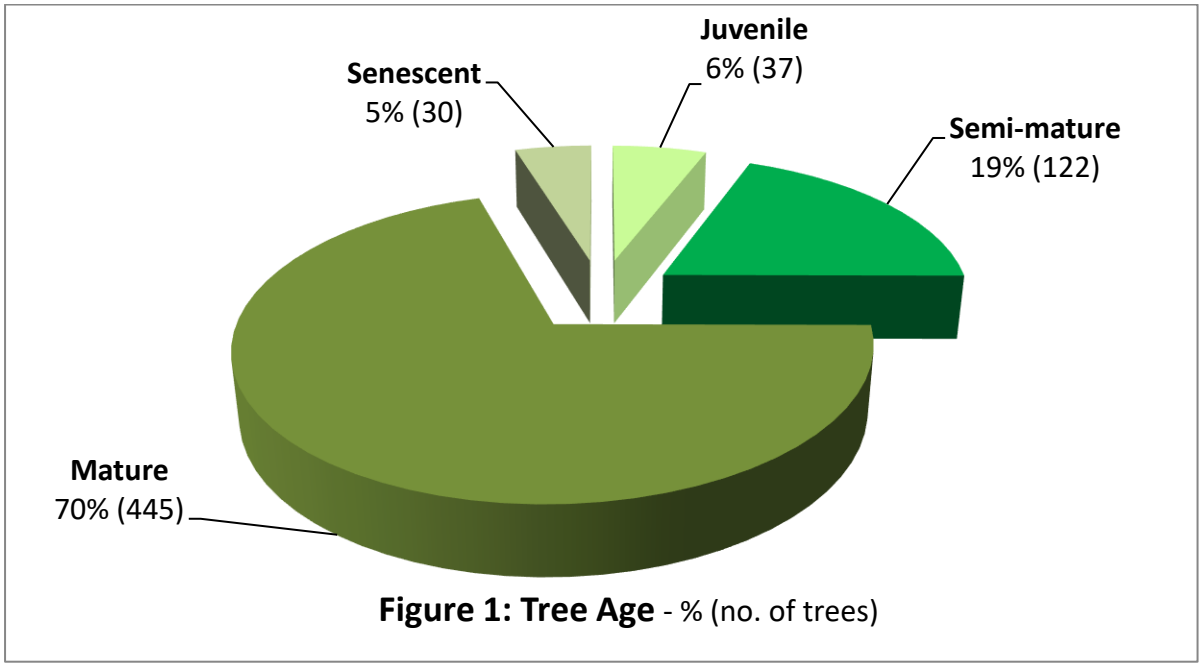

Figure 1: Tree Age - % (no. of trees)

St John of God Richmond Hospital October 2019

- 6% of the total tree population assessed are juvenile in age (37 trees).
- Approximately a fifth (19%) of the total tree population consists of semi-mature trees (122 trees).
- The majority (70%) of the tree population consists of mature trees (445 trees).
- 5% (30 trees) are senescent in age.

Tree Health:

- Good 436 trees
- Fair 167 trees
- Poor 12 trees
- Dead 19 trees

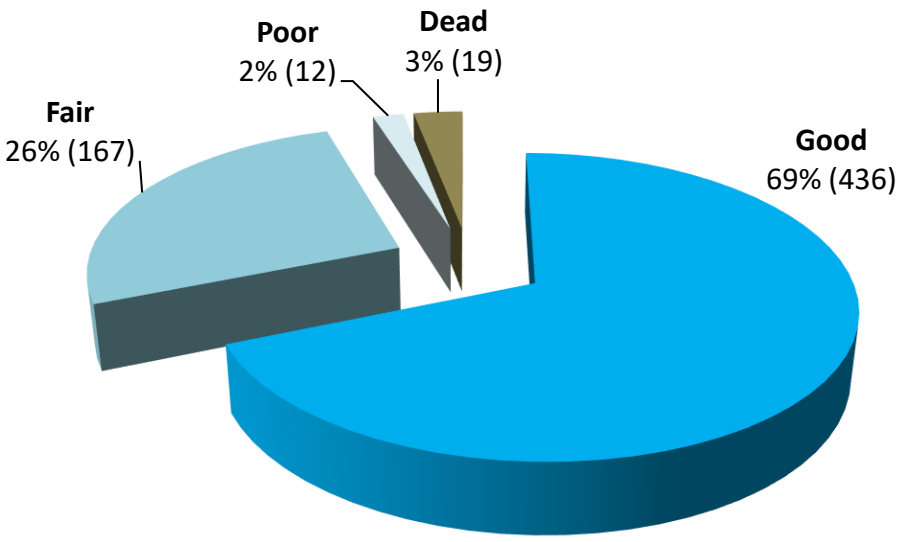

Figure 2: Tree Health - % (no.of trees)

St John of God Richmond Hospital October 2019

- Approximately two thirds (69%) of the tree population was assessed in good health (436 trees).
- Approximately a quarter (26%) of the tree population was assessed in fair health (167 trees).
- Only 2% (12 trees) were assessed in poor health.
- 3% (19 trees) were dead.

Tree Life Expectancy:

- > 50 years 435 trees
- 25 - 50 years 120 trees
- 15 – 25 years 31 trees
- 10 – 15 years 7 trees
- 5 - 10 years 13 trees
- < 5 years 9 trees
- Dead 19 trees

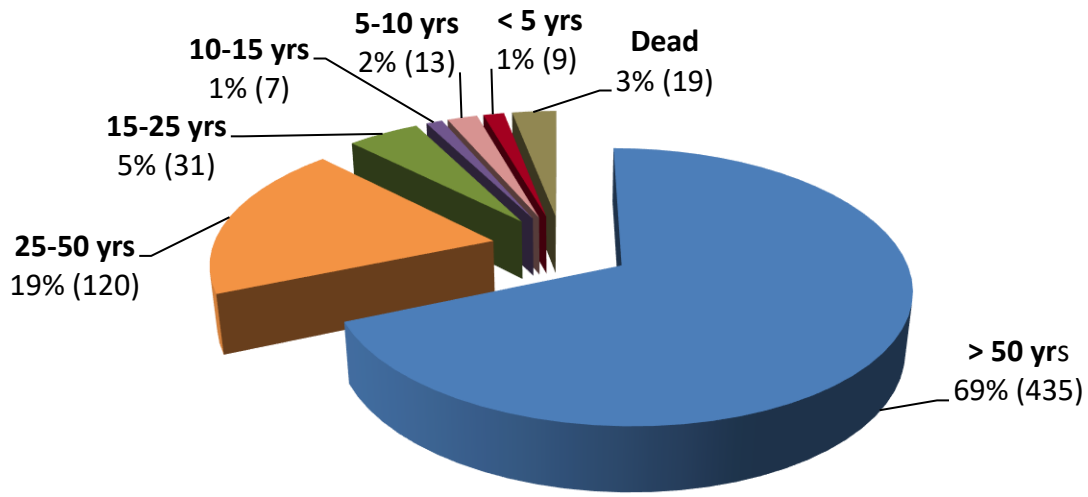

Figure 3: Tree Life Expectancy - % (no. of trees)

St John of God Richmond Hospital October 2019

- Approximately two thirds (69%) of the tree population have a life expectancy of >50 years (435 trees).
- Almost a fifth (19%) of the tree population have a remaining life expectancy of 25 – 50 years (120 trees).
- 5% of trees have a life expectancy of 15-25 years (31 trees)
- Only 4% of trees have a life span of 10-15, 5-10 or <5 years (39 trees)
- 3% of the trees assessed were dead (19 trees).
- These figures reflect the prolonged sustainability of the trees at St John of God Richmond Hospital.

