Ballard/Howe Mansion, 22 W Highland Drive – viewed from the south

Tree Solutions Inc
Consulting Arborists

Project No. TS-6946

Arborist Report

To:	City of Seattle, SDCI
Site:	22 W Highland Dr, Seattle, WA 98119
Re:	Exceptional Tree Removal Permit Application
Date:	October 6, 2021
Project Arborists:	Haley Galbraith, ISA Board Certified Master Arborist PN-7512BM ISA Qualified Tree Risk Assessor
	Connor McDermott, ISA Certified Arborist PN-8704A ISA Qualified Tree Risk Assessor
Attached:	ISA Basic Tree Risk Assessment Forms Statement of Financial Responsibility

Summary

Tree Solutions visited the above-addressed site in January 2020 and again in June 2021 to assess the health and structural conditions of four trees proposed for removal. All four are previously topped Lombardy poplar (*Populus nigra* 'Italica') trees we found to be in fair health and poor structural condition at the time of our inspections. The trees grow in a north to south row along the eastern boundary of the site. The property manager requested our services due to concern that the subject trees present elevated risk to surrounding property.

All four of the trees in question are considered Exceptional, per Seattle Director's Rule 16-2008.

No environmentally critical area (ECA) exists on site.

Using the ISA Basic Tree Risk Assessment forms, we determined that all four of the Lombardy poplar trees assessed present a high level of risk potential to surrounding targets over a three year time frame. Therefore, we recommend removal of all four Lombardy poplar trees in question.

This report includes all documentation required for a tree removal permit through Seattle Department of Construction and Inspections (SDCI) including the following:

- Arborist Report describing tree conditions and associated risk
- Site Plan including targets, address, parcel number, tree locations, environmentally critical areas
- Photos showing tree conditions
- ISA Basic Tree Risk Assessment Forms

Recommendations

- Complete removal of all four Lombardy poplar trees.
    - Advisable to hire tree service company that has a crane so the trees can be accessed safely and disturbance to surrounding soils and vegetation minimized.

- Replant new trees at a 1:1 ratio for each tree removed.

Assignment and Scope of Work

This report outlines the site inspections by Haley Galbraith on January 15 and 28, 2020, and by Haley Galbraith and Connor McDermott on June 8, 2021. We were asked to visit the site and provide advanced (level three) risk assessments of the Lombardy poplar trees on site. We were asked to produce an arborist report documenting our findings and recommendations. The property manager, Holly Betz of Cornell and Associates, requested these services due to concern that the subject trees present elevated risk to surrounding property.

The likelihood of whole tree or part failure is based on what was visible during the time of the assessments and what would likely occur under normal weather conditions over a three year time period. This time frame should not be considered a guarantee period for the risk assessment. This assessment discusses the tree conditions found at the time of the inspection, but weather and activities in and around the trees since this inspection can have a significant impact on tree condition and likelihood of failure.

A “Hazard Tree” is defined as “a tree that has been assessed as having characteristics that make it an unacceptable risk for continued retention. A hazard tree, or a hazardous component, exists when the sum of the risk factors equals or exceeds a predetermined threshold of risk.” The predetermined threshold for risk and the actions required to reduce the risk below that threshold is established by the risk manager.

As Qualified Tree Risk Assessors, our job is to provide the risk manager, in this case the property manager, with technical information required to make informed decisions. The risk manager must decide how to implement the actions required to reduce risk to acceptable levels.

Observations & Discussion

Site

The 13,780 square-foot site fronts W Highland Dr in the Queen Anne neighborhood of Seattle. One multi-family structure, known as “Ballard Mansion”, and an on-site parking area currently exist on site. According to the SDCI GIS map, no ECA exists on site.

The four trees proposed for removal are located along the eastern property line, atop a rock retaining wall that borders the driveway for the adjacent apartment building, and gradually gets taller from north to south. Targets considered during our risk assessment included the Ballard Mansion (22 W Highland Dr), the parking area on site to the north of the row of trees, the apartment building (1205 Queen Anne Ave N) across the driveway to the east, and vehicles and pedestrians using W Highland Dr to the south.

Trees

The subject trees were planted in a row oriented north to south along the eastern property line. They are mature Lombardy poplars that have been topped on more than one occasion in the past, and have since been allowed to grow large reiterative parts from the past topping points which now range from 60 to 80 feet tall. At the time of our inspections, we noted visible areas of decay on large parts throughout the tree canopies. We climbed two of the trees in June 2021 to carry out closer inspections and micro-resistance drill testing.

Due to the structural defects we observed, characteristics of the Lombardy poplar species, and close proximity of constant-use targets to the trees, we recommend all four trees be removed from the site.

Ecological Function

The trees proposed for removal currently provide some ecological functions, including:

- Wildlife habitat
- Storm water mitigation through slowing precipitation, filtering, and transpiration.
- Water quality services
- Improved air quality

Lost Ecological Function

Removal of the trees will result in a temporary loss of ecological function, including:

- Wildlife habitat
- Storm water mitigation through slowing precipitation, filtering, and transpiration.
- Water quality services
- Improved air quality.

Replaced Ecological Function

While the above ecosystem services will be impacted by the proposed tree removals, this project proposes replacing the ecological function by doing the following:

- Planting of four new trees.

Removal of the four trees as proposed will be mitigated with the planting of four *Ginkgo biloba* 'Princeton Sentry' trees on site. Although the chosen replacement tree species is not likely to obtain as large of size at maturity as the species being replaced, they will eventually provide a similar aesthetic as a deciduous tree with a relatively narrow, upright form. Future risk potential should not be a concern with the new species selected.

The four new trees will be planted in similar locations to the four Lombardy poplars, so stumps and large surface roots of the Lombardy poplars will need to be ground out and other improvements to the growing conditions will be made. Please see Figure 1 in Appendix A for proposed replacement tree locations.

Respectfully submitted,
Haley Galbraith and Connor McDermott, Consulting Arborists

TREE	A	**Lombardy Poplar** *Populus nigra* **'Italica'**	RISK RATING	**HIGH**

TREE DIMENSIONS		TREE CONDITION		RECOMMENDATION
diameter (DSH)	**54.6"**	health	**Fair**	**Remove**
diameter (multi)		structure	**Poor**	
height (ft)	**90-100'**	designation	**Exceptional**	
canopy dia. (ft)	**45-60'**			

RISK ASSESSMENT	**3 year time frame**		TARGET	**Ballard Mansion or adjacent apartments to east**	
	Likelihood part will fail	Likelihood part will impact target	Likelihood part will fail & impact target	Consequences	Risk Rating
branches, crown	Probable	High	Likely	Significant	High
trunk(s)	Improbable	High	Unlikely	Severe	Low
root plate	Improbable	High	Unlikely	Severe	Low

Potential Targets

- Ballard Mansion (22 W Highland Dr) – 7 feet west
- Apartments on adjacent property (1205 Queen Anne Ave N) – 18 feet east
- Cars in parking area on site – 9 feet north

Observations

Tree A is the northernmost tree of the four subject trees. The base of tree A has significant fluting, but no visible areas of decay. One micro-resistance drill test at the base showed sound wood (see Figure 3).

Wildlife cavities visible from ground level exist in large canopy parts due to decay from past topping cuts, which is why failure rated probable over a three-year timeframe. The large north-central topping cut is of most concern.

Recommendations

Based on the current condition of the tree, and with consideration for species characteristics, we recommend tree A be removed. In order to retain the tree and reduce risk presented to surrounding targets, extensive and ongoing crown reduction pruning maintenance would be required, and further pruning injury would lead to increased decay over time, ultimately exacerbating the existing structural issues.

Photo 1. Base of tree A viewed from parking area to north. This photo was taken in January 2020, during the first visit we performed to evaluate the trees for risk.

TREE	B	**Lombardy Poplar** *Populus nigra* **'Italica'**	RISK RATING	**HIGH**

TREE DIMENSIONS		TREE CONDITION		RECOMMENDATION
diameter (DSH)	**48.4"**	health	**Fair**	**Remove**
diameter (multi)		structure	**Poor**	
height (ft)	**90-100'**	designation	**Exceptional**	
canopy dia. (ft)	**45-60'**			

RISK ASSESSMENT	**3 year time frame**		TARGET	**Ballard Mansion or adjacent apartments to east**	
	Likelihood part will fail	Likelihood part will impact target	Likelihood part will fail & impact target	Consequences	Risk Rating
branches, crown	Probable	High	Likely	Significant	High
trunk(s)	Possible	High	Somewhat likely	Severe	Moderate
root plate	Improbable	High	Unlikely	Severe	Low

Potential Targets

- Ballard Mansion (22 W Highland Dr) – 5 feet west
- Apartments on adjacent property (1205 Queen Anne Ave N) – 18 feet east

Observations

Tree B also has a fluted base, and vigorous basal sprouting. Two micro-resistance drill tests at the base confirmed significant decay in both locations tested (see Figures 4 and 5).

The attachment points throughout the canopy of tree B appear more stable than those of the other three trees, but past topping cuts have still resulted in areas of visible decay and a probable likelihood of failure.

Photo 2. Base of tree B with 40-inch steel probe fully inserted into cavity at base. This photo was taken in January 2020, during the first visit we performed to evaluate the trees for risk.

Recommendations

Based on the current condition of the tree, and with consideration for species characteristics, we recommend tree B be removed. In order to retain the tree and reduce risk presented to surrounding targets, extensive and ongoing crown reduction pruning maintenance would be required, and further pruning injury would lead to increased decay over time, ultimately exacerbating the existing structural issues.

TREE	C	**Lombardy Poplar** *Populus nigra* **'Italica'**	RISK RATING	**HIGH**

TREE DIMENSIONS		TREE CONDITION		RECOMMENDATION
diameter (DSH)	**48.8"**	health	**Fair**	**Remove**
diameter (multi)		structure	**Poor**	
height (ft)	**90-100'**	designation	**Exceptional**	
canopy dia. (ft)	**45-60'**			

RISK ASSESSMENT	**3 year time frame**		TARGET	**Ballard Mansion or adjacent apartments to east**	
	Likelihood part will fail	Likelihood part will impact target	Likelihood part will fail & impact target	Consequences	Risk Rating
branches, crown	Probable	High	Likely	Significant	High
trunk(s)	Possible	High	Somewhat likely	Severe	Moderate
root plate	Improbable	High	Unlikely	Severe	Low

Potential Targets

- Ballard Mansion (22 W Highland Dr) – 16 feet northwest
- Apartments on adjacent property (1205 Queen Anne Ave N) – 25 feet east

Observations

Tree C has the most candelabra-shaped crown structure of the four trees. The central leads do not appear well-attached and several large wildlife cavities are visible from ground level. Decay was confirmed in the basal trunk and aerially, using the micro-resistance drill (see Figures 6 through 10).

Recommendations

Based on the current condition of the tree, and with consideration for species characteristics, we recommend tree C be removed. In order to retain the tree and reduce risk presented to surrounding targets, extensive and ongoing crown reduction pruning maintenance would be required, and further pruning injury would lead to increased decay over time, ultimately exacerbating the existing structural issues.

Photo 3. Past topping of tree C resulted in the growth of multiple reiterative leads that are now weakly attached to decaying past topping locations. This photo was taken in January 2020, during the first visit we performed to evaluate the trees for risk.

TREE	D	**Lombardy Poplar** *Populus nigra* **'Italica'**	RISK RATING	**HIGH**

TREE DIMENSIONS		TREE CONDITION		RECOMMENDATION
diameter (DSH)	**69.0"**	health	**Fair**	**Remove**
diameter (multi)		structure	**Poor**	
height (ft)	**90-100'**	designation	**Exceptional**	
canopy dia. (ft)	**45-60'**			

RISK ASSESSMENT	**3 year time frame**		TARGET	**Adjacent apartments to east**	
	Likelihood part will fail	Likelihood part will impact target	Likelihood part will fail & impact target	Consequences	Risk Rating
branches, crown	Probable	High	Likely	Significant	High
trunk(s)	Possible	High	Somewhat likely	Severe	Moderate
root plate	Improbable	High	Unlikely	Severe	Low

Potential Targets

- Ballard Mansion (22 W Highland Dr) – 25 feet north
- Apartments on adjacent property (1205 Queen Anne Ave N) – 25 feet east
- Vehicles and pedestrians on W Highland Dr – 24 feet south

Observations

Tree D has a large basal trunk cavity on the north side and several wildlife cavities visible in large parts throughout the canopy, particularly along the east side of the central leader. A significant amount of decay was confirmed in the basal trunk and aerially, using the micro-resistance drill (see Figures 11 through 16).

Recommendations

Based on the current condition of the tree, and with consideration for species characteristics, we recommend tree D be removed. In order to retain the tree and reduce risk presented to surrounding targets, extensive and ongoing crown reduction pruning maintenance would be required, and further pruning injury would lead to increased decay over time, ultimately exacerbating the existing structural issues.

