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March 1, 2024 12067

John Ugrob
Operations Superintendent
City of Encinitas
160 Calle Magdalena
Encinitas, California 92024

Subject: Indian Laurel Tree Risk Evaluation – 610 2nd Street, City of Encinitas, California 92024

Dear Mr. Ugrob:

In January 2022, West Coast Arborists (WCA) identified and inspected an Indian laurel fig tree (*Ficus microcarpa*) (Tree ID 5112ETREE) for poor structure for the City of Encinitas (City), details unknown. After WCA's inspection, Tree ID 5112ETREE was placed on the annual pruning schedule for downtown Encinitas *Ficus* trees. Dudek arborists routinely inspect trees identified as "high-risk trees" on Arbor Access, West Coast Arborists' workflow website platform, as part of Dudek's contracted responsibilities with the City. On December 12, 2023, a Dudek arborist inspected the Indian laurel tree (Tree ID 5112ETREE) located at 610 2nd Street, Encinitas, California. During the **Level 1 Limited Visual Inspection**, the Dudek arborist observed a large area of heartwood decay in the main stem of the tree that progresses into a large **co-dominant stem**. The arborist subsequently performed a **tree risk assessment** to evaluate the level of risk that the tree may present to the surrounding community (terms shown in bold are defined in Attachment A, Glossary of Terms).

To assess the risk associated with the subject tree, Dudek's International Society of Arboriculture (ISA) Certified Arborist and ISA Tree Risk Assessment Qualified Arborist evaluated the tree and provided recommendations for short- and long-term tree management. Dudek arborist Katrina Burritt evaluated the subject tree and its surrounding environment on January 24, 2024. During the inspection, the arborist evaluated the tree and the risk it presents to the public and surrounding infrastructure. The tree evaluation included an inspection of the tree's crown for trimming recommendations, of the trunk and **scaffold branches** for overall structural soundness, and of the trunk base and roots for the presence of observable **cavities** or signs of rot. The evaluation focused on identifying root, trunk, and/or branch **defects** that may pose a risk to the community. In addition, **sonic tomography** was conducted at the base of the tree to detect any internal decay within the trunk of the tree. Growing-environment evaluations included a standard site protocol to determine if there are factors that may be causing or may lead to future tree decline and/or increased risk to the surrounding community. The evaluation focused on collecting information that could be used to determine the tree's **risk rating** to help formulate recommendations for short- and long-term tree management. This letter report summarizes the results of Dudek's assessment, and provides recommendations for tree management.

1 Overview

Dudek's assessment and evaluation consisted of the following:

1. Perform a **Level 2 Basic Tree Risk Assessment** of one Indian laurel (Tree ID 5112ETREE) located on 2nd Steet between West E Street and West F Street in the City's right-of-way.
2. Perform a **Level 3 Advanced Assessment** of the Indian laurel to detect any internal decay within the trunk of the tree.
3. Develop a letter report and associated tree information matrix that identifies any potential hazards, obvious defects, and potential **targets**, and provide recommended mitigation for the observed defects.

2 Evaluation Methods

On January 24, 2024, Dudek ISA Certified Arborist and ISA Tree Risk Assessment Qualified Arborist Katrina Burritt evaluated one Indian laurel on 2nd Street between West E Street and West F Street in the City's right-of-way. The evaluation consisted of a Level 2 Basic Tree Risk Assessment and a Level 3 Advanced Assessment with the use of a PiCUS 74 Sonic Tomograph. The evaluation focused on the trunk, crown, and root collar, and exposed **buttress roots**. No root excavations were performed during the assessment. Tree health and structure were evaluated based on the ISA Tree Risk Assessment Manual (ISA 2017a). The following sections detail the methods used during the evaluation.

2.1 Level 2 Basic Tree Risk Assessment

A Level 2 Basic Tree Risk Assessment is a 360-degree visual assessment that evaluates site conditions and a tree's crown, trunk, trunk flare, and visible aboveground roots. The assessment involves inspection of the tree's crown, branches, trunk, and **root collar** for the presence of structural defects, such as **included bark**, cavities, **fungal fruiting bodies**, and **decay**. The Level 2 Basic Tree Risk Assessment also involves evaluation of the likelihood that an observed defect could fail, the likelihood of the defect impacting a specific target should failure occur, and the subsequent damage that may occur should failure and impact occur. Through this evaluation, the level of risk for a tree and/or a specific tree part is determined using ISA's Tree Risk Assessment Form (ISA 2017b) and based on a defined timeframe. The defined timeframe establishes the period for which risk is being evaluated to determine the likelihood of failure during that given timeframe. The defined timeframe for this risk assessment was 12 months, with the assumption of normal weather conditions for the region. In addition, estimates were made about the likelihood of a tree impacting a specific target (e.g., vehicle, person, house) and about the level of risk as a combination of the **likelihood of the tree or tree part failing** and impacting a target, and the severity of the **consequences from that failure** (see Exhibit 1). Using the tables provided in Exhibit 1, the arborist determined if the observed defect and/or tree had a low, moderate, high, or extreme risk of failure.