Deadwood in Trees:

- 0% 364 trees
- <5% 219 trees
- 5-10% 14 trees
- 10-20% 10 trees
- 20-50% 7 trees
- 80-100% 20 trees

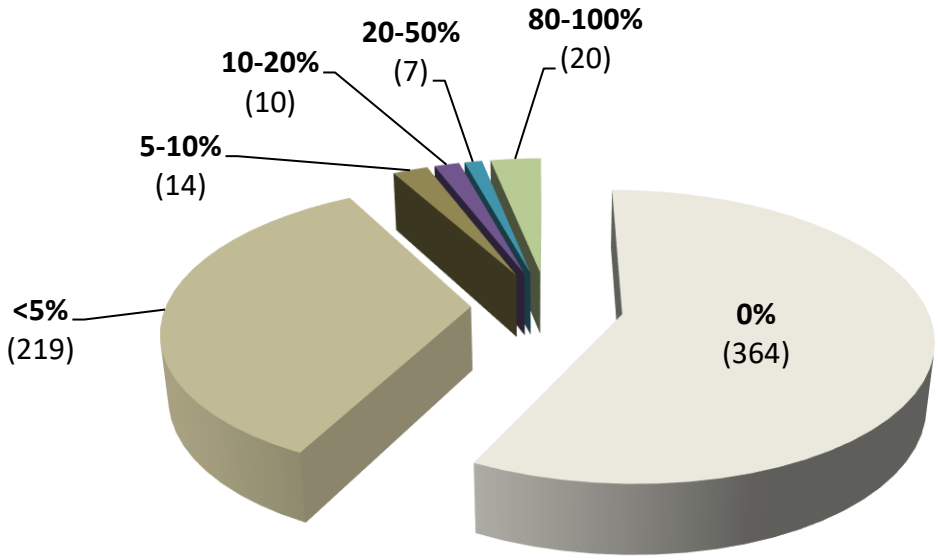

Figure 4: % of Deadwood in Trees - (no. of trees)

St John of God Richmond Hospital October 2019

- The majority of trees had no (0%) deadwood retained within their canopy structure (364 trees).
- Approximately a third (34%) retained <5% of deadwood (219 trees).
- Fourteen (14) trees retained between 5-10% of deadwood.
- Seventeen (17) trees retained between 10-50% of deadwood.
- There are twenty (20) trees that have larger amounts of deadwood (80-100%) retained within their canopy structure, almost all of these are dead.

Tree Risk:

- Negligible Risk 15 trees
- Very Low Risk 186 trees
- Low Risk 250 trees
- Medium Risk 174 trees
- High Risk 9 trees
- Urgent Risk Nil
- Critical Risk Nil

Total 634 trees

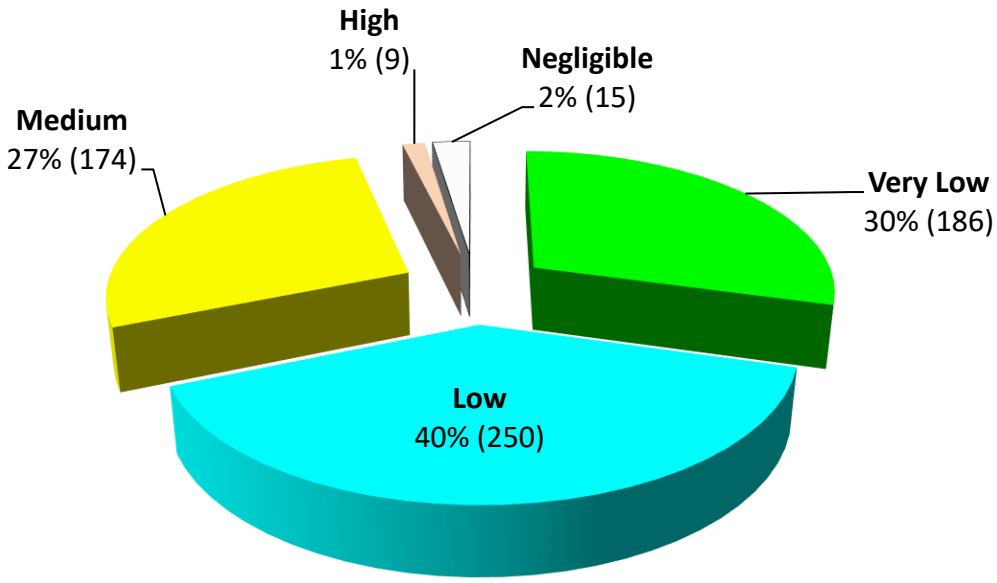

Figure 5: Tree Risk - % (no. of trees)

- No (0) trees were assessed as **Critical Risk** or **Urgent Risk**.
- Nine (9) trees were assessed as **High Risk.** These High Risk trees represent approximately 1% of the total tree population and require arboricultural works to reduce the current risk rating as soon as possible.

  Specific arboricultural work actions for the trees assessed as **High Risk** is outlined in **RECOMMENDATIONS** in this report and detailed work actions are contained in the electronic excel files.
- The middle risk category (**Medium Risk**) consists of 174 trees and represents approximately a quarter (27%) of the tree population.
- The lowest risk categories (**Low**, **Very Low Risk** & **Negligible Risk**) consist of 451 trees and represent the majority of the tree population (72%).

- The risk of the tree is determined by three (3) factors, Probability of Risk, Risk Consequence and Occupancy Rate. This incorporates an assessment of the size of the part that may fail, the target for the part that may fail and the site usage within the zone of impact.

- Maps of the locations of the tagged trees by Risk are contained in the Appendices: Maps 2 – 6.

Main Work Actions:

Table 1: Main Work Actions

• No visual defects sited	286	trees
• Deadwood		
- small (<5cm diam)	195	trees
- medium (5 – 10cm diam)	27	trees
- large (10cm plus diam)	8	trees
• Aerial inspection	Nil	
• Further reporting & testing (Picus Sonic Tomograph)	1	tree
• Mulching	21	trees
• Tree Removal	63	trees
High risk	5	trees
Medium, Low & Very Low Risk	58	trees

<u>No Visual Defects</u>

- 45% of the tree population assessed had no visual defects (286 trees).

<u>Deadwood</u>

- The main work action is removal of deadwood from trees. Note: the figures above do not include the deadwood in trees that have been recommended for removal.

- Deadwood has been classified as small, medium and large diameter. The target area affected if the deadwood were to fail has been listed in the excel files.

Aerial Inspections & Picus Sonic Tomograph Testing

- No trees were assessed as requiring aerial inspection with only one (1) tree (tree no. 79) being assessed as requiring further investigation by Picus Sonic Tomograph testing.

- Tree no. 79 is a *Ficus microcarpa var. hillii* (Hill's Weeping Fig) which is a large **High Risk** tree. The base of the tree has wounds, cavities and decay and requires a Picus Sonic Tomograph Test before the final decision can be made on the management of this tree.

- A Map of the location of the tree requiring Picus testing is contained in the Appendices – Map 7.

Mulching

- Twenty-one (21) trees require mulching. These trees have exposed roots that have/are being damaged by property maintenance (mowers, whipper snippers & herbicides) and would benefit from mulch being placed around the base of the tree to alleviate these issues.

- Mulching around the base of large individual trees is recommended to prevent soil moisture losses, alleviate soil compaction and root damage. Mulch area under the tree out to the drip line to a depth no greater than 75mm. Mulch should not be placed against trunk of tree.

Infrastructure Damage

- One (1) tree – No. 258 is growing close to a building and is impacting the infrastructure and will continue to cause more damage into the future as the tree grows.

- Three (3) trees - No. 349, 350 & 351 are touching buildings and need to be crown raised to prevent any damage.

- One (1) tree – No. 360 is damaging a brick retaining wall from root pressure in a garden.

- Three (3) trees – No. 407, 408 & 409 are lifting the asphalt in the carpark.

- Two (2) trees – No. 453 & 456 are impacting the tennis courts and are recommended for removal.

- Costing to attend to these matters has not been included in the Tree Works Budget Estimates.

Recommended Tree Removals

- Sixty-three (63) trees have been recommended for removal based on hazard, health, structural defects, weed or inappropriate species and inappropriate location.

Table 2: Tree Removals by Risk

Hazard Risk Rating	Total number of trees surveyed October 2019	Number of trees recommended for removal
Negligible	15	Nil
Very Low Risk	186	18
Low Risk	250	14
Medium Risk	174	26
High Risk	9	5
Urgent Risk	Nil	
Critical Risk	Nil	
Total	**634**	**63**

High Risk Recommended Tree Removals

- 5 the 9 **High Risk** trees require removal. Of these: 3 trees have structural defects that have compromised retention, 1 tree is in advanced decline and will impact a house and 1 tree is dead.

- Removal of trees assessed as **High Risk** needs to be undertaken as soon as possible.

Medium, Low & Very Low Risk Recommended Tree Removals

- 26 of the 174 **Medium Risk** trees are recommended for removal. Of these: 10 are dead, 6 have structural defects, 5 are in advanced decline, 3 are damaging infrastructure and 2 are weed species.

- 14 of the 250 **Low Risk** trees are recommended for removal. Of these: 4 are damaging infrastructure, 3 are dead and several have poor health and structure.

- 18 of the 186 **Very Low Risk** trees are recommended for removal. Of these: 12 are weed species, 5 are dead and 1 tree is in advanced decline.

- No (0) **Negligible Risk** trees are recommended for removal.

- Removal of trees assessed as either **Medium**, **Low** or **Very Low Risk** can be taken over a longer period of time as determined by St John of God Richmond Hospital.

- Ongoing monitoring of trees whilst they are retained is required to ensure that their risk rating does not increase from lower to higher risk categories.

- A Map of the location of the trees recommended for removal is contained in the Appendices – Map 8.