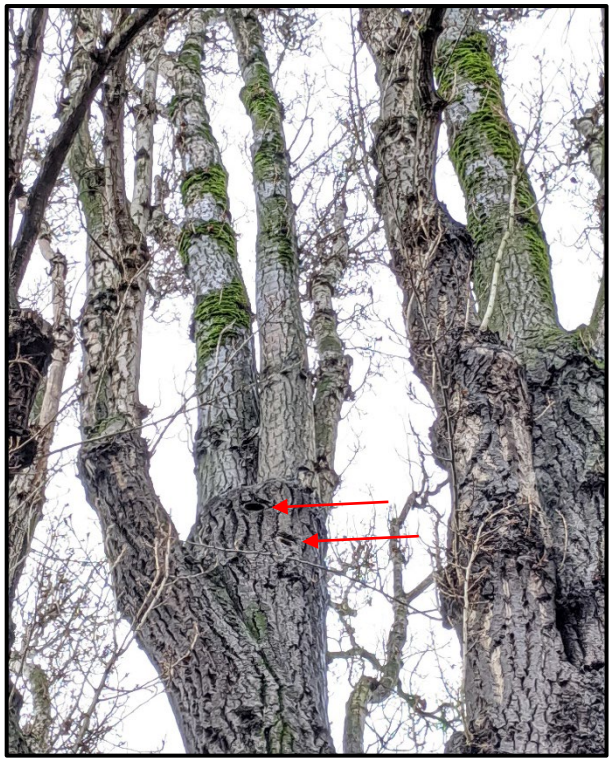


Photo 4. Past topping of tree D resulted in the growth of multiple reiterative leads that are now weakly attached to decaying past topping locations. This photo showing wildlife cavities (indicated by red arrows) was taken in January 2020, during the first visit we performed to evaluate the trees for risk.

Appendix A **SDCI GIS Maps**

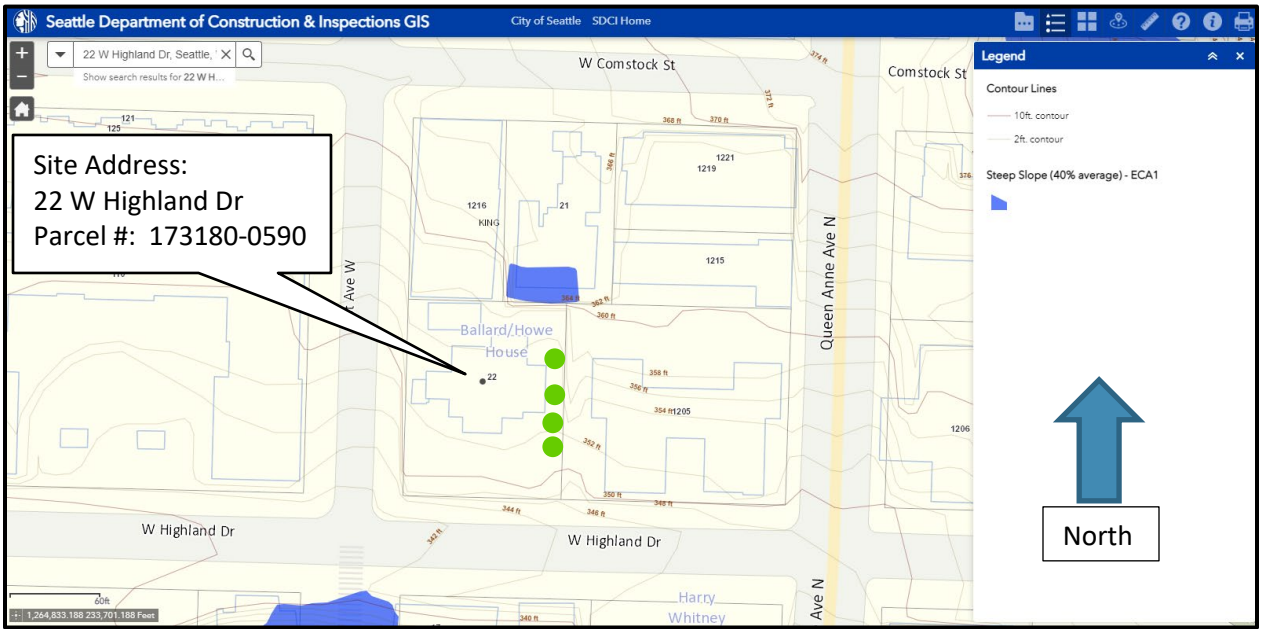


Figure 1. Screenshot of SDCI GIS map showing no ECA on site; green dots indicate approximate locations of proposed replacement trees.

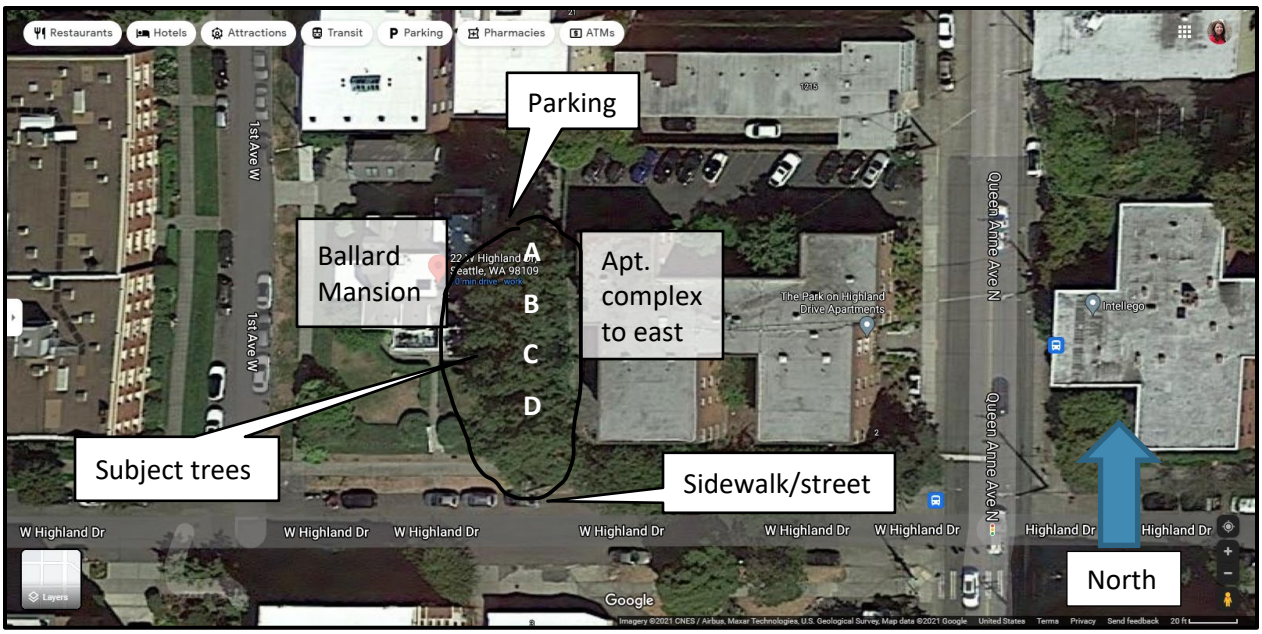


Figure 2. Screenshot of Google Maps showing subject tree locations and surrounding targets.

Appendix B **Test Results**

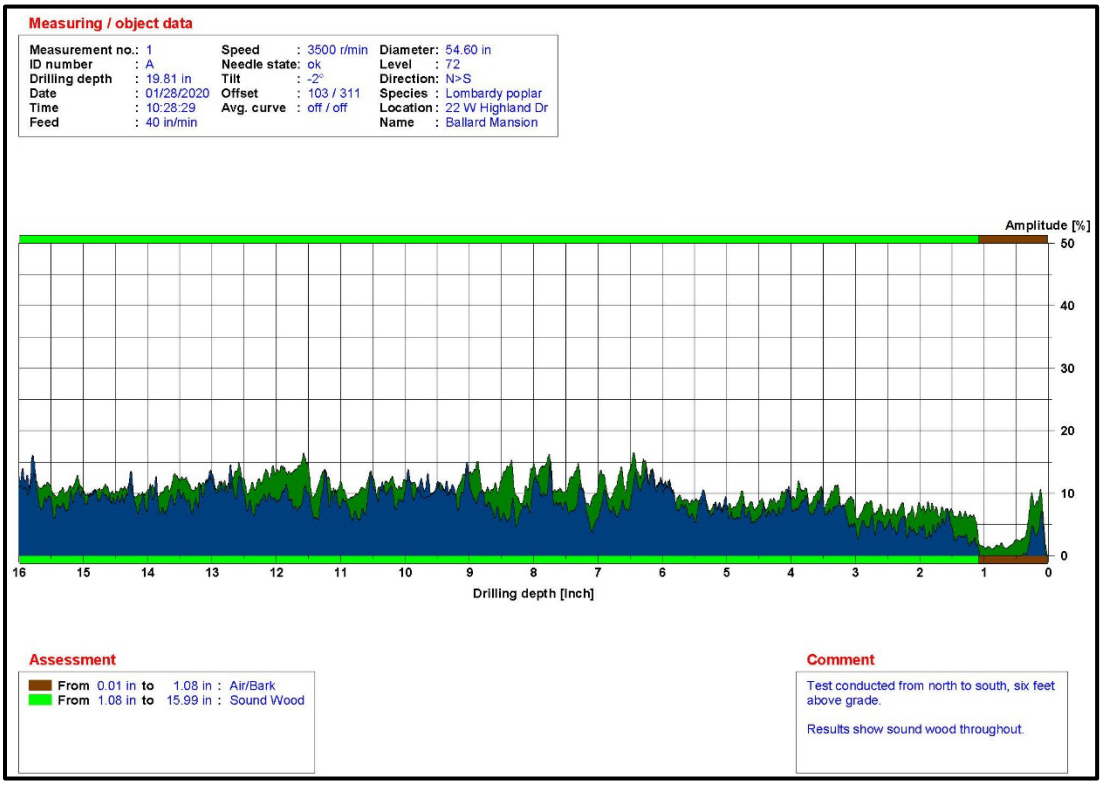


Figure 3. Results of test 1 on tree A, conducted at the base of the tree from north to south.

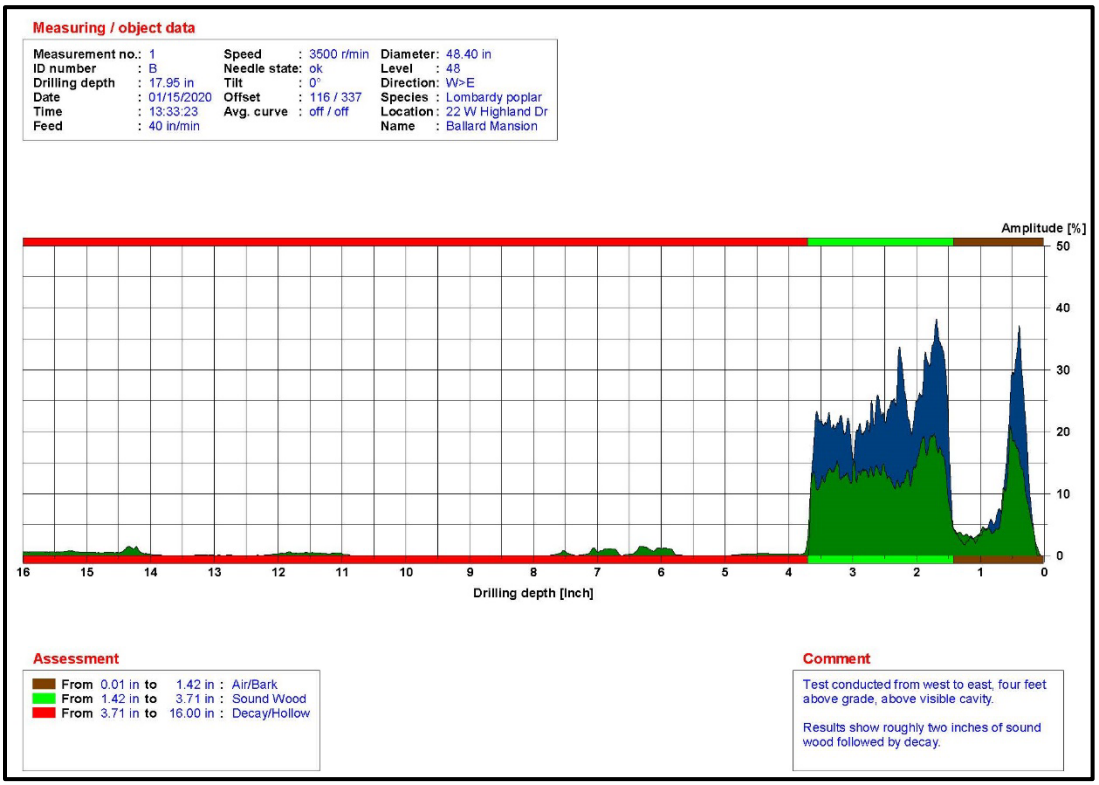


Figure 4. Results of test 1 on tree B, conducted at the base of the tree from west to east.