Exhibit 1. Tree Risk Matrices

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

2.2 Level 3 Advanced Assessment

A Level 3 Advanced Assessment is performed in conjunction with, or after, a Level 2 Basic Tree Risk Assessment to provide detailed information about specific tree parts, defects, targets, and site conditions. Specialized equipment, data analysis, and expertise are usually required for advanced assessments. For this assessment, sonic tomography was used to perform a Level 3 Advanced Assessment of the trunk of the tree. The sonic tomograph provides a detailed analysis of the structural integrity of the trunk and is discussed in the following section.

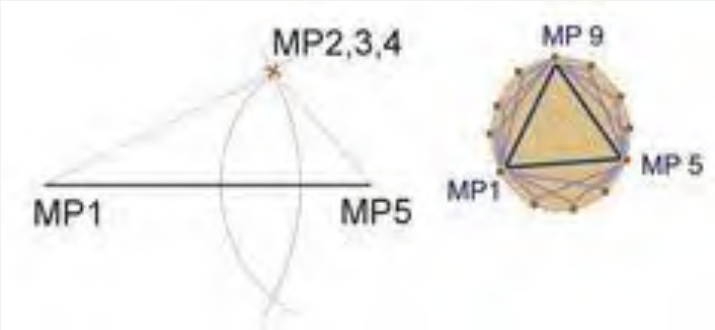
Sonic Tomography

Sonic tomography detects decay, cavities, and **fractures** in trees by measuring the velocity of sound waves as they pass through wood. Differences in velocity help determine areas of healthy wood and areas of damaged wood, because damaged wood has less elasticity and density than healthy wood. The reduction in elasticity results in the inability of sound waves to take a direct path through the wood, thereby indicating the presence of damaged wood. The speed of sound in wood correlates with wood quality, and is, therefore, a measure of the breaking safety of the trunk (i.e., acceptable level of trunk damage/hollowness) and **residual wall thickness** (i.e., remaining undamaged wood).

To evaluate the presence and level of potential decay, cavities, and/or fractures within trees, a series of evenly spaced **measuring points** (MPs) are installed. MPs consist of pins that are tapped into the tree with a hammer until they make contact with the wood and are past the tree's bark layer. Contact with wood allows for accurate sound transmission. Upon completion of MP placement, the geometry of the tree is recorded using PiCUS calipers and a **triangulation method** (Exhibits 2 and 3). During the triangulation method, the MP positions are split into triangles, and the lengths of all sides are measured. The resulting measurements provide a detailed image of a tree's geometry, which is essential for calculating the sonic tomogram of a tree.

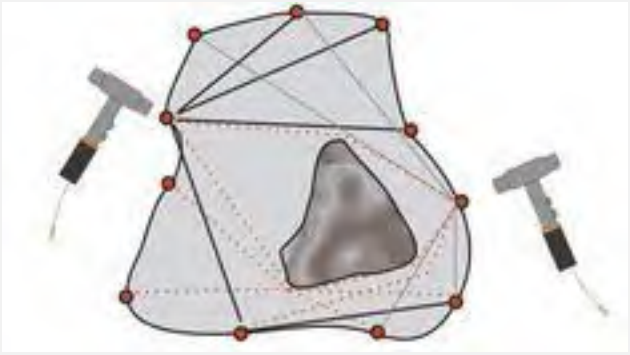
Exhibit 2. Example of Calculating a Tree's Geometry (not subject tree)

Exhibit 3. Triangulation Method



Once the tree's geometry is calculated and recorded, sensors are attached to the MPs and sonic measurements are taken. The sonic measurements are taken by tapping each MP with an electronic hammer that creates sonic waves (Exhibit 4).