Tree Works Budget Estimates:

• Negligible Risk	Nil
• Very Low Risk	$7,050
• Low Risk	$27,445
• Medium Risk	$44,600
• High Risk	$10,500
• **Total Estimate**	**$89,595**

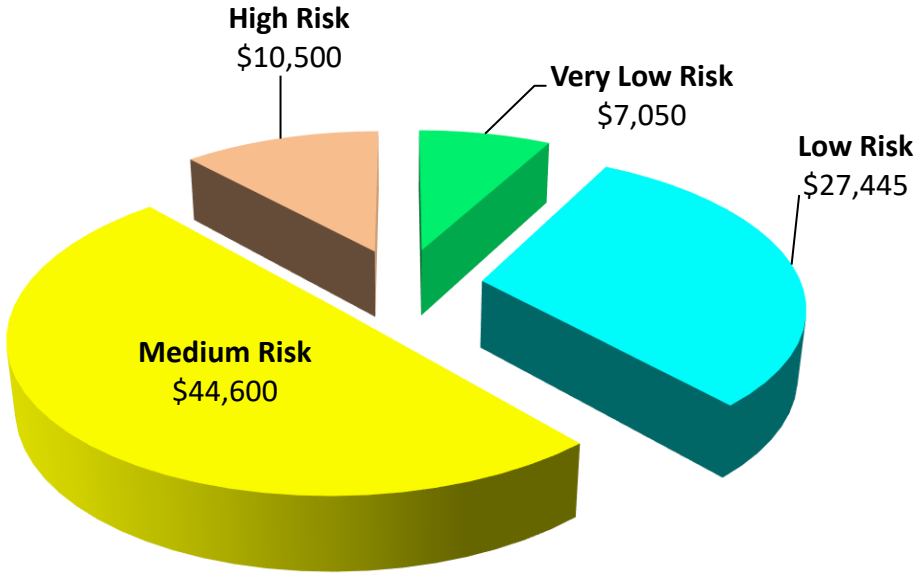

Figure 6: Tree Risk by Works Budget Estimate

St John of God Richmond Hospital October 2019

- Estimates are based on the price for three (3) people, truck, and chipper coming to site to undertake tree works on one tree only at a time. Multiple tree works should see a reduction in the overall cost.

Tree Protection Zones (TPZ) & Structural Root Zones (SRZ)

In accordance with Australian Standard AS4970-2009 "Protection of Trees on Development Sites" each trees TPZ and SRZ has been calculated. These calculations are provided in the excel data sheets and the zones for each tree are shown in the Appendices – Maps 9 & 10: SRZ & TPZ Driveway and Maps 11 & 12: SRZ & TPZ Main Hospital.

Tree Protection Zone (TPZ) radius is calculated using the following procedure. Diameter of the trunk is measured at approximately 1.4m above ground level; this measurement is referred to as DBH (Diameter at Breast Height). RTPZ = DBH X 12. For multi-stemmed trees the formula used is RTPZ = √[(DBH1)2 + (DBH2)2 + (DBH3)2]. The TPZ is measured radially from the centre of the stem and must be protected on all sides.

The Structural Root Zone (SRZ) radius is calculated by measuring the diameter of the stem close to ground level, just above the basal flare. This measurement is taken as D and then used in the following formula: RSRZ = (Dx50)0.42 x 0.64 and becomes the Structural Root Zone, measured radially from the centre of the stem.

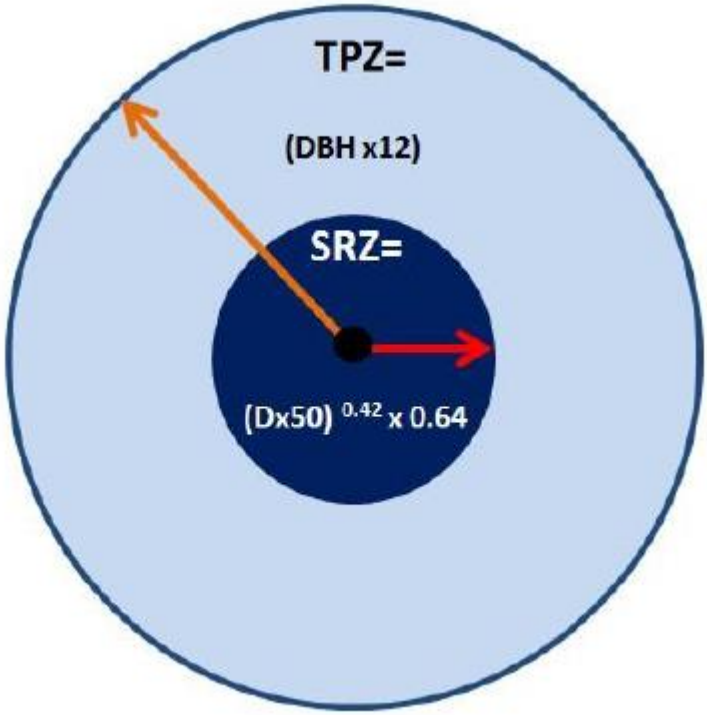

Figure 7 – A representation of TPZ & SRZ calculations.

It is important to realize that these calculations provide a notional figure only and tree dynamics, form and site conditions will greatly affect these zones, and it is the job of the arborist to interpret the information correctly.

For palms, cycads, tree ferns, and similar monocots, the TPZ is positioned at least 1m outside the crown projection. SRZs are not applicable to these plant types.

AS4970-20093 states "a TPZ should not be less than 2m nor greater than 15m (except where crown protection is required" and the minimum radius for an SRZ is 1.5m.

Tree Retention Value

Tree retention values have also been determined as requested and are provided in the excel data sheets. The landscape significance and retention value of an assessed tree is determined by ATC taking into consideration all data collected, excluding the anticipated tree impact. This includes:

- The amount of deadwood within the tree's crown
- The amount of epicormic growth within the tree's crown
- The amount of live canopy cover, within the tree's crown
- Any existing tree defects
- The total life expectancy of the tree in its location
- Its prominence in the surrounding landscape
- Its ecological value
- The amenity provided by the tree
- The suitability of the particular tree species in its surrounding environment prior to proposed works

Four categories have been used to classify the tree retention value for each tree: High, Moderate, Low and Very Low. These categories are explained in Appendix B.

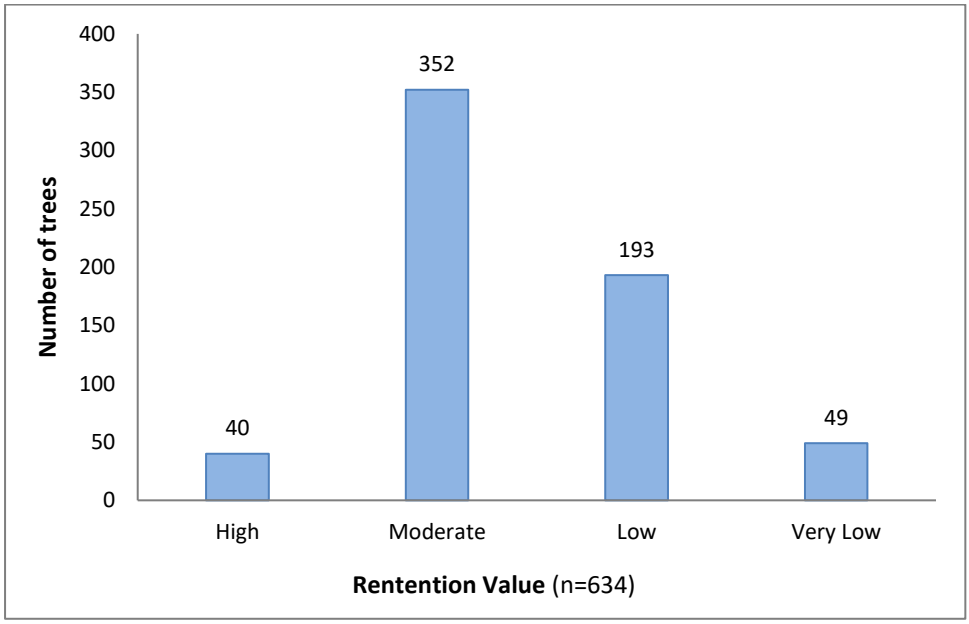

Figure 8: Tree Retention Value

- 6% of trees have a high retention value (40 trees).
- Over half (55%) of the trees have a moderate retention value (352 trees).
- 30% have a low retention value (193 trees).
- 8% of trees have a very low retention value (49 trees).
- Maps of the location of the trees assessed as high retention value are contained in the Appendices – Maps 13 & 14.

RECOMMENDATIONS

- Note: No (0) trees were assessed as **Critical Risk** or **Urgent Risk** at St John of God Richmond Hospital during the Arboricultural Tree Risk assessment which was conducted in October 2019.

- Undertake tree work actions on the nine (9) trees assessed as **High Risk**. Five (5) of these trees are recommended for removal.