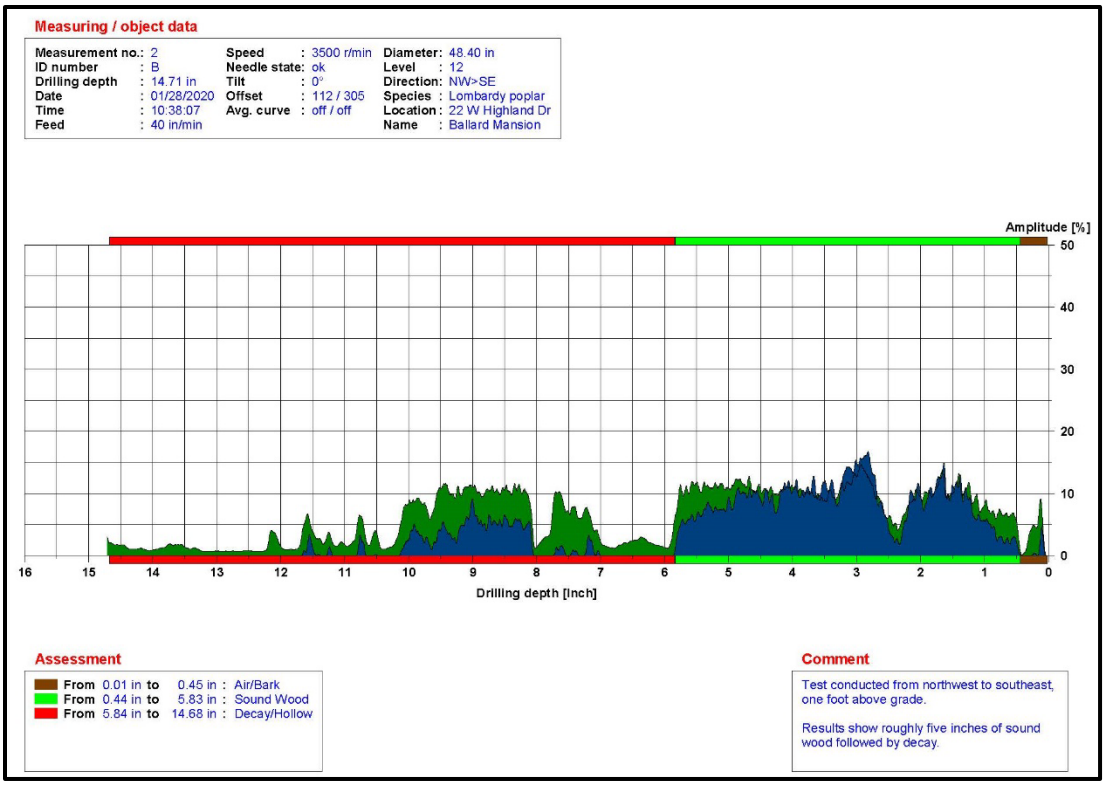


Figure 5. Results of test 2 on tree B, conducted at the base of the tree from northwest to southeast.

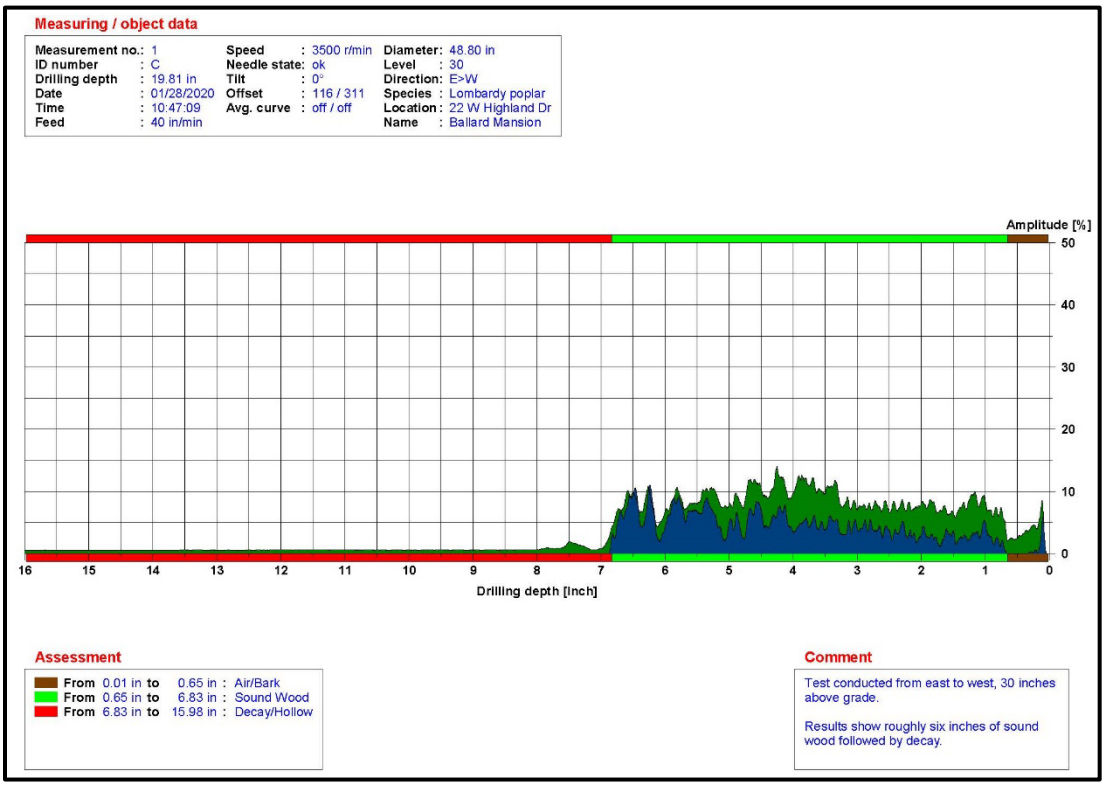


Figure 6. Results of test 1 on tree C, conducted at the base of the tree from east to west.

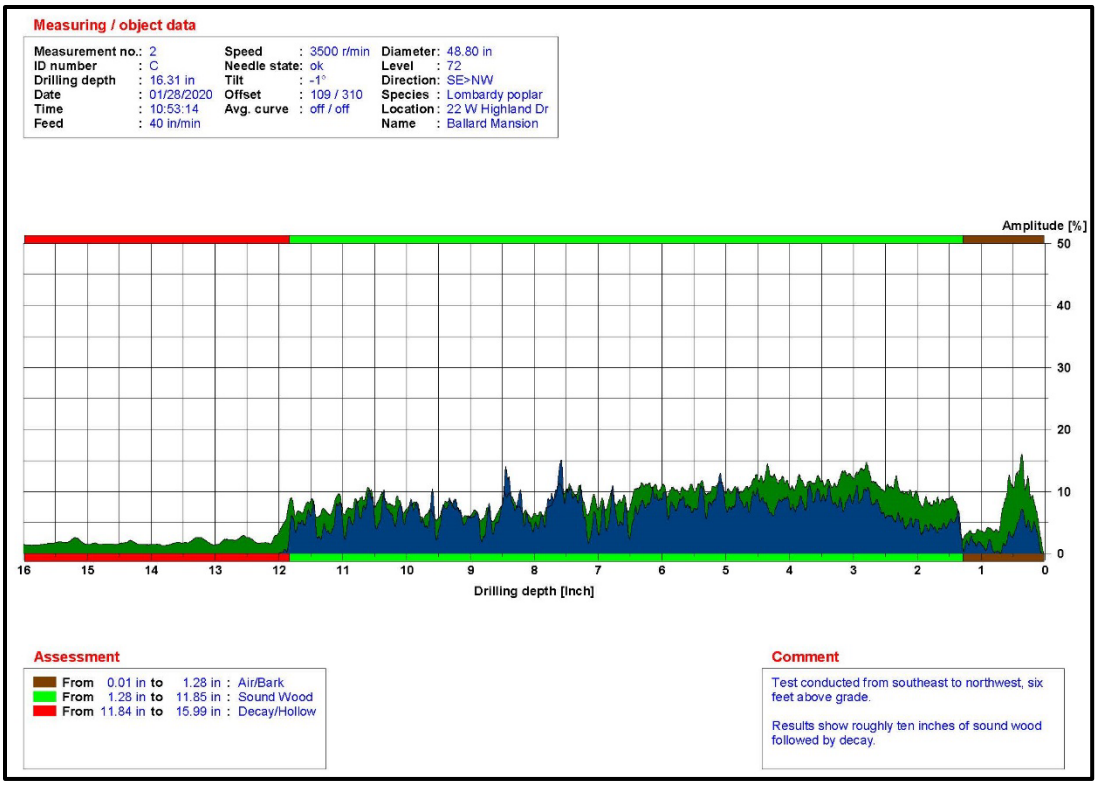


Figure 7. Results of test 2 on tree C, conducted at the base of the tree from southeast to northwest.

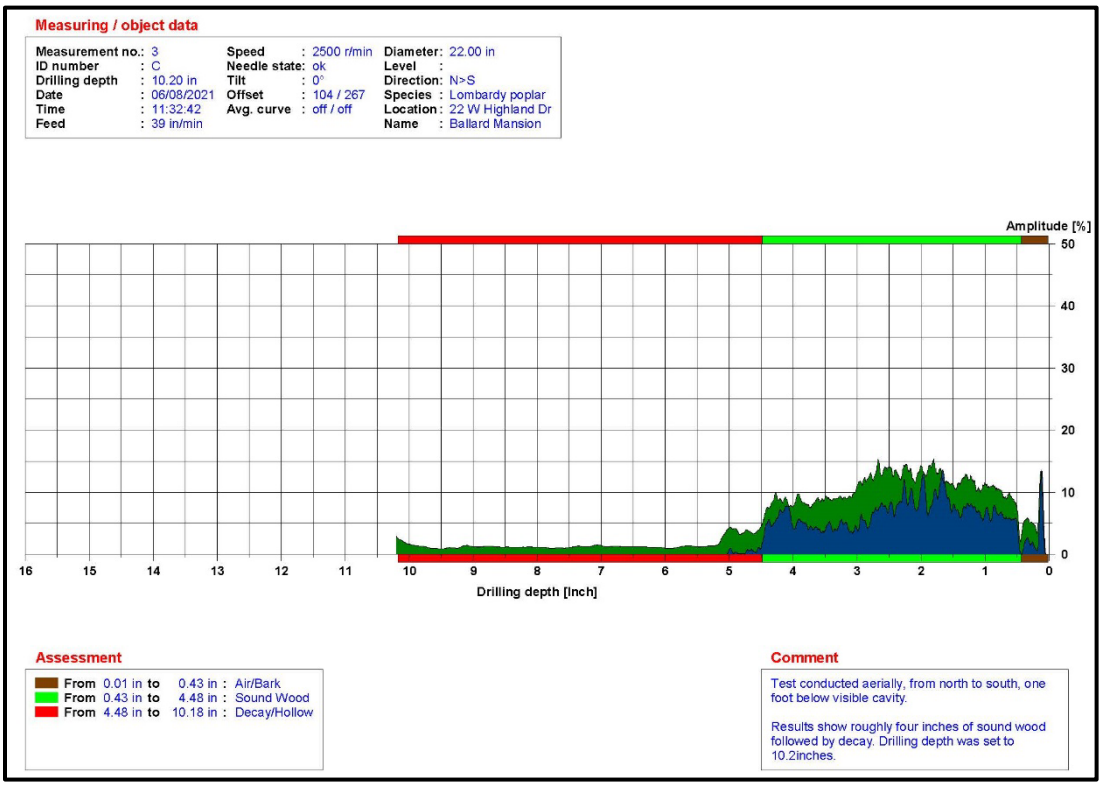


Figure 8. Results of test 3 on tree C, conducted aerially, from north to south one foot below visible cavity.

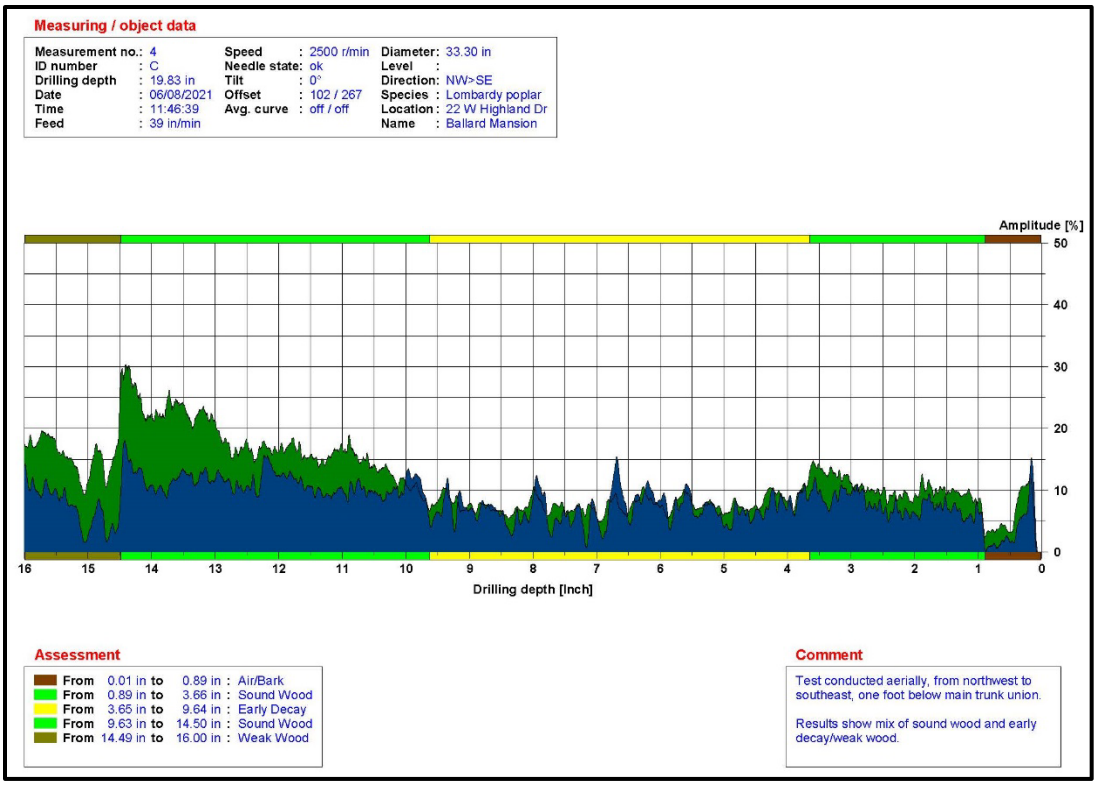


Figure 9. Results of test 4 on tree C, conducted aerially, from northwest to southeast one foot below main trunk union.