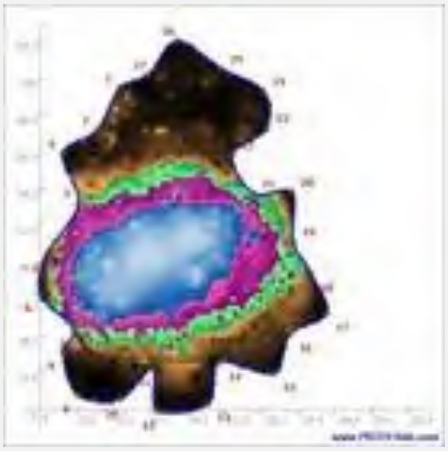
Exhibit 4. Graphic Representation of Sonic Measurement Method



These sonic waves reverberate through the tree, and the velocity of each wave is recorded at each of the MPs. This process is repeated until all MPs have been tapped and the corresponding velocities are recorded. The sonic tomograph's main unit (a computer) records and calculates the sonic tomogram when all readings have been taken. The tomogram then shows the relative and apparent ability of the wood to transmit acoustic waves. This display shows different colors that represent the various properties of the wood (Exhibit 5). The colors displayed and their corresponding properties are as follows:

- Dark brown – Areas of healthy wood, where the fastest velocities occur
- Green – Varies, but describes the distance between healthy and damaged wood, and can be indicative of early fungus infection
- Violets and blues – Damaged wood

Exhibit 5. Graphic Representation of Sonic Tomogram Reading (not subject tree)



Following the sonic tomography sampling, data is electronically transferred into the PiCUS 74 software program (i.e., custom software created for the analysis and presentation of sonic tomograph data) for detailed analysis. The software calculates 2D tomograms that show the ability of wood to transmit sonic waves, which allows the user to measure residual wall thickness. During the analysis, the extent and level of decay within the tree is calculated, and the structural integrity of the tree is analyzed.

Following completion of the damaged/decayed wood analysis, the overall level of damaged wood is calculated at the cross-sectional plane of evaluation using PiCUS Q74 software. After completion of the analysis, management recommendations for each tree are made. The management recommendations are also based on the findings of the Level 2 and Level 3 evaluations. The combination of the Level 2 and Level 3 evaluations provides a comprehensive overview of each tree and the associated risk.

The failure risk described for the Level 3 Advanced Assessment is based on failure at the points of measurement (approximately 24, 30, and 38 inches above soil grade) and does not include failure risk associated with other tree components, such as root crown, root, and branch failure.

3 Results

The following sections detail the results from the Level 2 and Level 3 tree assessments.

3.1 Level 2 Basic Tree Risk Assessment Results

For the Level 2 Basic Tree Risk Assessment, Dudek evaluated site history, tree health and species profiles, load factors, tree defects, and conditions that may affect the likelihood of failure in the crown and branches, trunk, and roots/root collar. The following sections provide a summary of those findings, and Attachment B, Basic Risk Assessment Matrix, provides additional details. Attachment C, Photograph Log, provides representative photographs of the evaluated tree.

Targets

Targets represent people and property that may be impacted should failure of a tree or tree part occur. For this evaluation, targets were first classified by their distance in relation to the tree. Anything that is a distance beyond 1.5 times the height of the tree is not considered a target because impact would not occur in the event of whole tree failure. For the assessed tree, the main targets identified were parked vehicles, moving vehicles, pedestrians, cyclists, pets, the building at 610 2nd Street, the property at 610 2nd Street (which includes the yard, gazebo, and fence), and a nearby streetlight. The distance of targets from trees varied from being within the drip line to within 1.5 times the tree height. Occupancy rate is the other factor used to assess targets, or how often a target is within the fall distance from the tree. For this assessment, frequency was identified as the following for each target:

- Rare: *Pedestrians, cyclists, pets* – This reflects that the actual time of the targets spent within the fall distance of an individual tree is brief.
- Occasional: *Moving vehicles* – Targets are infrequently or irregularly within the fall distance of an individual tree, but they are not uncommon.

- **Frequent:** *Parked vehicles* – Vehicles were parked along 2nd Street on the east side of the tree. Parked cars are considered to have a frequent occupancy rate because parked cars eventually move but may remain in the same location for an extended period of time.
- **Constant:** *Building at 610 2nd Street, property at 610 2nd Street, streetlight* – These structures are fixed and do not move. As such, they are constantly within the fall distance of the assessed tree.