  Recommended Arborist work actions are contained in the excel data sheet (Trees by Risk).

- Work through the identified work action list in the attached spreadsheets from highest risk to lowest risk ratings.

- Tree work actions for trees assessed as **Medium**, **Low**, & **Very Low Risk** can be taken over a longer period of time as determined by St John of God Richmond Hospital.

- Trees need to be regularly monitored to ensure that their risk rating does not increase from a lower to higher risk category.

- Continue to mulch around the base of large individual trees is recommended to prevent soil moisture losses, alleviate soil compaction and root damage. Mulch area under the tree out to the drip line to a depth no greater than 75mm. Mulch should not be placed against trunk of tree.

- All tree work should be performed to specifications detailed within the report and all works should be to Australian Standard 4373 – 2007 Pruning of Amenity Trees and SafeWork NSW Code of Practice 'Amenity Tree Industry', 1998. Reference should also be undertaken for any tree works to the Safe Work Australia Guide to Managing Risks of Tree Trimming and Removal Work – 2016. All tree work should be performed by a minimum AQF Level 3 qualified arborist.

If you require any further information in relation to this report, please contact us on 0418 474796.

Yours sincerely

Hugh Taylor
Director - Australian Tree Consultants
Member Arboriculture Australia
Diploma Horticulture – Arboriculture (Level 5)
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Certificate IV Occupational Health & Safety
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Thomas Taylor
Environmental Scientist
BNatSc (Environmental Management)
Diploma in Environmental Monitoring & Technology

LIMITATION OF LIABILITY

Australian Tree Consultants Pty Ltd and their employees are tree specialists who use their qualifications, education, knowledge, training, diagnostic tools and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of this assessment and report.

Australian Tree Consultants Pty Ltd and its employees cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that sometimes fail in ways the arboriculture industry does not fully understand. Conditions are often hidden within trees and below ground. Unless otherwise stated, observations have been visually assessed from ground level. Australian Tree Consultants Pty Ltd cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of Australian Tree Consultants Pty Ltd services, such as property boundaries and ownership, disputes between neighbours, sight lines, landlord-tenant matters, and related incidents. Australian Tree Consultants Pty Ltd cannot take such issues into account unless complete and accurate information is given prior or at the time of the site inspection. Likewise Australian Tree Consultants Pty Ltd cannot accept responsibility for the authorisation or non-authorisation of any recommended treatment or remedial measures undertaken.

In the event that Australian Tree Consultants Pty Ltd recommends retesting or inspection of trees at stated intervals or installs any cable/s, bracing systems and support systems, Australian Tree Consultants Pty Ltd must inspect the system installed at intervals not greater than 12 months unless otherwise specified in written reports. It is the client's responsibility to make arrangements with Australian Tree Consultants Pty Ltd to conduct the re- inspection.

Trees can be managed, but they cannot be controlled. To live or work near a tree involves a degree of risk. The only way to eliminate all risks associated with a tree is to eliminate the tree.

All written reports must be read in their entirety, at no time shall part of the written assessment be referred to unless taken in full context of the whole written report.

If this written report is to be used in a court of law or any legal situation Australian Tree Consultants Pty Ltd must be advised in writing prior to the written assessment being presented in any form to any other party.

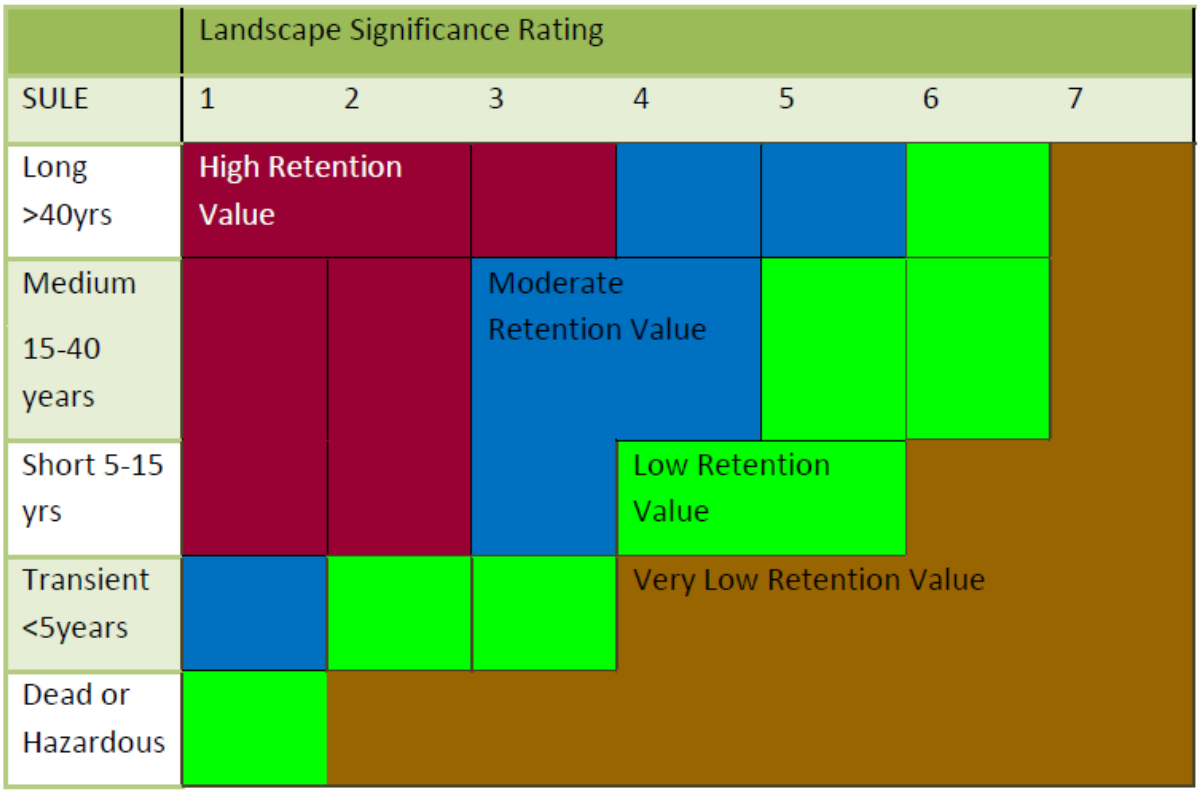
APPENDIX (A): TREE HAZARD CLASSIFICATION©

Notes: The hazard categories listed below are applicable under normal weather conditions, which include strong winds and torrential rains, but exclude extreme localized events such as tornado-like squalls and storms which have the capacity to destroy many trees regardless of their age and condition.

The term 'remedial work' refers to all remedial activities relative to a tree eg. soil remediation, watering and pruning.