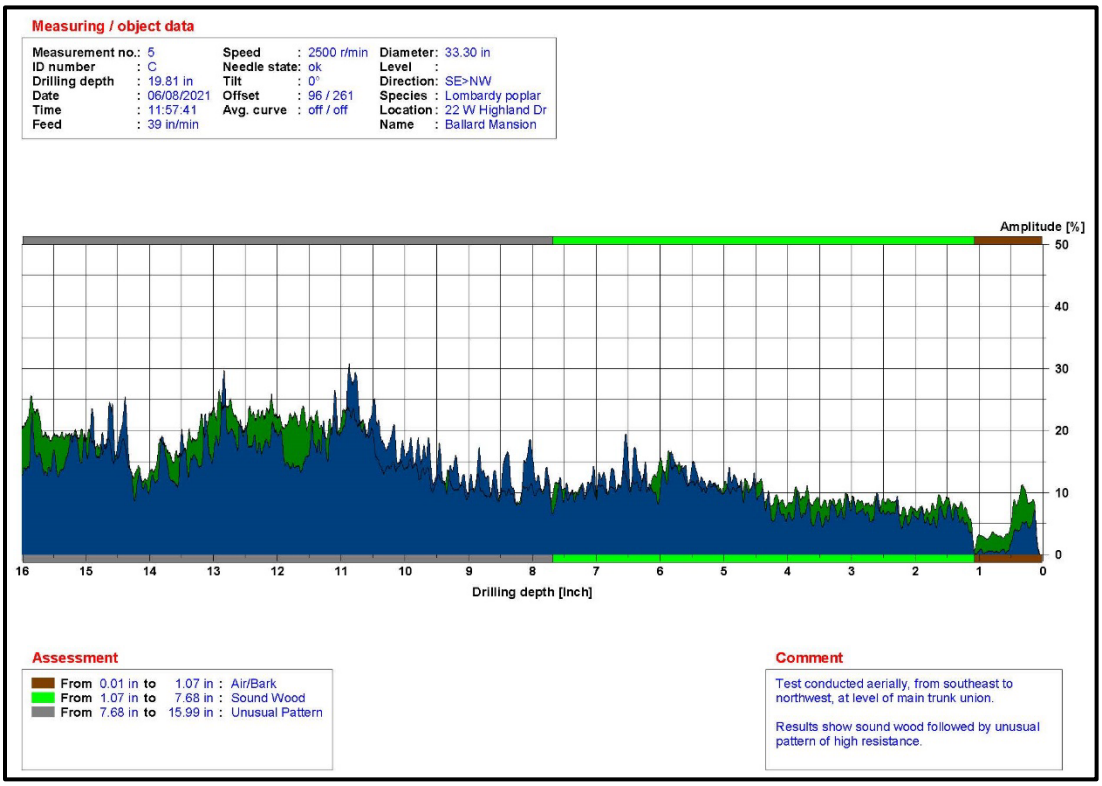


Figure 10. Results of test 5 on tree C, conducted aerially, from southeast to northwest at level of main trunk union.

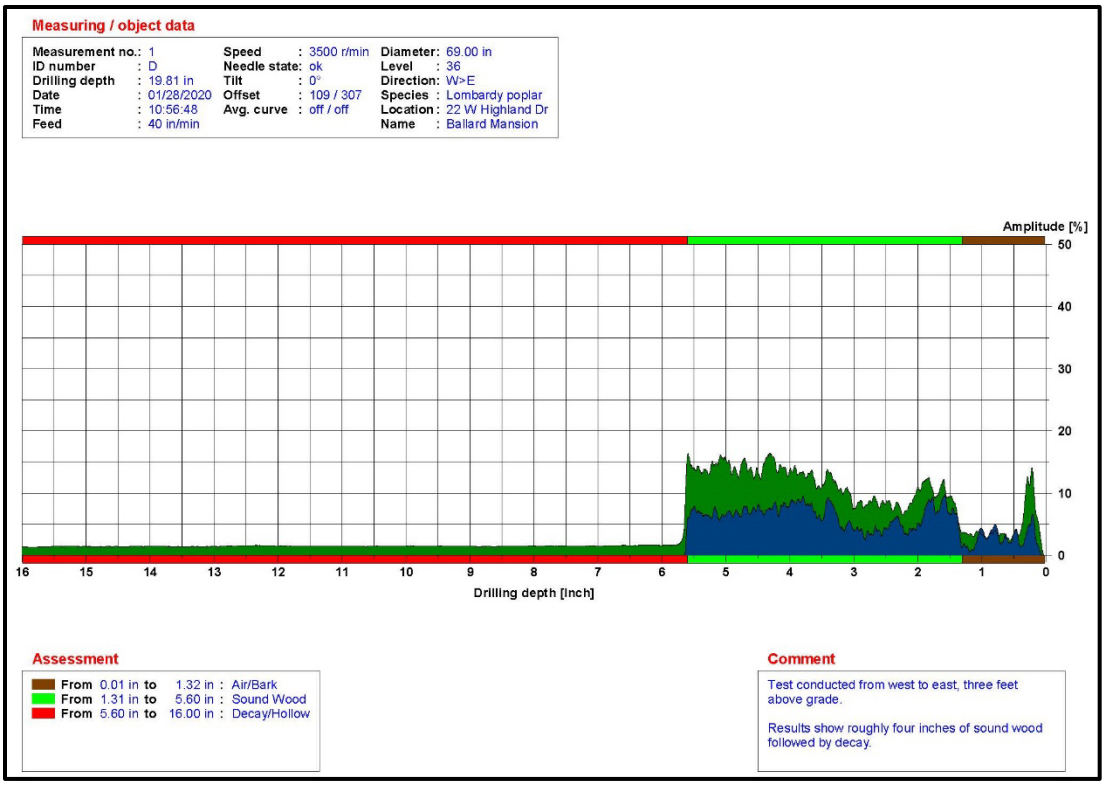


Figure 11. Results of test 1 on tree D, conducted at the base of the tree from west to east.

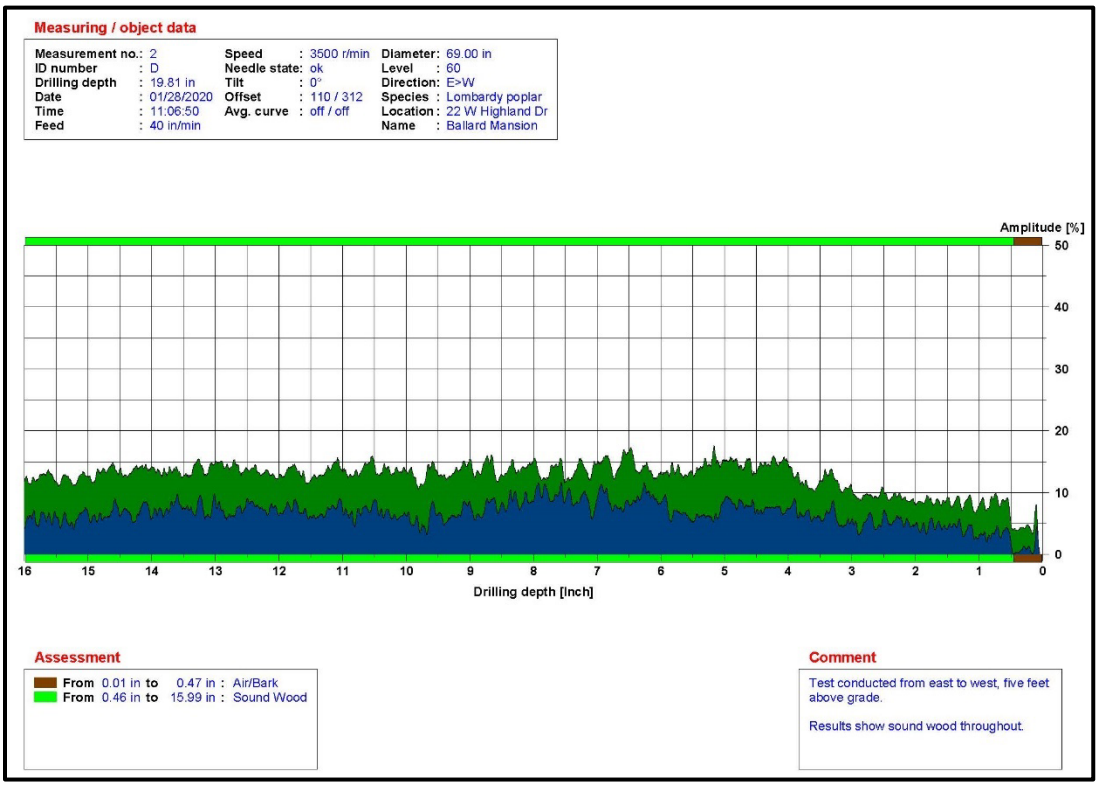


Figure 12. Results of test 2 on tree D, conducted at the base of the tree from east to west.

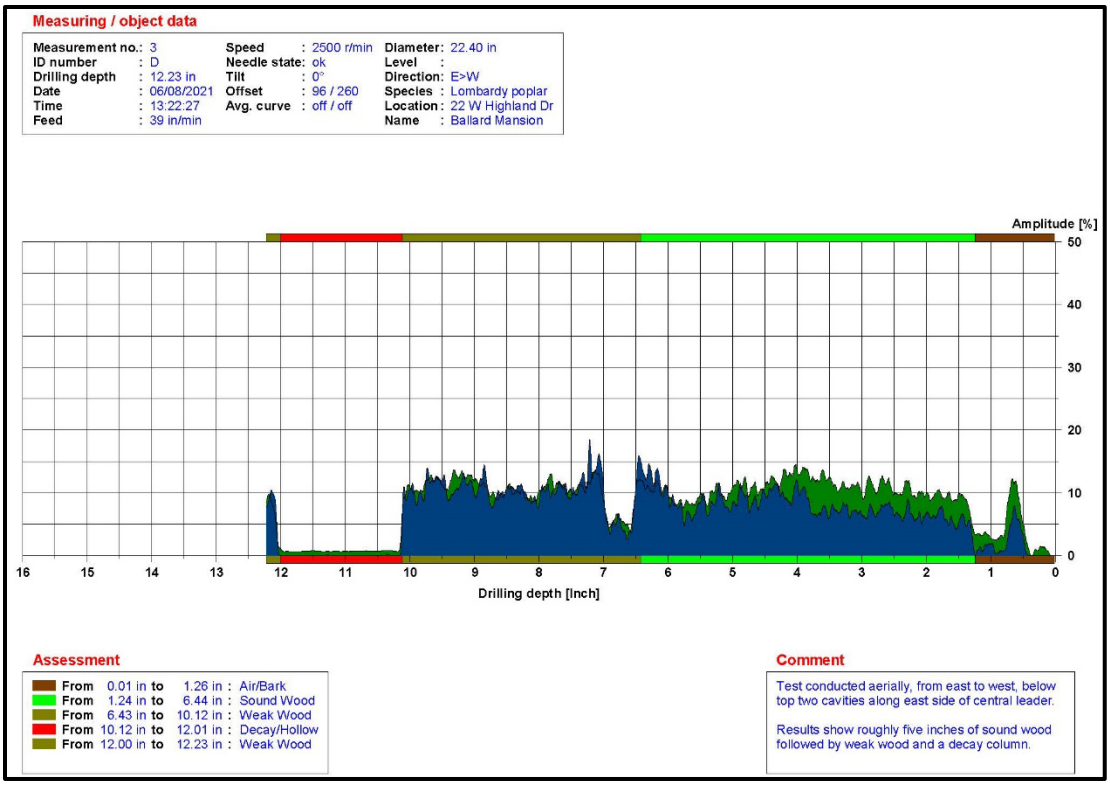


Figure 13. Results of test 3 on tree D, conducted aerially from east to west, below top two cavities along east side of central leader.