Growing Environment

The tree is a large, mature Indian laurel street tree that was planted and is maintained in a 8-foot by 12-foot tree well within the City sidewalk. The tree is in an urban area that is primarily flat and paved. Surrounding land uses include sidewalk and commercial buildings to the west; 2nd Street and commercial buildings to the east; sidewalk, West E Street, and commercial buildings to the north; and sidewalk and commercial buildings to the south. There is no irrigation within the tree well, and, as such, the tree receives only limited water via rainfall.

Site history was evaluated and includes factors such as previous land uses; grade changes; and potentially cut/ damaged roots from construction-related activities, landscaping, and irrigation installation on the adjacent property (610 2nd Street). The assessed tree has been subject to a mixture of direct and indirect impacts that may have resulted from urban development and/or maintenance activities, such as root pruning for sidewalk, curb, and gutter repairs. A previous co-dominant stem failure (date unknown) was observed at the time of inspection.

In general, the prevailing wind direction in coastal Southern California is from the west/northwest, with common occurrences of high wind events from Santa Ana wind conditions and heavy winter rainstorms. Winter storm tracks can commonly produce strong winds from the east/southeast, especially along the coast.

Load Factors

Load factors evaluate a tree's level of exposure to wind and the ability of the tree to disperse the force of the wind throughout the crown. Trees with a dense crown have more canopy area to buffer the impact of wind, and therefore have a lower overall load placed on limbs and branches. A lower load factor reduces the potential for limbs and branches to break during a wind event. Tree ID 5112ETREE has a crown density described as normal and is protected by the adjacent buildings on the west side from wind exposure. This tree was reduced in height in 2021, 2022, and 2023, resulting in a total decrease in height by approximately 10 to 15 feet. This reduction in height has created a shorter overall tree that is less prone to the effects of wind sail, although there are now few interior lateral branches that can be pruned back, if necessary. The City plans to maintain the tree's current height by inspecting all the downtown *Ficus* trees annually and subsequently requesting West Coast Arborists to conduct as-needed pruning.

Tree Health and Species Profile

The health and species profile of each tree was evaluated to determine vigor; percent of the crown that is normal, chlorotic (abnormal), or necrotic (dead); observable pests; abiotic disorders (human inflicted); and the known failure issues associated with the tree species. Overall, the vigor of the tree was classified as normal and showed little signs of decline. Evidence of pests, such as mealybug, aphids, and sooty mold, were present in moderate numbers at the time of inspection, although these pests are typical of *Ficus* trees within an urban environment in Southern California. Multiple **co-dominant stems** and branches were observed, although this is typical for the genus *Ficus*. A species' failure profile is categorized by branches, trunk, and roots, and is specific to an individual tree species. Cal Poly's SelecTree lists *Ficus microcarpa* as having medium-weak branch strength (Caly Poly 2024). Furthermore,

Indian laurel trees are commonly observed to have branch or stem part failure that results in branches breaking and falling.

Tree Defects and Conditions Affecting the Likelihood of Failure

The assessment of tree defects and conditions affecting the likelihood of failure represents observations from the arborist's visual assessment of a tree's crown and branches, trunk, roots, and root collar. Each tree part was assessed on multiple factors to look for poor structural conditions, dead wood, pests, diseases, previous maintenance work, and other factors that may result in a defect of the tree part. For each tree, the arborist identified the defect of main concern, rated the likelihood that failure would occur within the given 12-month time frame, and rated the total load (mass) of the defect. The following section provides a review of the observed defects and conditions affecting the likelihood of failure for the tree's crown and branches, trunk, and root/root collar.

Crown and Branches

The tree's crown and branches were assessed on conditions such as crown balance, live crown ratio, and other factors that reflect weak attachments, such as co-dominant stems, included bark, and response growth from previous pruning. The tree crown reaches up to approximately 35 feet in height and 40 feet across at its widest point. Past pruning is evident, including wounds that display the following practices: crown cleaning, thinning, raising, reducing, and lion-tailing. Lion-tailing is an inappropriate tree-pruning practice that limits the ability to follow ISA best management practices for tree pruning (Lilly et al. 2019) and can create a wind sail effect. Additionally, *Ficus* tree canopies are naturally prone to shading-out interior branches. Both "weak" and "strong" attachment points were evaluated in the scaffold branches of the assessed tree. Examples of weak attachment points include co-dominant stems, and **epicormic sprouts**. Conversely, stronger attachments consisted of accommodating attachment angles with no included bark and sound branch architecture.