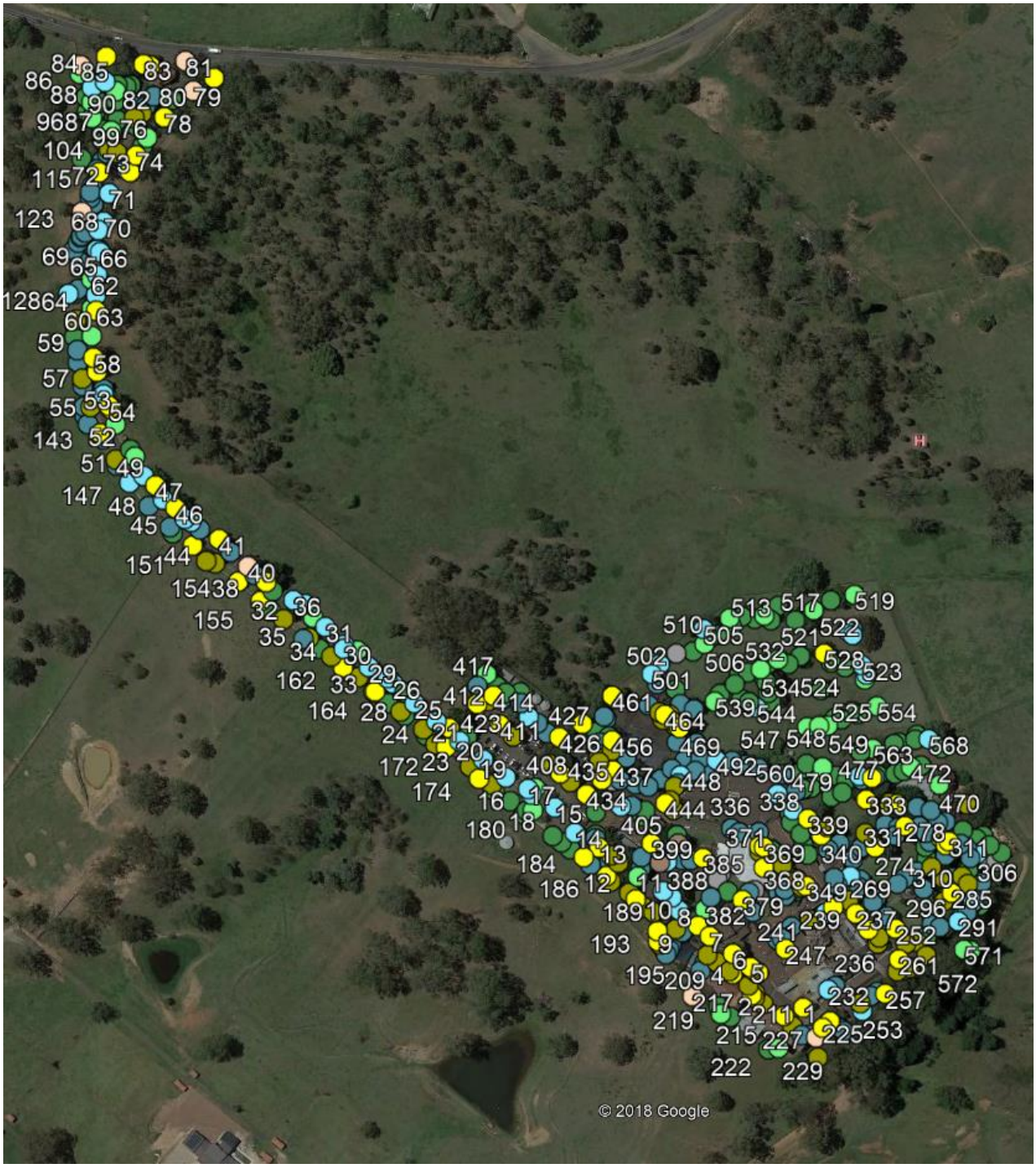
HAZARD CATEGORY (Colour code)	HAZARD RATING	DESCRIPTION	TIME FRAME
H0	Negligible	The tree appears healthy, no apparent sign of disease or damage, or is not of a size, species or condition likely to pose a threat.	Remedial tree works required at a time frame to be scheduled by client.
H1	Very Low	The tree appears healthy but is of a type or condition to potentially develop minor branch drop of live or dead wood	Remedial tree works required at a time frame to be scheduled by client.
H2	Low	The tree appears healthy, minor defects that can be rectified by minor tree surgery.	Remedial tree works required at a time frame to be scheduled by client.
H3	Medium	Mature to aged tree in declining condition, and/or structure, and/or disease apparent, showing potential for branch drop.	Remedial tree works required at a time frame to be scheduled by client.
H4	High	The tree shows signs of over weighted limbs, significant disease, root damage, removal of adjacent supporting tree, other significant defects present.	Remedial tree works required as soon as possible.
H5	Urgent	Defects are very severe, dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.	Remedial tree works required as soon as possible.
H6	Critical	Failure of either whole or part of tree is predictably imminent.	Site management needs to be notified for corrective action and immediate action (e.g. barricading off the tree) needs to be undertaken to reduce the risk. Remedial tree works required as soon as possible.

APPENDIX B: Tree Retention Value



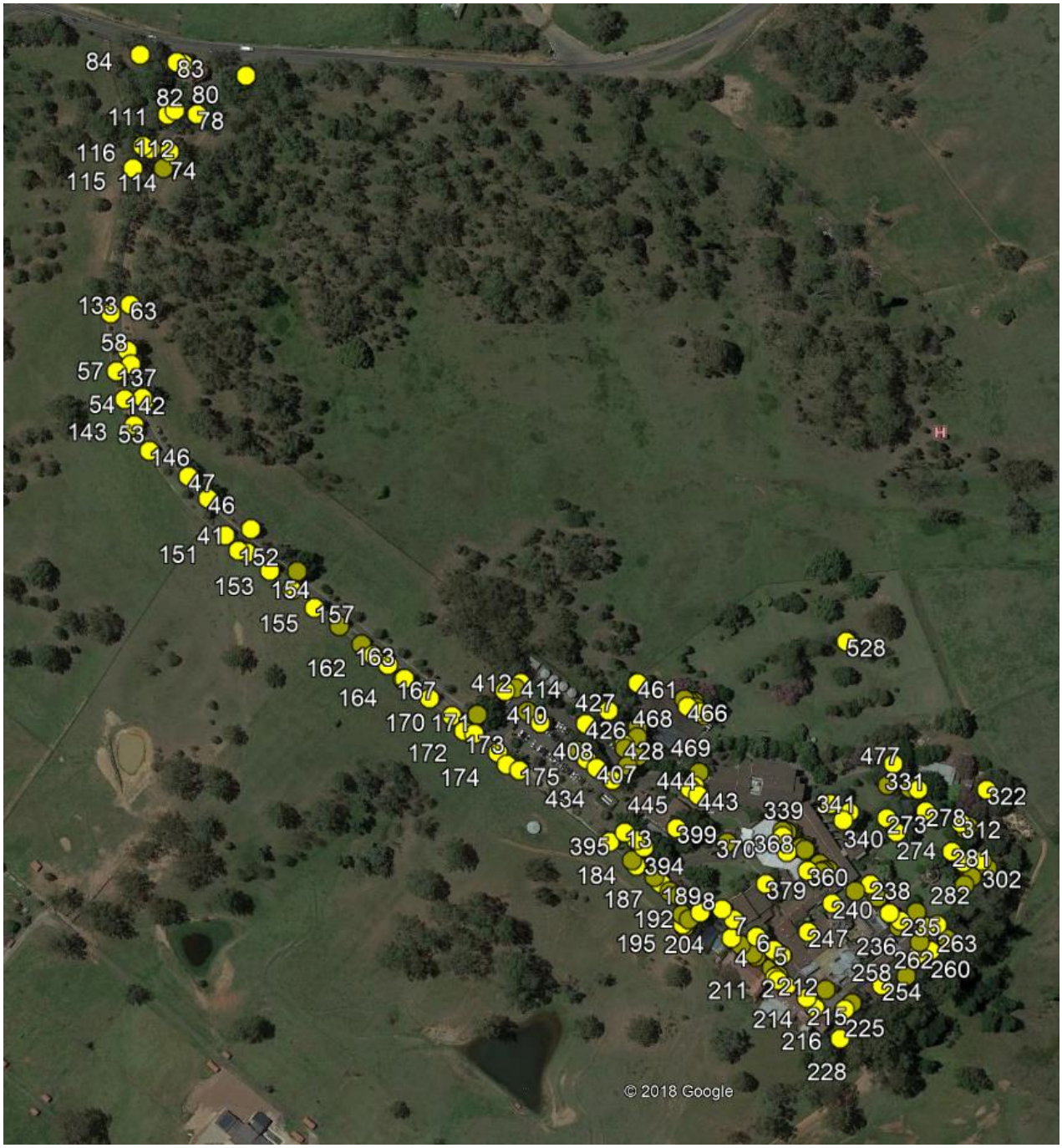
Reference modified from: Earthscape and Couston, Mark and Howden, Melanie, 2001, Tree Retention Values table, Footprint Green Pty. Ltd., Sydney Australia

Retention Value	Recommended Action
High	• These trees are considered worthy of preservation; as such careful consideration should be given to their retention as a priority. • Proposed site design and placement of buildings and infrastructure should consider the Tree Protection Zones to minimise any adverse impact. • In addition to Tree Protection Zones, the extent of the canopy (canopy drip-line) should also be considered, particularly in relation to high rise developments. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
Moderate	• The retention of these trees is desirable. • These trees should be retained as part of any proposed development if possible, however these trees are considered less critical for retention. • If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replacement Policy to compensate for loss of amenity.
Low	• These trees are not considered to worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. • These trees should not be considered as a constraint to the future development of the site.
Very Low	• These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. • The removal of these trees is therefore recommended regardless of the implications of any proposed development.