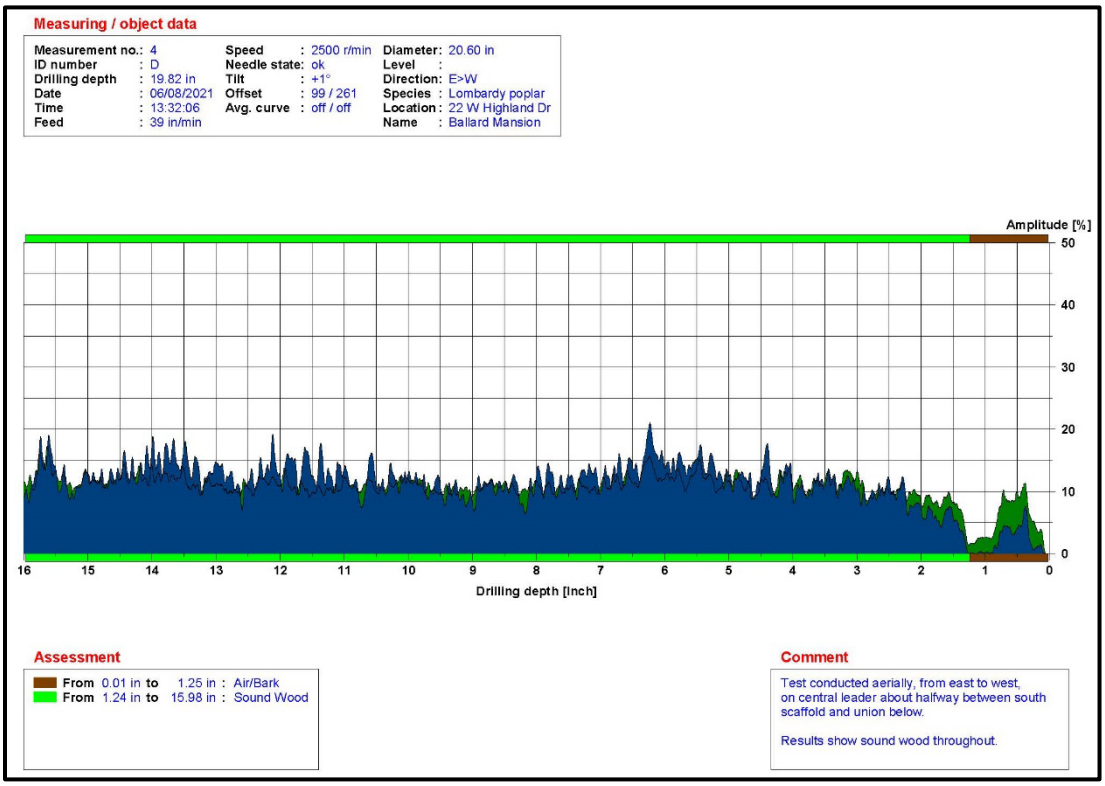


Figure 14. Results of test 4 on tree D, conducted aerially from east to west, on central leader about halfway between south scaffold and union below.

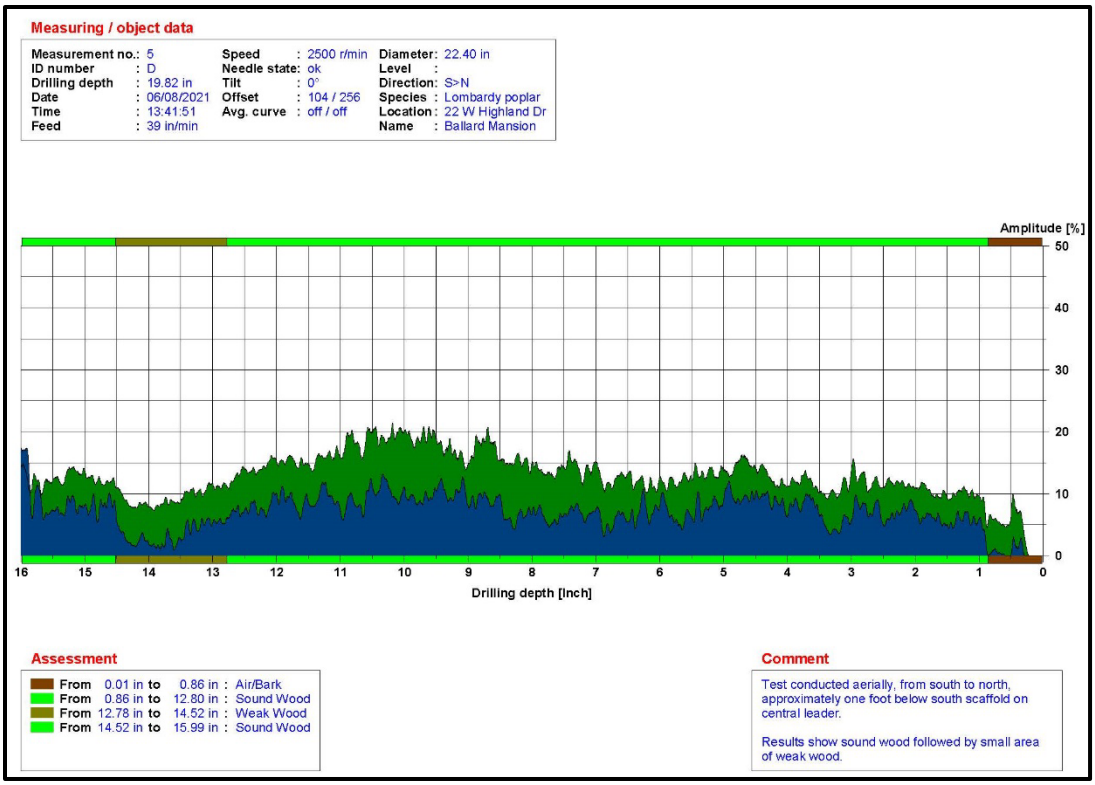


Figure 15. Results of test 5 on tree D, conducted aerially from south to north, approximately one foot below south scaffold on central leader.

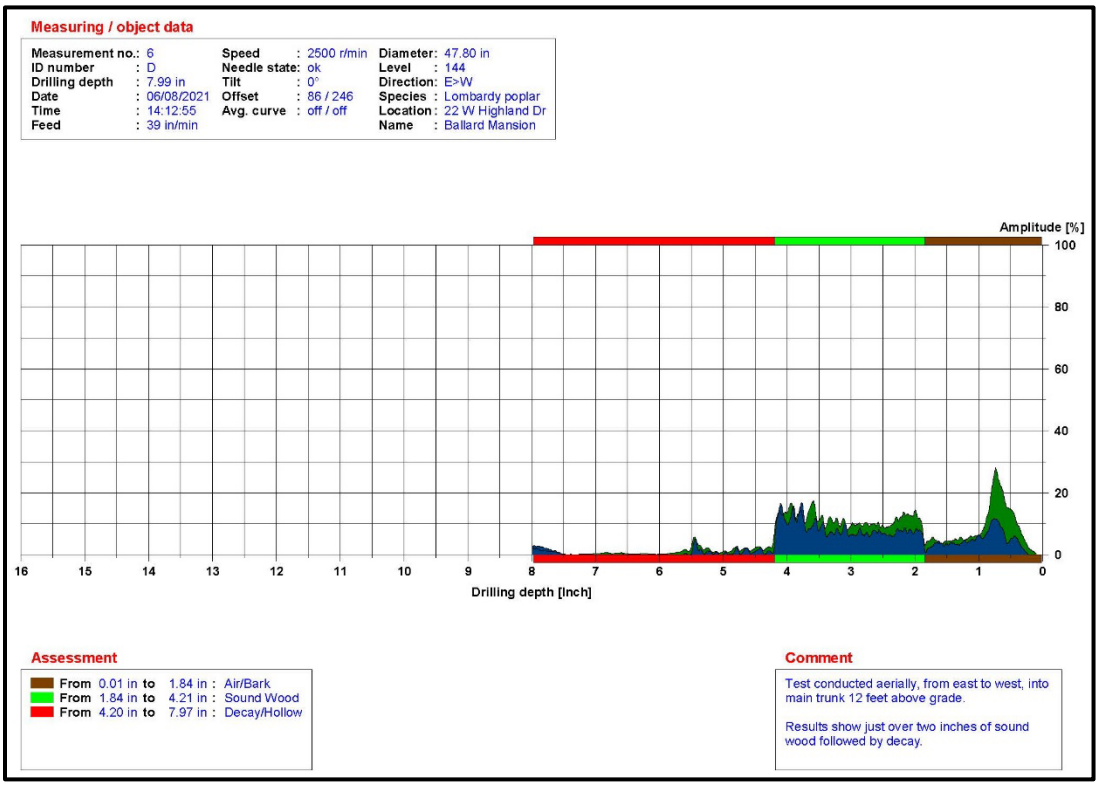


Figure 16. Results of test 6 on tree D, conducted aerially from east to west, into main trunk 12 feet above grade.

Appendix C **Additional Photographs**

Photo 5. Looking east at row of subject trees with red arrow pointing to Connor in tree D. This provides size reference for amount of tree above average level of defects where Connor is located in tree.

Photo 6. Close-up of Connor performing aerial inspection; red arrows point to wildlife cavity and approximate location of test 3 on tree C (see Figure 8) which showed only four inches of sound wood.

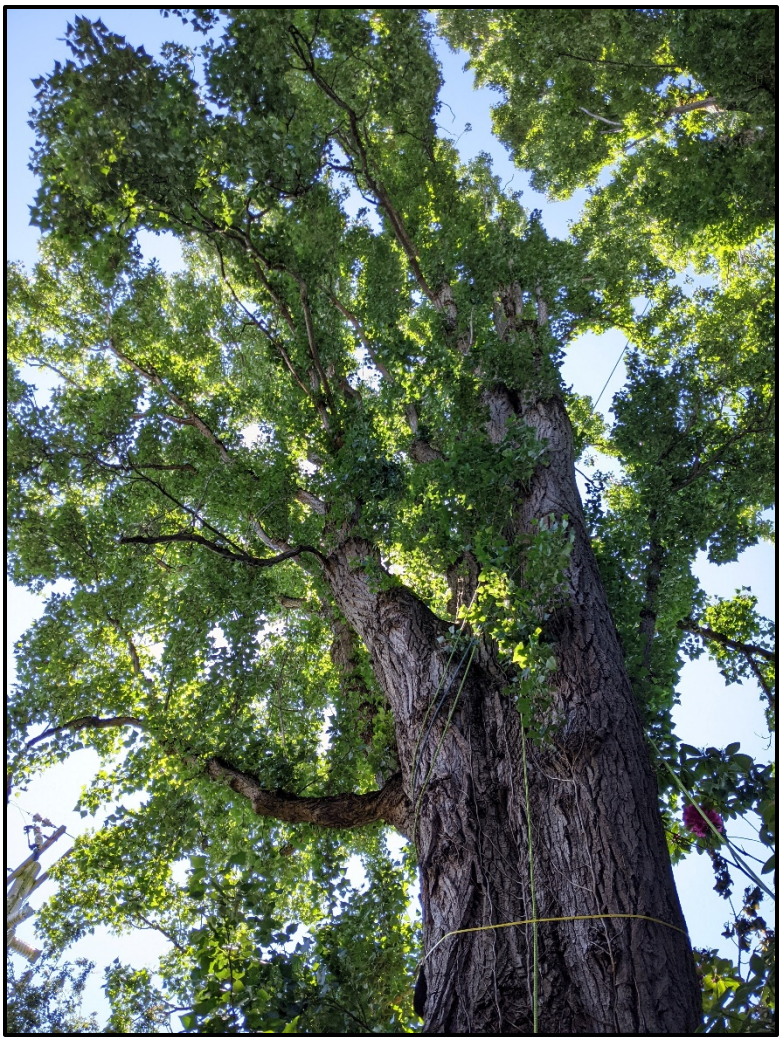


Photo 7. Tape around trunk of tree D indicates level at which test 6 was conducted (see Figure 16). The results of this test showed just over two inches of sound wood; this test result was the most concerning of all in our opinion because of how much tree material is supported by the weakened trunk of this tree.

Appendix D **Assumptions & Limiting Conditions**

1 Consultant assumes that the site and its use do not violate, and is in compliance with, all applicable codes, ordinances, statutes or regulations.

2 The consultant may provide a report or recommendation based on published municipal regulations. The consultant assumes that the municipal regulations published on the date of the report are current municipal regulations and assumes no obligation related to unpublished city regulation information.

3 Any report by the consultant and any values expressed therein represent the opinion of the consultant, and the consultant's fee is in no way contingent upon the reporting of a specific value, a stipulated result, the occurrence of a subsequent event, or upon any finding to be reported.

4 All photographs included in this report were taken by Tree Solutions, Inc. during the documented site visit, unless otherwise noted. Sketches, drawings and photographs (included in, and attached to, this report) are intended as visual aids and are not necessarily to scale. They should not be construed as engineering drawings, architectural reports or surveys. The reproduction of any information generated by architects, engineers or other consultants and any sketches, drawings or photographs is for the express purpose of coordination and ease of reference only. Inclusion of such information on any drawings or other documents does not constitute a representation by the consultant as to the sufficiency or accuracy of the information.

5 Unless otherwise agreed, (1) information contained in any report by consultant covers only the items examined and reflects the condition of those items at the time of inspection; and (2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, climbing, or coring.

6 These findings are based on the observations and opinions of the authoring arborist, and do not provide guarantees regarding the future performance, health, vigor, structural stability or safety of the plants described and assessed.

7 Measurements are subject to typical margins of error, considering the oval or asymmetrical cross-section of most trunks and canopies.