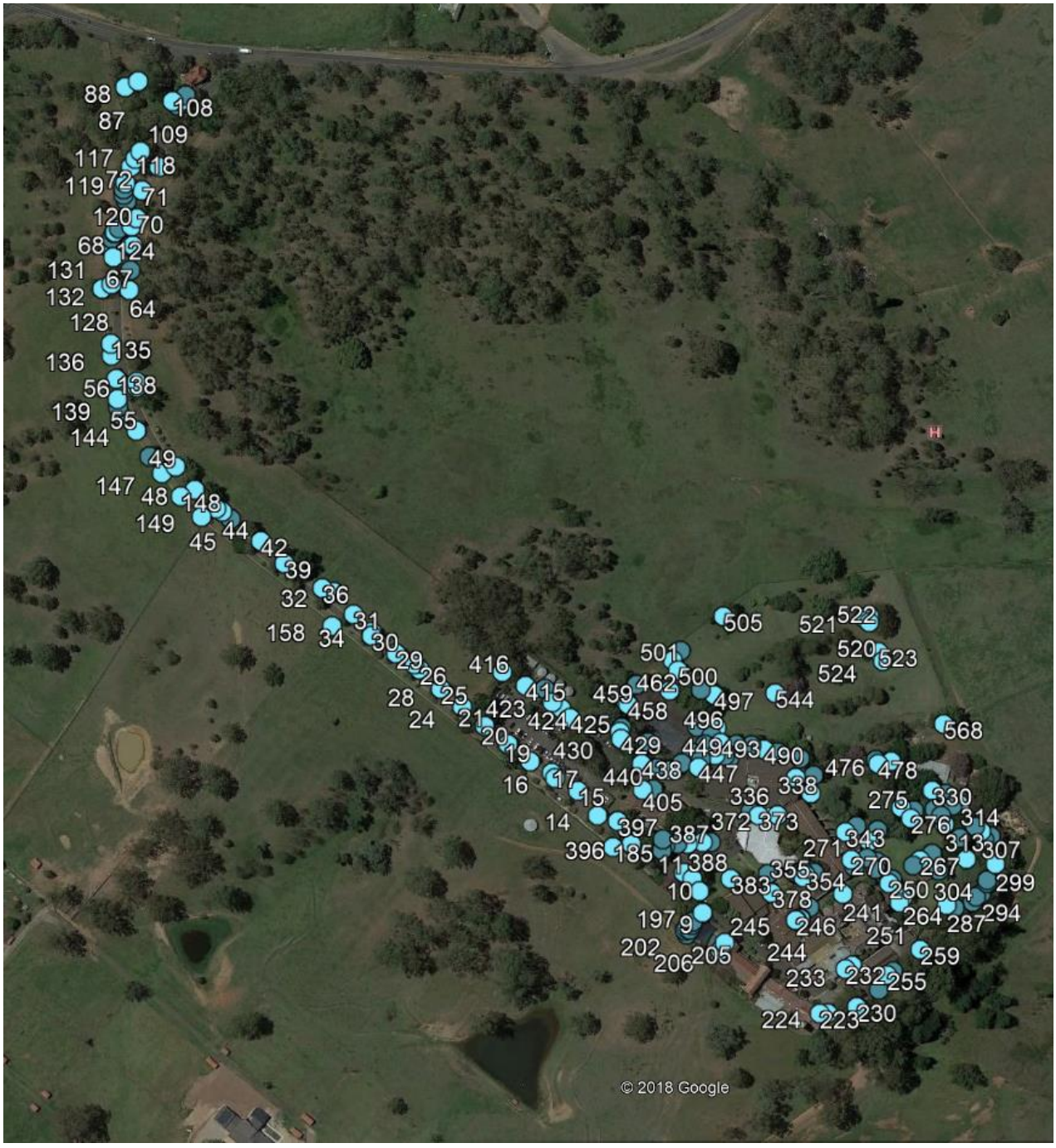


Map 1: Overall Site trees assessed. Colour icon = Risk rating.