8 Tree Solutions did not review any reports or perform any tests related to the soil located on the subject property unless outlined in the scope of services. Tree Solutions staff are not and do not claim to be soils experts. An independent inventory and evaluation of the site's soil should be obtained by a qualified professional if an additional understanding of the site's characteristics is needed to make an informed decision.

9 Our assessments are made in conformity with acceptable evaluation/diagnostic reporting techniques and procedures, as recommended by the International Society of Arboriculture.

Appendix E **Methods**

Measuring

We measured the diameter of each tree at 54 inches above grade, diameter at standard height (DSH). If a tree had multiple stems, we measured each stem individually at standard height and determined a single-stem equivalent diameter by using the method outlined in the city of Seattle Director's Rule 16-2008. A tree is regulated based on this single-stem equivalent diameter value.

Evaluating

We evaluated tree health and structure utilizing visual tree assessment (VTA) methods. The basis behind VTA is the identification of symptoms, which trees produce in reaction to weak spots or areas of mechanical stress. Trees react to mechanical and physiological stresses by growing more vigorously to re-enforce weak areas, while depriving less stressed parts. Understanding uniform stress allows us to make informed judgments about the condition of a tree.

Rating

When rating tree health, we took into consideration crown indicators such as foliar density, size, color, stem and shoot extensions. When rating tree structure, we evaluated the tree for form and structural defects, including past damage and decay. Tree Solutions has adapted our ratings based on the Purdue University Extension formula values for health condition (*Purdue University Extension bulletin FNR-473-W - Tree Appraisal*). These values are a general representation used to assist arborists in assigning ratings.

Excellent - Perfect specimen with excellent form and vigor, well-balanced crown. Normal to exceeding shoot length on new growth. Leaf size and color normal. Trunk is sound and solid. Root zone undisturbed. No apparent pest problems. Long safe useful life expectancy for the species.

Good - Imperfect canopy density in few parts of the tree, up to 10% of the canopy. Normal to less than ¾ typical growth rate of shoots and minor deficiency in typical leaf development. Few pest issues or damage, and if they exist they are controllable or tree is reacting appropriately. Normal branch and stem development with healthy growth. Safe useful life expectancy typical for the species.

Fair - Crown decline and dieback up to 30% of the canopy. Leaf color is somewhat chlorotic/necrotic with smaller leaves and "off" coloration. Shoot extensions indicate some stunting and stressed growing conditions. Stress cone crop clearly visible. Obvious signs of pest problems contributing to lesser condition, control might be possible. Some decay areas found in main stem and branches. Below average safe useful life expectancy

Poor - Lacking full crown, more than 50% decline and dieback, especially affecting larger branches. Stunting of shoots is obvious with little evidence of growth on smaller stems. Leaf size and color reveals overall stress in the plant. Insect or disease infestation may be severe and uncontrollable. Extensive decay or hollows in branches and trunk. Short safe useful life expectancy.

Advanced Testing

We used a micro-resistance drill to test for decay in the trees. These drill systems measure the amount of resistance presented to the drilling needle as it is driven into the wood, perpendicular to the annual rings. The drilling needle is driven into the wood, at a constant rate, up to ½ meter deep, and can detect minute changes in wood density. The data is recorded as a graphic resistance profile using a vertical scale that represents wood density. It is then analyzed.

Appendix F **Qualified Tree Risk Assessment**

The International Society of Arboriculture has developed a standardized and systematic process for assessing tree risk. This approach evaluates the likelihood of whole tree or part failure and any associated consequences, based on what is visible during the time of the site visit and what would likely occur under normal weather conditions, over a limited time period.

Following are excerpts from Best Management Practices - Tree Risk Assessment Second Edition.[1]

Levels of Risk Assessment

Level 1 – Survey
Level 1 shall be a limited visual assessment of an individual tree or a population of trees to identify specified conditions or defects. Conditions to be identified should include obvious defects. Level 1 assessment shall be from a limited, specified perspective, such as drive-by, walk-by or aerial patrol. Level 1 survey assessment methodology shall be specified. Periodic assessments, monitoring, and follow-up recommendations should be made based on the outcome of the assessment and the objectives.

Level 2 – Basic
Level 2 assessments shall include a 360-degree, ground-based visual inspection of the tree crown, trunk, above-ground roots, and site conditions around the tree. Use of hand tools, trowels, binoculars, or probes, shall not be precluded from a level 2 assessment. A mallet or other tool should be used to sound the trunk, root collar and above ground buttress roots in order to detect large hollows and loose bark. Level 2 shall provide a detailed visual inspection of a tree(s) to detect the conditions specified and tree defects in relation to surrounding targets.

A basic assessment should include the identification of conditions indicating the presence of structural defects including, but not limited to:

- Dead, diseased, broken branches, stems, and roots;
- Weakly attached branches and co-dominant stems;
- Mechanical damage and cracks into the wood;
- Abnormal growth such as swelling, ribs, flat areas, or seams;
- Indications of decay and cankers;
- Root plate lifting, abnormal trunk flare, lack of trunk flare, soil cracks, grade change, restricted or undermined roots;
- Unusual tree architecture including lean, low live crown ratio, poor taper, and crown asymmetry

Level 2 inspections should be conducted annually; more frequently if species, tree size, tree condition or other factors indicate a need for a more frequent interval. Scheduling inspections shall be the responsibility of the tree owner. Monitoring and follow-up recommendations should be made based on the outcome of the assessment and the objectives.

[1] E. Smiley, N. Matheny, S. Lilly. Best Management Practices: Tree Risk Assessment Second Edition. Champaign, IL: ISA 2017.

Level 3 – Advanced
Level 3 assessments shall include all Level 2 requirements. Level 3 shall include advanced method(s) to provide more detailed information on tree structural strength, the extent of specific structural defects, conditions, or other factors in relation to a target. Level 3 assessment shall include, but is not limited to, one or more of the following tree assessment techniques: *aerial assessment* of branch or stem defects; *micro-resistance* d*rilling*; evaluation of *target risk*; *increment boring*; *probing*; *pull testing*; *radiation assessment* (e.g. radar, x-ray, gamma ray); *sonic assessment*; s*ounding*; and, s*ub-surface root* and/or *soil assessment*.

Likelihood of Failure

Improbable: the tree or branch is not likely to fail during normal weather conditions and may not fail in many severe weather conditions within the specified time frame.

Possible: failure could occur, but it is unlikely during normal weather conditions within the specified time frame.

Probable: failure may be expected under normal weather conditions within the specified time frame.

Imminent: failure has started or is most likely to occur in the near future, even if there is no significant wind or increased load. This is a rare occurrence for a risk assessor to encounter, and it may require immediate action to protect people from harm.

Likelihood of Impacting a Target

Very Low: the chance of the failed tree or branch impacting the specified target is remote. This is the case in a rarely used site fully exposed to the assessed tree or an occasionally used site that is partially protected by trees or structures. Examples included a rarely used trail or trail head in a rural area, or an occasionally used area that has some protection against being struck by the tree failure due to the presence of other trees between the tree being assessed and the targets.

Low: it is not likely that the failed tree or branch will impact the target. This is the case in an occasionally used area that is fully exposed to the assessed tree, a frequently used area that is partially exposed to the assessed tree, or a constant target that is well protected from the assessed tree. Examples include a little-used service road next to the assessed tree or a frequently used public street that has a street tree between the street and the assessed tree.

Medium: the failed tree or branch may not impact the target, with nearly equal likelihood. This is the case in a frequently used area that is fully exposed on one side to the assessed tree or a constantly occupied area that is partially protected from the assessed tree. Examples include a suburban street next to the assessed street tree or a house that is partially protected from the assessed tree by an intermediate tree.

High: the failed tree or branch will most likely impact the target. This is the case when a fixed target is fully exposed to the assessed tree or near a high-use road or walkway with an adjacent street tree.

Figure 17. Risk Rating Matrix

Likelihood of Failure (Tree)	Likelihood of Impacting Target (Person or Property)			
	Very Low	Low	Medium	High
Imminent	**Unlikely**	**Somewhat likely**	**Likely**	**Very likely**
Probable	**Unlikely**	**Unlikely**	**Somewhat likely**	**Likely**
Possible	**Unlikely**	**Unlikely**	**Unlikely**	**Somewhat likely**
Improbable	**Unlikely**	**Unlikely**	**Unlikely**	**Unlikely**

Matrix shows the level of risk as the combined factors of 'likelihood of a tree failing' and 'likelihood of impacting a specified target'.

Consequences of Failure

Negligible: consequences are those that involve low-value property damage or disruption that can be replaced or repaired, and do not involve personal injury.

Minor: consequences are those that involve low-to-moderate property damage or small disruptions to traffic or a communication utility.

Significant: consequences are those that involve property damage of moderate-to-high value, considerable disruption, or personal injury.

Severe: consequences are those that could involve serious personal injury or death, damage to high-value property, or disruption of important activities.

Figure 18. Consequence Matrix

Likelihood of Failure and Impact	Consequences (to target)			
	Negligible	Minor	Significant	Severe
Very likely	**Low**	**Moderate**	**High**	**Extreme**
Likely	**Low**	**Moderate**	**High**	**High**
Somewhat likely	**Low**	**Low**	**Moderate**	**Moderate**
Unlikely	**Low**	**Low**	**Low**	**Low**

Matrix showing the level of risk as the combination of the likelihood of a tree failing and impacting a specified target, and the severity of the associated consequences.

Risk Rating Categories, Timing for Mitigation

In the tree risk assessment matrix, four terms are used to define levels of risk; low, moderate, high, and extreme. These risk ratings are used to communicate the level of risk and to assist in making recommendations to the owner or risk manager for mitigation and inspection frequency. **The priority for action depends upon the risk rating and risk tolerance of the owner or manager.**

Extreme: The extreme-risk category applies in situations in which failure is *imminent* and there is a high likelihood of impacting the target, and the consequences of the failure are "severe." The tree risk assessor should recommend that **mitigation measures be taken as soon as possible.** In some cases, this may mean immediate restriction of access to the target zone area to avoid injury to people.

High: High-risk situations are those for which consequences are "significant" and likelihood is "very likely" or "likely," or consequences are "severe" and likelihood is "likely." This combination of likelihood and consequences indicates that the tree risk assessor should recommend mitigation measures be taken. **The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or manager. In populations of trees, the priority of high-risk trees is second only to extreme-risk trees.**

Moderate: Moderate-risk situations are those for which consequences are "minor" and likelihood is "very likely" or "likely"; or likelihood is "somewhat likely" and consequences are "significant" or "severe." The tree risk assessor may recommend mitigation and/or retaining and monitoring. **The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or manager. In populations of trees, moderate-risk trees represent a lower priority than high- or extreme-risk trees.**

Low: The low-risk category applies when consequences are "negligible "and likelihood is "unlikely"; or consequences are "minor" and likelihood is "somewhat likely." **Some trees with this level of risk may benefit from mitigation or maintenance measures, but immediate action is not usually required. Tree risk assessors may recommend retaining and monitoring these trees, as well as mitigation that does not include removal of the tree.**

Options for Mitigation

Remove the risk altogether, if possible, by cutting off one or more branches, removing dead wood, or possibly removing the entire tree. Extreme risk situations should be closed off until the risk is abated.

Modify the risk of failure probability. In some cases, it may be possible to reduce the probability of failure by adding mechanical support in the form of cables braces or props.

Modify the risk rating by moving the target. Risk ratings can sometimes be lowered by moving the target so that there is a much lower probability of the defective part striking anything. Moving the target should generally be seen as an interim measure.

Retain and monitor. This approach is used where some defects have been noted but they are not yet serious and the present risk level is only moderate.