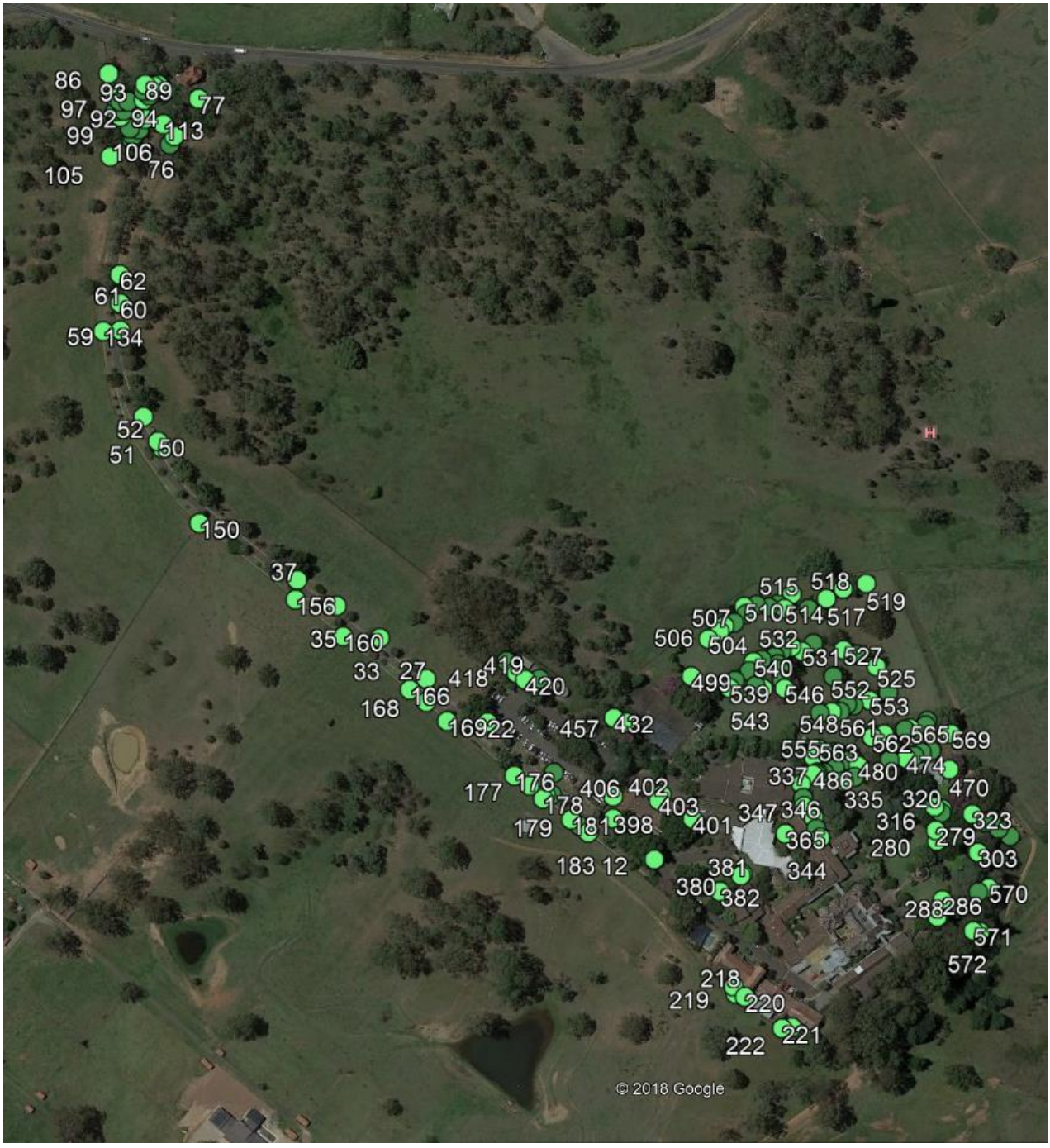
Map 2: High Risk trees



Map 3: Medium Risk trees



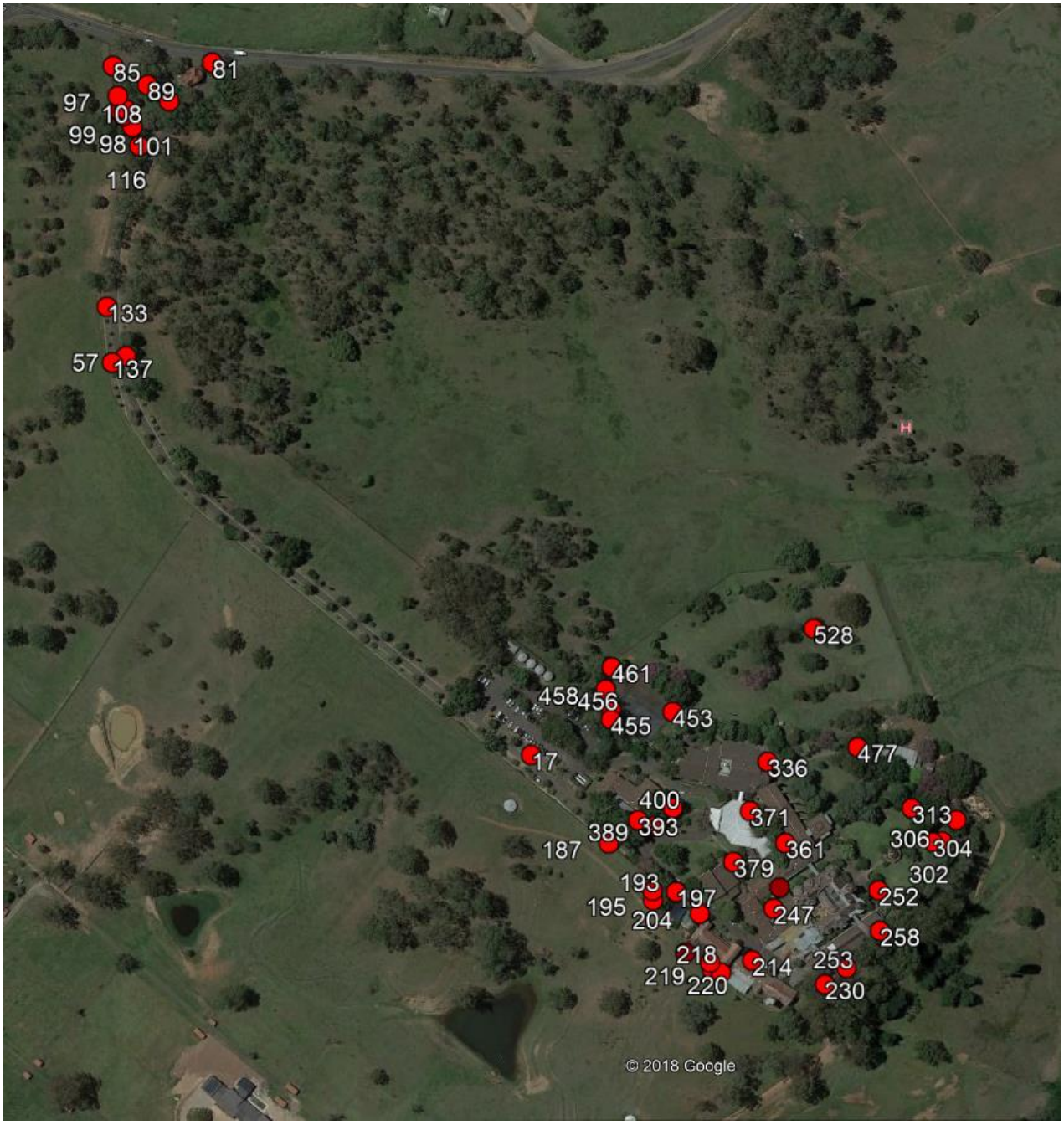
Map 4: Low Risk trees



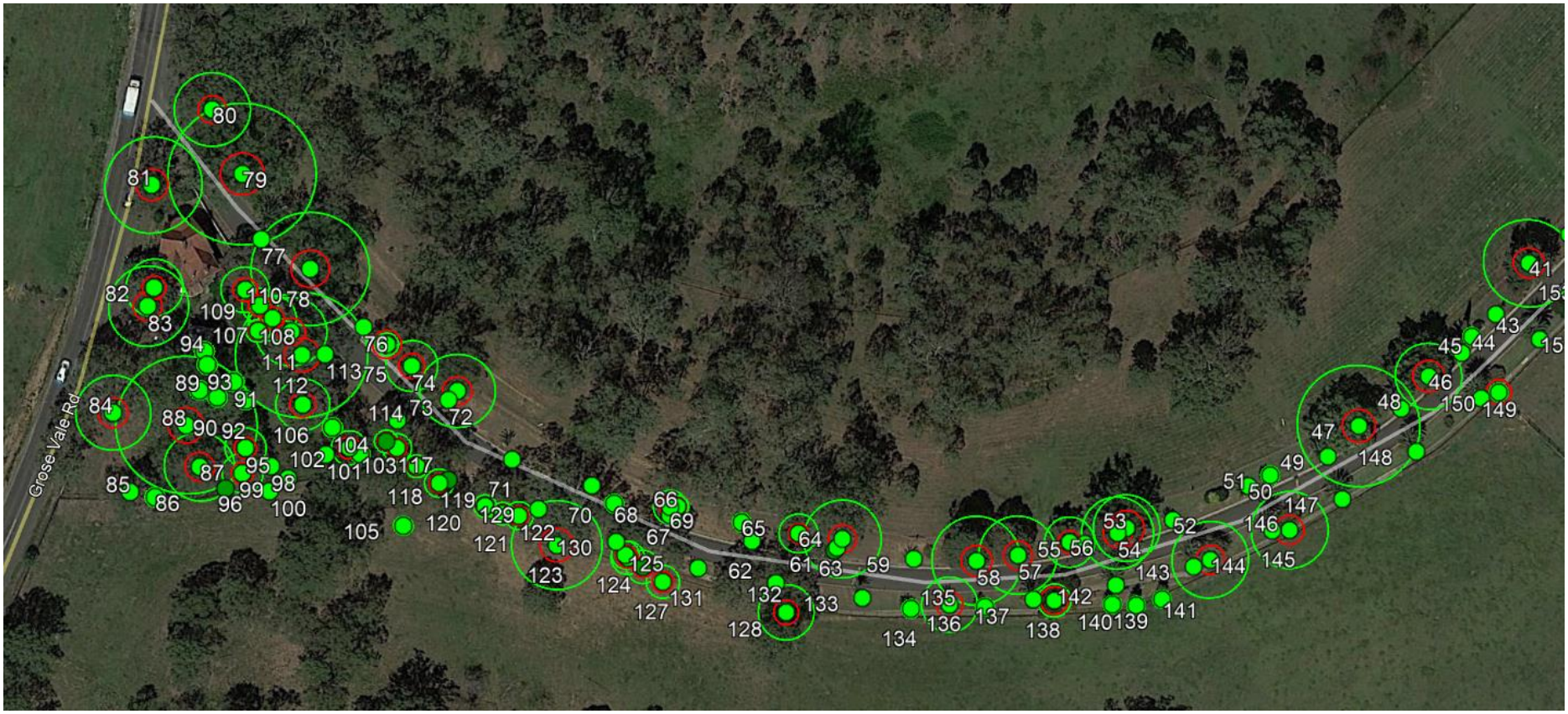
Map 5: Very Low Risk trees

Map 6: Negligible Risk trees

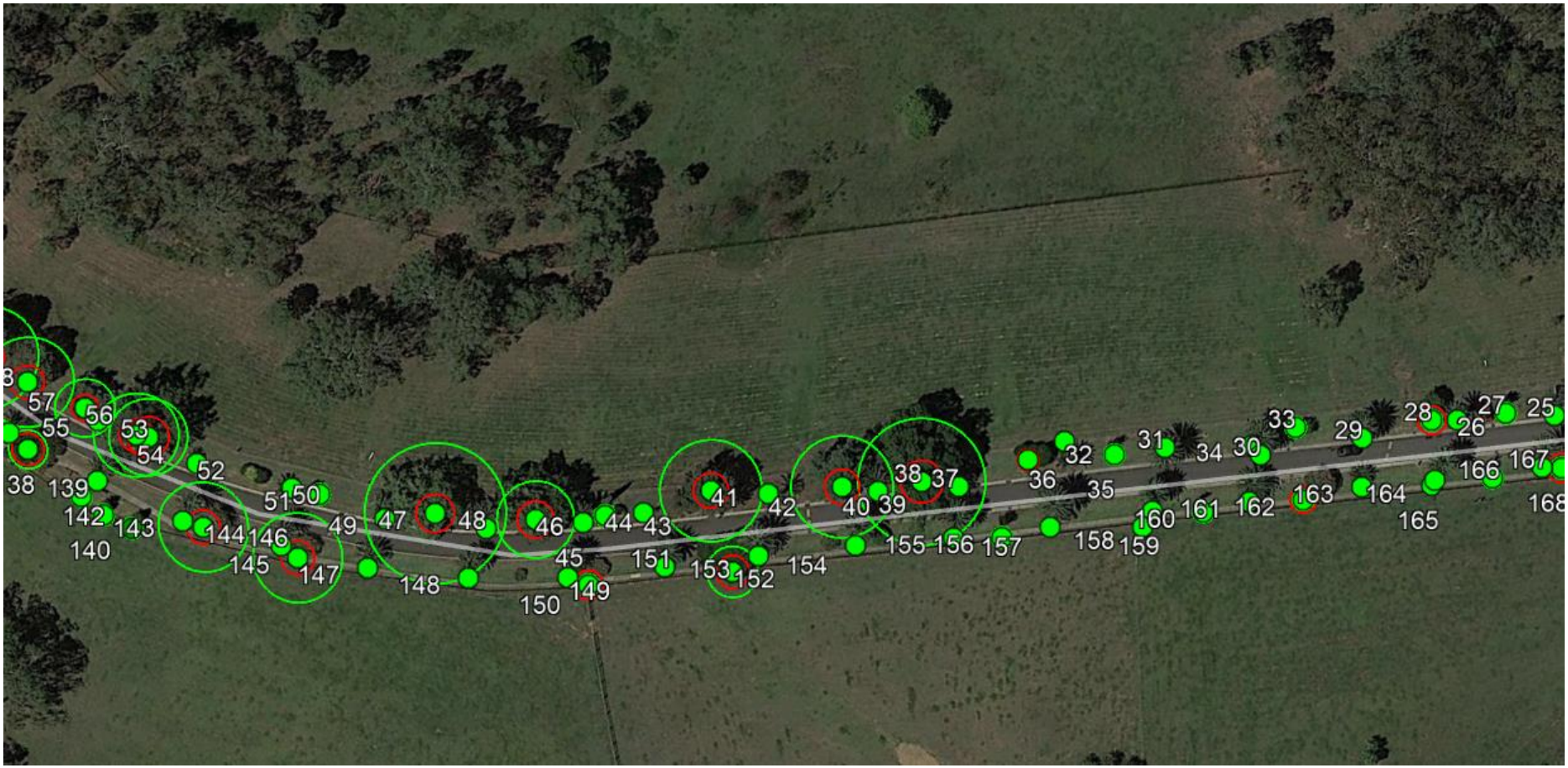
Map 7: Picus Sonic Tomograph Test



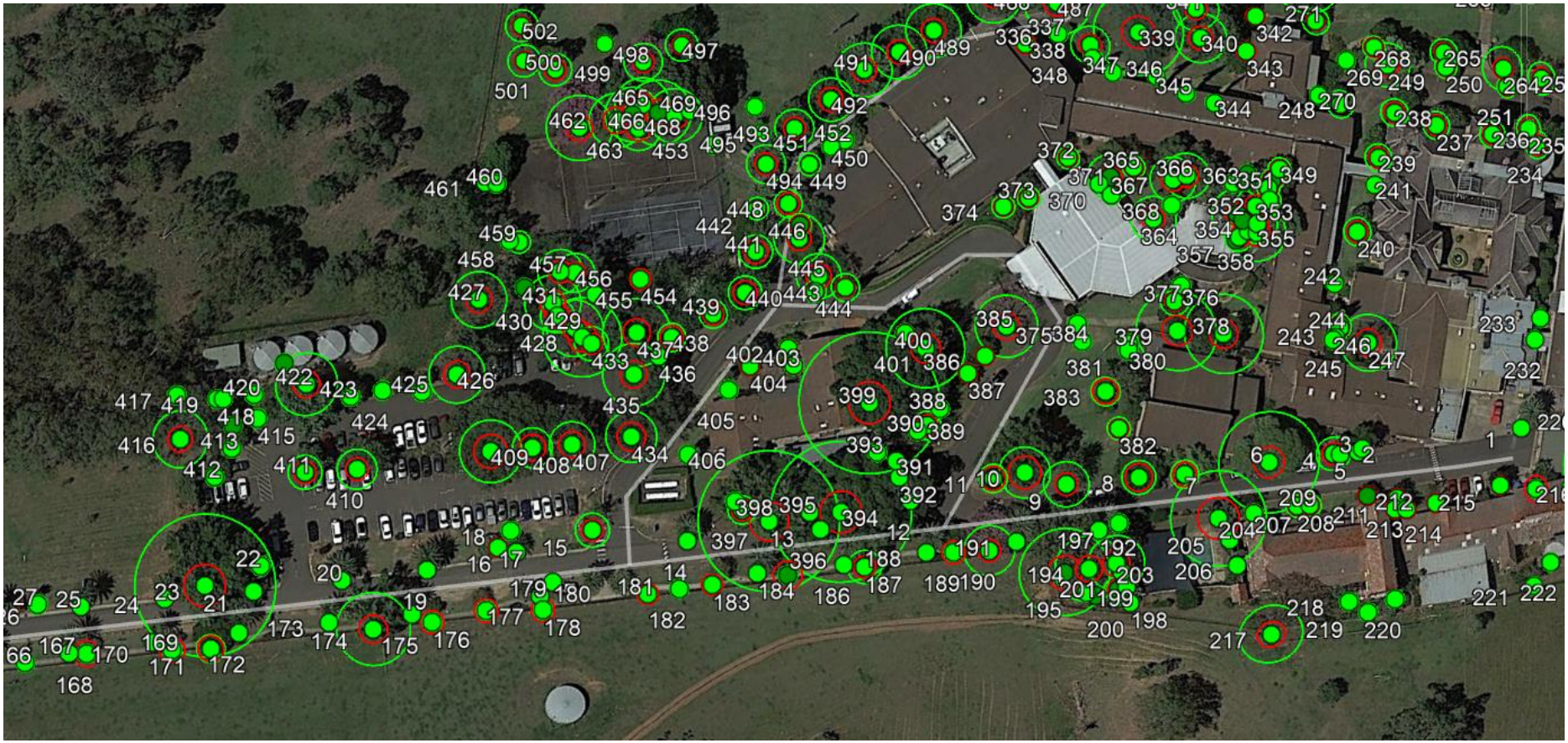
Map 8: Recommended Tree Removals



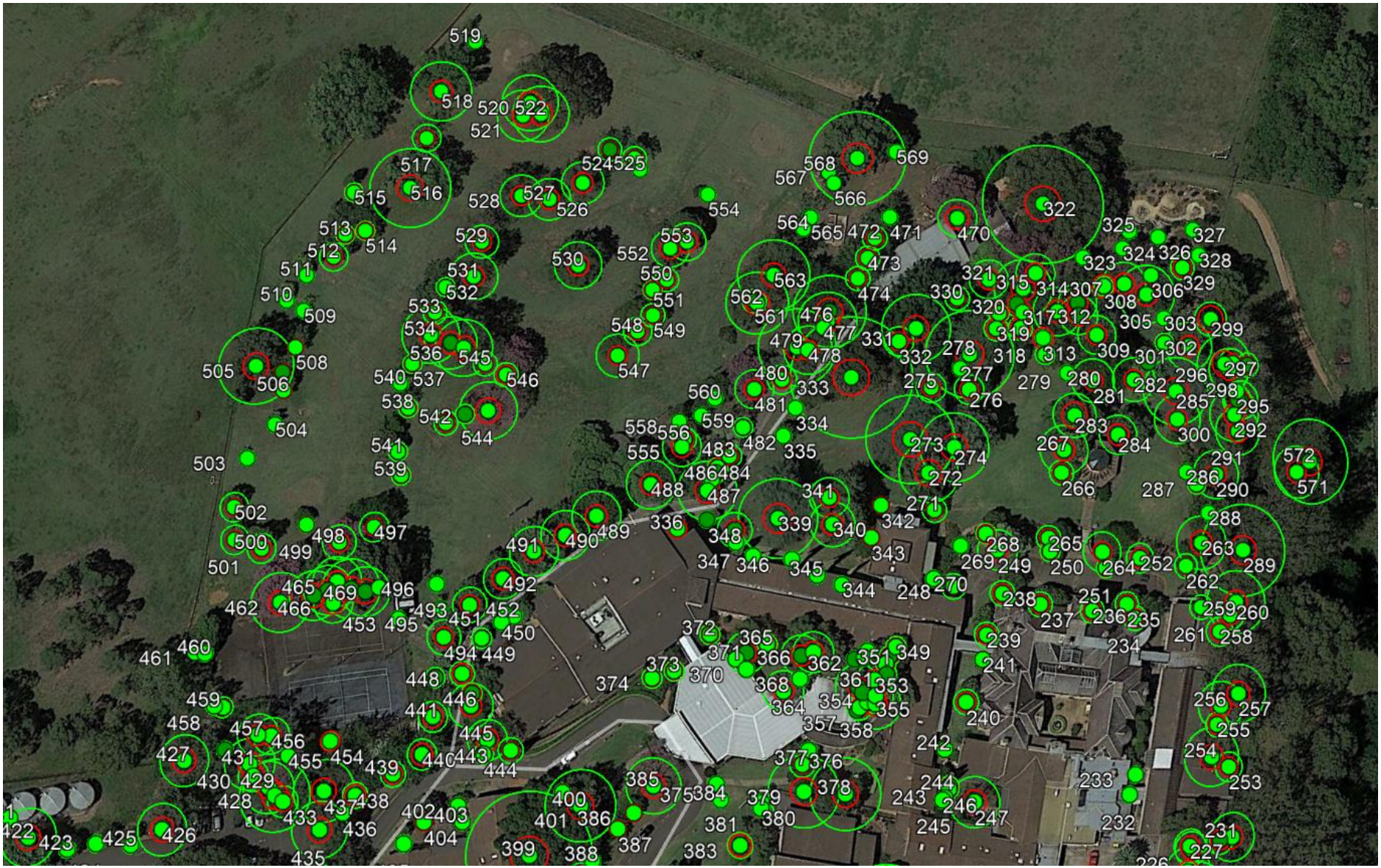
Map 9: SRZ & TPZ Driveway



Map 10: SRZ & TPZ Driveway



Map 11: SRZ & TPZ Main Hospital



Map 12: SRZ & TPZ Main Hospital

Map 13: High Retention Value Trees Driveway

Map 14: High Retention Value Trees Main Hospital