Definitions (Risk)

acceptable risk: the degree or amount of risk that the owner, manager, or controlling authority is willing to accept (ISA 2013)

acceptable threshold: the highest level of risk that does not exceed the owner/manager's tolerance (ISA 2013)

consequences: outcome of an event (ISA 2013)

consequences of failure: personal injury, property damage, or disruption of activities due to the failure of a tree or tree part (ISA 2013)

likelihood: the chance of an event occurring. In the context of tree failures, the term may be used to specify: (1) the chance of a tree failure occurring; (2) the chance of impacting a specified target; and (3) the combination of the likelihood of a tree failing and the likelihood of impacting a specified target (ISA 2013)

likelihood of failure: the chance of a tree failure occurring within the specified time frame (ISA 2013)

likelihood of failure and impact: the chance of a tree failure occurring and impacting a target within the specified time frame (ISA 2013)

likelihood of impact: the chance of a tree failure impacting a target during the specified time frame ISA 2013)

likely (likelihood of failure and impact): defined by its placement in the likelihood matrix (see *Matrix 1 on page 2 of the Tree Risk Assessment form*); imminent likelihood of failure and medium likelihood of impact, or probable likelihood of failure and high likelihood of impact (ISA 2013)

limited visual assessment: a visual assessment from a specified perspective such as foot, vehicle, or aerial (airborne) patrol of an individual tree or a population of trees near specified targets to identify specified conditions or obvious defects (ISA 2013)

mitigation: process of reducing damages or risk (Lilly 2001)

mitigation options: alternatives for reducing risk (ISA 2013)

mitigation priority: established hierarchy for mitigation of risks based on risk ratings, budget, resources, and policies (ISA 2013)

residual risk: risk remaining after mitigation (ISA 2013)

risk perception: the subjective perceived level of risk from a situation or object, often differing from the actual level of risk (ISA 2013)

risk rating: the level of risk combining the likelihood of a tree failing and impacting a specified target, and severity of the associated consequences (ISA 2013)

risk tolerance: degree of risk that is acceptable to the owner, manager, or controlling authority (ISA 2013)

target: person, object, or structure that could be injured or damaged in the event of tree or branch failure (Lilly 2001)

target-based actions: risk mitigation actions aimed at reducing the likelihood of impact in the event of tree failure (ISA 2013)

target management: acting to control the exposure of targets to risk (ISA 2013)

target value: the monetary worth of something; the importance or preciousness of something (ISA 2013)

target zone: the area where a tree or branch is likely to land if it were to fail (ISA 2013)

tree risk assessment: a systematic process used to identify, analyze, and evaluate tree risk (ISA 2013)

tree risk evaluation: the process of comparing the assessed risk against given risk criteria to determine the significance of the risk (ISA 2013)

tree risk management: the application of policies, procedures, and practices used to identify, evaluate, mitigate, monitor, and communicate tree risk (ISA 2013)

unacceptable risk: a degree of risk that exceeds the tolerance of the owner, manager, or controlling authority (ISA 2013)

Basic Tree Risk Assessment Form

Client: Ballard Mansion c/o Holly Betz, Cornell and Associates | Date: June 8, 2021 | Time: AM/PM

Address/Tree location: 22 W Highland Dr, Seattle, WA 98119 | Tree no.: A | Sheet: 1 of 2

Tree species: Lombardy poplar (Populus nigra 'Italica') | dbh: 54.6 inches | Height: 90-100 feet | Crown spread dia.: 45-60 feet

Assessor(s): Haley Galbraith, PN-7512BM and Connor McDermott, PN-8704A | Tools used: steel probe, laser hypsometer, micro-resistance drill | **Time frame**: 3 years

Target Assessment

Target number	Target description	Target protection	Target zone: Target within drip line	Target zone: Target within 1x Ht.	Target zone: Target within 1.5x Ht.	Occupancy rate (1–rare, 2 – occasional, 3 – frequent, 4 – constant)	Practical to move target?	Restriction practical?
1	Ballard Mansion (22 W Highland Dr)	None	✓			4	No	No
2	Apartments on adj. property to east (1205 Queen Anne Ave N)	None	✓			4	No	No
3	Parking area to north	None	✓			3	No	No
4								

Site Factors

History of failures 4 Lombardy poplars previously grew in ROW to west and had several failures leading to removal **Topography** Flat ☒ Slope ☐ _____% **Aspect** _____

Site changes None ☒ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe 4 ROW poplars removed in February 2020

Soil conditions Limited volume ☒ Saturated ☐ Shallow ☒ Compacted ☒ Pavement over roots ☒ 40 % Describe Retaining wall to east/driveway for apts.

Prevailing wind direction S/SW **Common weather** Strong winds ☒ Ice ☐ Snow ☐ Heavy rain ☒ Describe Typical PNW; exposed at top of Queen Anne hill

Tree Health and Species Profile

Vigor Low ☐ Normal ☒ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 95 % Chlorotic _____% Necrotic 5 %

Pests/Biotic _____ **Abiotic** _____

Species failure profile Branches ☒ Trunk ☒ Roots ☐ Describe Upright form with multiple co-dominant leaders narrowly attached. Decay prone. Vigorous sprouting.

Load Factors

Wind exposure Protected ☐ Partial ☒ Full ☐ Wind funneling ☐ _____ **Relative crown size** Small ☐ Medium ☐ Large ☒

Crown density Sparse ☐ Normal ☐ Dense ☒ **Interior branches** Few ☐ Normal ☐ Dense ☒ **Vines/Mistletoe/Moss** ☒ Ivy at base

Recent or expected change in load factors 4 previously existing Lombardy poplars removed from adjacent ROW in Feb. 2020; addt'l. ROW poplars to north of those removed prior.

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 100 %

Dead twigs/branches ☒ 5 % overall Max. dia. approx. 2

Broken/Hangers Number _____ Max. dia. _____

Over-extended branches ☐

Pruning history

Crown cleaned ☐ Thinned ☐ Raised ☐

Reduced ☐ Topped ☒ Lion-tailed ☐

Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐

Codominant ☒ Many narrowly-attached co-dom. unions throughout Included bark ☐

Weak attachments ☒ associated with past topping cuts Cavity/Nest hole ____% circ.

Previous branch failures ☒ from other similar trees Similar branches present ☒

Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐

Conks ☐ Heartwood decay ☒ associated with past topping cuts

Response growth _____

Condition(s) of concern: Decayed areas throughout canopy due to past topping cuts; several wildlife cavities observed.

Part Size: up to 24 inches diameter Fall Distance: up to 100 feet

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☒

Likelihood of failure Improbable ☐ Possible ☐ Probable ☒ Imminent ☐

Condition(s) of concern: Narrowly attached co-dominant unions with included bark throughout canopy.

Part Size: up to 24 inches diameter Fall Distance: up to 100 feet

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☒

Likelihood of failure Improbable ☐ Possible ☐ Probable ☒ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐

Codominant stems ☐ Included bark ☐ Cracks ☐

Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐

Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐

Cavity/Nest hole _____ % circ. Depth _____ Poor taper ☐

Lean _____° Corrected? _____

Response growth _____

Condition(s) of concern _____

Part Size _____ Fall Distance _____

Load on defect N/A ☒ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth_____ Stem girdling ☐

Dead ☐ Decay ☐ Conks/Mushrooms ☐

Ooze ☐ Cavity ☐ _____% circ.

Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____

Root plate lifting ☐ Soil weakness ☐

Response growth _____

Condition(s) of concern _____

Part Size _____ Fall Distance _____

Load on defect N/A ☒ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Risk Categorization

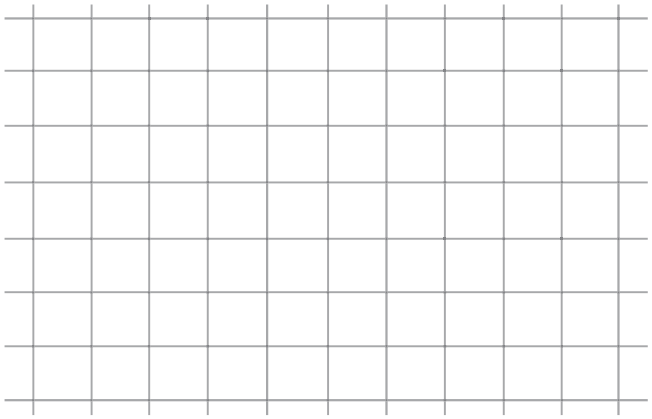
Target (Target number or description)	Tree part	Condition(s) of concern	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating (from Matrix 2)
1	Large canopy parts	Decay/weak attach.			●					●			●				●		High
2					●					●			●				●		High
3					●				●			●						●	Mod.

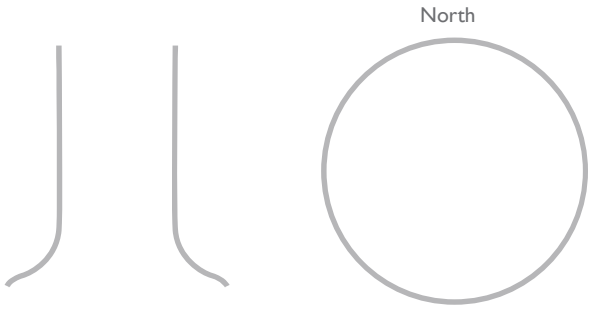
Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impact: Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure: Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low





Notes, explanations, descriptions

The Ballard Mansion residence and the apartments on the adjacent property to the east are both fixed targets that are fully exposed to the tree, therefore, there is a high likelihood of impact if large canopy part failure was to occur. Based on our observations over the course of multiple inspections, we believe large canopy part failure is probable. In the event that failure and impact occurred, consequences would be significant.

Mitigation options

1. Based on the current condition of the tree, and with consideration for species characteristics, we recommend tree A be removed. **Residual risk** None
2. In order to retain the tree and reduce risk presented to surrounding targets, extensive and ongoing crown reduction pruning would be required. **Residual risk** Mod. - High
3. _____ **Residual risk** _____
4. _____ **Residual risk** _____

Overall tree risk rating Low ☐ Moderate ☐ High ■ Extreme ☐

Overall residual risk None ■ Low ☐ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason Advanced (level 3) inspections already performed in 2020 and 2021.

Inspection limitations ■ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe _____

Basic Tree Risk Assessment Form

Client: Ballard Mansion c/o Holly Betz, Cornell and Associates | Date: June 8, 2021 | Time: AM/PM

Address/Tree location: 22 W Highland Dr, Seattle, WA 98119 | Tree no.: B | Sheet: 1 of 2

Tree species: Lombardy poplar (Populus nigra 'Italica') | dbh: 48.4 inches | Height: 90-100 feet | Crown spread dia.: 45-60 feet

Assessor(s): Haley Galbraith, PN-7512BM and Connor McDermott, PN-8704A | Tools used: steel probe, laser hypsometer, micro-resistance drill | **Time frame**: 3 years

Target Assessment

Target number	Target description	Target protection	Target zone: Target within drip line	Target zone: Target within 1x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate (1–rare, 2 – occasional, 3 – frequent, 4 – constant)	Practical to move target?	Restriction practical?
1	Ballard Mansion (22 W Highland Dr)	None	✓			4	No	No
2	Apartments on adj. property to east (1205 Queen Anne Ave N)	None	✓			4	No	No
3								
4								

Site Factors

History of failures 4 Lombardy poplars previously grew in ROW to west and had several failures leading to removal **Topography** Flat ■ Slope ☐ _____% **Aspect** _____

Site changes None ■ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe 4 ROW poplars removed in February 2020

Soil conditions Limited volume ■ Saturated ☐ Shallow ■ Compacted ■ Pavement over roots ■ 40 % Describe Retaining wall to east/driveway for apts.

Prevailing wind direction S/SW **Common weather** Strong winds ■ Ice ☐ Snow ☐ Heavy rain ■ Describe Typical PNW; exposed at top of Queen Anne hill

Tree Health and Species Profile

Vigor Low ☐ Normal ■ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 95 % Chlorotic _____% Necrotic 5 %

Pests/Biotic _____ **Abiotic** _____

Species failure profile Branches ■ Trunk ■ Roots ☐ Describe Upright form with multiple co-dominant leaders narrowly attached. Decay prone. Vigorous sprouting.

Load Factors

Wind exposure Protected ☐ Partial ■ Full ☐ Wind funneling ☐ _____ **Relative crown size** Small ☐ Medium ☐ Large ■

Crown density Sparse ☐ Normal ☐ Dense ■ **Interior branches** Few ☐ Normal ☐ Dense ■ **Vines/Mistletoe/Moss** ■ Ivy at base

Recent or expected change in load factors 4 previously existing Lombardy poplars removed from adjacent ROW in Feb. 2020; addt'l. ROW poplars to north of those removed prior.

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 100 %

Dead twigs/branches ■ 5 % overall Max. dia. approx. 2

Broken/Hangers Number _____ Max. dia. _____

Over-extended branches ☐

Pruning history

Crown cleaned ☐ Thinned ☐ Raised ☐

Reduced ☐ Topped ■ Lion-tailed ☐

Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐

Codominant ■ Many narrowly-attached co-dom. unions throughout Included bark ☐

Weak attachments ■ associated with past topping cuts Cavity/Nest hole ____% circ.

Previous branch failures ■ from other similar trees Similar branches present ■

Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐

Conks ☐ Heartwood decay ■ associated with past topping cuts

Response growth _____

Condition(s) of concern: Decayed areas throughout canopy due to past topping cuts; several wildlife cavities observed.

Part Size: up to 24 inches diameter Fall Distance: up to 100 feet

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ■

Likelihood of failure Improbable ☐ Possible ☐ Probable ■ Imminent ☐

Condition(s) of concern: Narrowly attached co-dominant unions with included bark throughout canopy.

Part Size: up to 24 inches diameter Fall Distance: up to 100 feet

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ■

Likelihood of failure Improbable ☐ Possible ☐ Probable ■ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐

Codominant stems ☐ Included bark ☐ Cracks ☐

Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐

Lightning damage ☐ Heartwood decay ■ Conks/Mushrooms ☐

Cavity/Nest hole _____ % circ. Depth _____ Poor taper ☐

Lean _____° Corrected? _____

Response growth _____

Condition(s) of concern: Significant decay confirmed in low basal trunk.

Part Size: Whole tree Fall Distance: up to 100 feet

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ■

Likelihood of failure Improbable ☐ Possible ■ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth_____ Stem girdling ☐

Dead ☐ Decay ☐ Conks/Mushrooms ☐

Ooze ☐ Cavity ☐ _____% circ.

Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____

Root plate lifting ☐ Soil weakness ☐

Response growth _____

Condition(s) of concern _____

Part Size _____ Fall Distance _____

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Risk Categorization

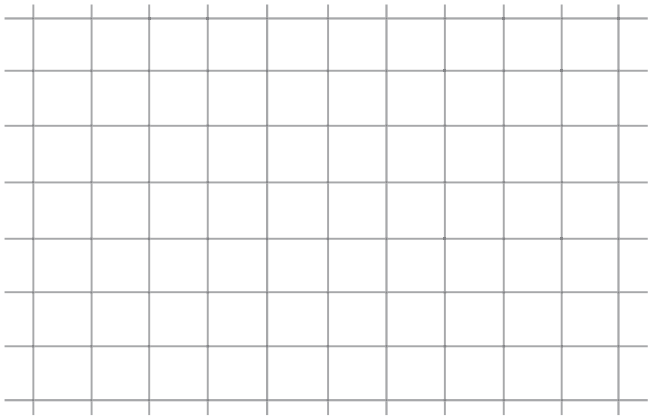
Target (Target number or description)	Tree part	Condition(s) of concern	Likelihood: Failure: Improbable	Likelihood: Failure: Possible	Likelihood: Failure: Probable	Likelihood: Failure: Imminent	Likelihood: Impact: Very low	Likelihood: Impact: Low	Likelihood: Impact: Medium	Likelihood: Impact: High	Likelihood: Failure & Impact (from Matrix 1): Unlikely	Likelihood: Failure & Impact (from Matrix 1): Somewhat	Likelihood: Failure & Impact (from Matrix 1): Likely	Likelihood: Failure & Impact (from Matrix 1): Very likely	Consequences: Negligible	Consequences: Minor	Consequences: Significant	Consequences: Severe	Risk rating (from Matrix 2)
1	Large canopy parts	Decay/weak attach.			●					●			●				●		High
2					●					●			●				●		High
1	Whole tree	Decayed basal trunk		●						●		●						●	Mod.
2				●						●		●						●	Mod.

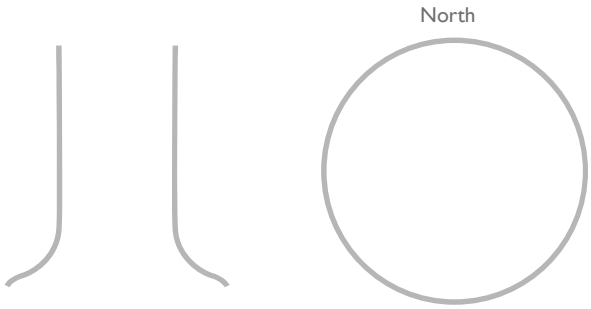
Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impact			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low





Notes, explanations, descriptions

The Ballard Mansion residence and the apartments on the adjacent property to the east are both fixed targets that are fully exposed to the tree, therefore, there is a high likelihood of impact if large canopy part failure was to occur. Based on our observations over the course of multiple inspections, we believe large canopy part failure is probable. In the event that failure and impact occurred, consequences would be significant.

Mitigation options

1. Based on the current condition of the tree, and with consideration for species characteristics, we recommend tree B be removed. **Residual risk** None
2. In order to retain the tree and reduce risk presented to surrounding targets, extensive and ongoing crown reduction pruning would be required. **Residual risk** Mod. - High
3. _____ **Residual risk** _____
4. _____ **Residual risk** _____

Overall tree risk rating Low ☐ Moderate ☐ High ■ Extreme ☐

Overall residual risk None ■ Low ☐ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason Advanced (level 3) inspections already performed in 2020 and 2021.

Inspection limitations ■ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe _____

This datasheet was produced by the International Society of Arboriculture (ISA) — 2017

Basic Tree Risk Assessment Form

Client: Ballard Mansion c/o Holly Betz, Cornell and Associates | Date: June 8, 2021 | Time: AM/PM

Address/Tree location: 22 W Highland Dr, Seattle, WA 98119 | Tree no.: C | Sheet: 1 of 2

Tree species: Lombardy poplar (Populus nigra 'Italica') | dbh: 48.8 inches | Height: 90-100 feet | Crown spread dia.: 45-60 feet

Assessor(s): Haley Galbraith, PN-7512BM and Connor McDermott, PN-8704A | Tools used: steel probe, laser hypsometer, micro-resistance drill | **Time frame**: 3 years

Target Assessment

Target number	Target description	Target protection	Target zone: Target within drip line	Target zone: Target within 1 x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate (1–rare, 2 – occasional, 3 – frequent, 4 – constant)	Practical to move target?	Restriction practical?
1	Ballard Mansion (22 W Highland Dr)	None	✓			4	No	No
2	Apartments on adj. property to east (1205 Queen Anne Ave N)	None	✓			4	No	No
3								
4								

Site Factors

History of failures 4 Lombardy poplars previously grew in ROW to west and had several failures leading to removal **Topography** Flat ☒ Slope ☐ _____% **Aspect** _____

Site changes None ☒ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe 4 ROW poplars removed in February 2020

Soil conditions Limited volume ☒ Saturated ☐ Shallow ☒ Compacted ☒ Pavement over roots ☒ 40 % Describe Retaining wall to east/driveway for apts.

Prevailing wind direction S/SW **Common weather** Strong winds ☒ Ice ☐ Snow ☐ Heavy rain ☒ Describe Typical PNW; exposed at top of Queen Anne hill

Tree Health and Species Profile

Vigor Low ☐ Normal ☒ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 95 % Chlorotic _____% Necrotic 5 %

Pests/Biotic _____ **Abiotic** _____

Species failure profile Branches ☒ Trunk ☒ Roots ☐ Describe Upright form with multiple co-dominant leaders narrowly attached. Decay prone. Vigorous sprouting.

Load Factors

Wind exposure Protected ☐ Partial ☒ Full ☐ Wind funneling ☐ _____ **Relative crown size** Small ☐ Medium ☐ Large ☒

Crown density Sparse ☐ Normal ☐ Dense ☒ **Interior branches** Few ☐ Normal ☐ Dense ☒ **Vines/Mistletoe/Moss** ☒ Ivy at base

Recent or expected change in load factors 4 previously existing Lombardy poplars removed from adjacent ROW in Feb. 2020; addt'l. ROW poplars to north of those removed prior.

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 100 %

Dead twigs/branches ☒ 5 % overall Max. dia. approx. 2

Broken/Hangers Number _____ Max. dia. _____

Over-extended branches ☐

Pruning history

Crown cleaned ☐ Thinned ☐ Raised ☐

Reduced ☐ Topped ☒ Lion-tailed ☐

Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐

Codominant ☒ Many narrowly-attached co-dom. unions throughout Included bark ☐

Weak attachments ☒ associated with past topping cuts Cavity/Nest hole ____% circ.

Previous branch failures ☒ from other similar trees Similar branches present ☒

Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐

Conks ☐ Heartwood decay ☒ associated with past topping cuts

Response growth _____

Condition(s) of concern: Decayed areas throughout canopy due to past topping cuts; several wildlife cavities observed.

Part Size: up to 24 inches diameter | Fall Distance: up to 100 feet

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☒

Likelihood of failure Improbable ☐ Possible ☐ Probable ☒ Imminent ☐

Condition(s) of concern: Narrowly attached co-dominant unions with included bark throughout canopy.

Part Size: up to 24 inches diameter | Fall Distance: up to 100 feet

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☒

Likelihood of failure Improbable ☐ Possible ☐ Probable ☒ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐

Codominant stems ☐ Included bark ☐ Cracks ☐

Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐

Lightning damage ☐ Heartwood decay ☒ Conks/Mushrooms ☐

Cavity/Nest hole _____ % circ. Depth _____ Poor taper ☐

Lean _____° Corrected? _____

Response growth _____

Condition(s) of concern: Significant decay confirmed in low basal trunk.

Part Size: Whole tree | Fall Distance: up to 100 feet

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☒

Likelihood of failure Improbable ☐ Possible ☒ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth_____ Stem girdling ☐

Dead ☐ Decay ☐ Conks/Mushrooms ☐

Ooze ☐ Cavity ☐ _____% circ.

Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____

Root plate lifting ☐ Soil weakness ☐

Response growth _____

Condition(s) of concern _____

Part Size _____ Fall Distance _____

Load on defect N/A ☒ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Risk Categorization

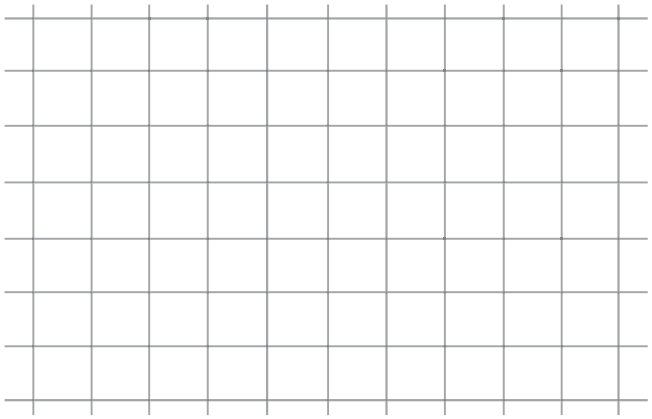
Target (Target number or description)	Tree part	Condition(s) of concern	Likelihood: Failure: Improbable	Likelihood: Failure: Possible	Likelihood: Failure: Probable	Likelihood: Failure: Imminent	Likelihood: Impact: Very low	Likelihood: Impact: Low	Likelihood: Impact: Medium	Likelihood: Impact: High	Likelihood: Failure & Impact (from Matrix 1): Unlikely	Likelihood: Failure & Impact (from Matrix 1): Somewhat	Likelihood: Failure & Impact (from Matrix 1): Likely	Likelihood: Failure & Impact (from Matrix 1): Very likely	Consequences: Negligible	Consequences: Minor	Consequences: Significant	Consequences: Severe	Risk rating (from Matrix 2)
1	Large canopy parts	Decay/weak attach.			●					●			●				●		High
2					●					●			●				●		High
1	Whole tree	Decayed basal trunk		●						●		●						●	Mod.
2				●						●		●						●	Mod.

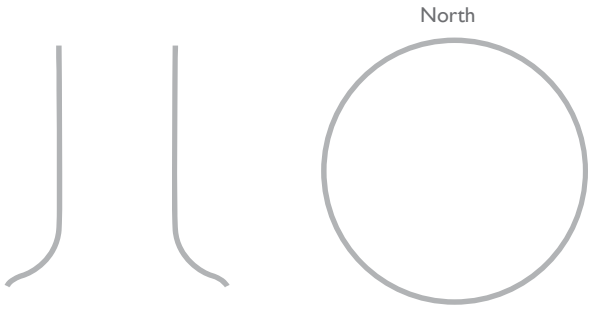
Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impact: Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure: Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low





Notes, explanations, descriptions

The Ballard Mansion residence and the apartments on the adjacent property to the east are both fixed targets that are fully exposed to the tree, therefore, there is a high likelihood of impact if large canopy part failure was to occur. Based on our observations over the course of multiple inspections, we believe large canopy part failure is probable. In the event that failure and impact occurred, consequences would be significant.

Mitigation options

1. Based on the current condition of the tree, and with consideration for species characteristics, we recommend tree C be removed. **Residual risk** None
2. In order to retain the tree and reduce risk presented to surrounding targets, extensive and ongoing crown reduction pruning would be required. **Residual risk** Mod. - High
3. _____ **Residual risk** _____
4. _____ **Residual risk** _____

Overall tree risk rating Low ☐ Moderate ☐ High ■ Extreme ☐

Overall residual risk None ■ Low ☐ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason Advanced (level 3) inspections already performed in 2020 and 2021.

Inspection limitations ■ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe _____

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2	Apartments on adj. property to east (1205 Queen Anne Ave N)	None	✓			4	No	No
3	Vehicles and pedestrians on W Highland Dr to the south	None		✓		3	No	No
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Site Factors

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Conks ☐ Heartwood decay ■ associated with past topping cuts

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Likelihood of failure Improbable ☐ Possible ☐ Probable ■ Imminent ☐

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Lean _____° Corrected? _____

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Part Size: Whole tree Fall Distance: up to 100 feet

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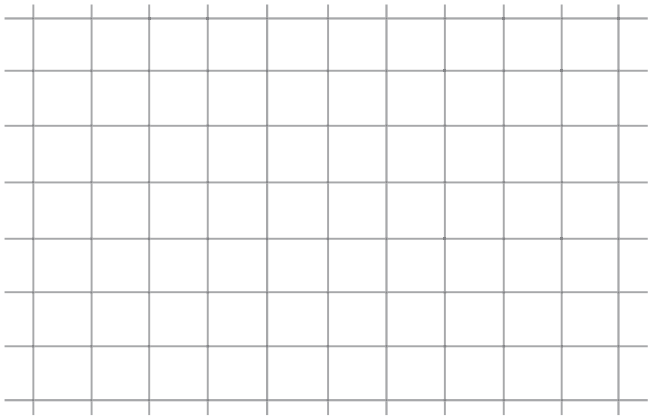

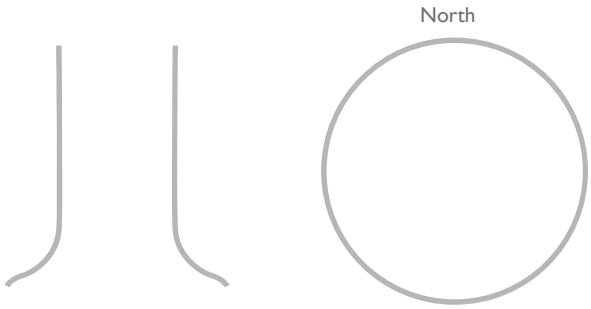

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