Below are the crown and branch conditions observed in the assessed tree:

- **Weak attachments:** Co-dominant branch unions formed at small and medium branches, and epicormic growth is evident from pruning wounds.
- **Main concern:** Epicormic growth is evident from reduction cuts.
- **Likelihood of failure:** Improbable to fail within the established 12-month time frame.

Details for the individual crown and branch assessment can be found in Attachment B. The crown and branch evaluation was limited at times by interior foliage, branches, and/or obstructions that limited viewing. Aerial crown evaluation of the tree was beyond the scope of this assessment.

Trunk

The trunk of the tree was assessed for defects that could lead to failure, including the presence of **conks**, co-dominant stems, signs of decay, damage to sapwood or heartwood, or a noticeable lean. The tree's trunk has a combined **diameter at standard height** of 49 inches. Below are the observed tree trunk condition and defects:

- **Co-dominant stems:** The tree has three co-dominant stems of similar size splitting at approximately 4 feet above ground.
- **Included bark:** Included bark was observed between two main stems (20 inches and 15 inches), increasing the possibility of stem failure.

- **Main concern:** A significant wound was observed on the east side of the tree that originates at the union of two main stems (20 inches and 15 inches) and extends up into the middle 15-inch stem. There is extensive heartwood decay present in the wound that includes termite damage and a possible crack.
- **Likelihood of failure:** The main concern identified for the subject tree was classified as probable to fail within the established 12-month time frame.

Additional concerns can be found in Attachment B.

Roots and Root Collars

The following are the root and root collar conditions and defects observed in the subject tree:

- **Dead and damaged roots:** Previous root pruning approximately 0.5 feet from the trunk was observed. Dead and decayed wood from previous pruning events were present near the tree's root flare. Dudek has not been provided documentation regarding root pruning or damage incurred to the roots of this tree, so the extent or cause of the damage is unknown.
- **Main concern:** Damage to the large structural roots due to sidewalk, street, and development activities has occurred.
- **Likelihood of failure:** The main concern identified for the subject tree was classified as a possibility to fail within the established 12-month time frame.

Risk Categorization

To evaluate the potential risk rating, a Dudek Tree Risk Assessment Qualified Arborist evaluated the trees using ISA's Tree Risk Assessment Form (ISA 2017b). As observed at the time of the tree inspection, potential targets should tree failure (whole tree, branch, trunk, or root) occur included parked vehicles, moving vehicles, pedestrians, cyclists, pets, the building at 610 2nd Street, the property at 610 2nd Street, and a nearby streetlight. Examples of evaluated targets can be seen in photographs in Attachment C. Potential targets ranged from within the tree's dripline to within 1.5 times the height of the tree. The frequency of the targets ranges from constant (i.e., building at 610 2nd Street) to rare (i.e., pedestrians). Details are provided in the Level 2 Basic Risk Assessment Matrix in Attachment B.

Risk rating is a factor of the potential for tree or tree part failure, the likelihood of impact with a target, and the consequences of failure. The high risk rating is related to a probable likelihood that the trunk would fail, a high likelihood that parked vehicles would be present during the potential failure, and a significant level of consequence should failure and impact occur. Based on the findings of the Level 2 evaluation, the tree was found to have a high overall risk rating due to the risk associated with the damaged trunk and the tree impacting nearby parked vehicles should failure occur

3.2 Level 3 Advanced Assessment Summary Results

The following describes the findings of the Level 3 Advanced Assessment.

Sonic Tomography

The subject tree was evaluated for the presence of internal decay, damaged wood, and/or cracks at three locations on the trunk below the point of trifurcation (24 inches, 30 inches, and 38 inches above soil grade). Dudek found that the tree had elevated levels of detectable internal damage (10% to 20% internal damage and/or decay) at all of the reading locations. Attachment D, Sonic Tomography Matrix, presents the sonic tomography evaluation. Individual sonic tomograms for the tree are presented in Attachment E, Sonic Tomography Images.

4 Discussion and Recommendations

The defects observed during the evaluation of tree ID 5112ETREE are typical for Indian laurel trees in an urban environment. The tree presents a high risk related to a probable likelihood that the trunk would fail at the severely decayed union of co-dominant stems, a high likelihood that a target (parked vehicles) would be present during the potential failure, and a significant level of consequence should failure and impact occur. In many cases, urban trees with co-dominant stems can go for many years without failure, and there are many such cases where a tree can go its entire lifespan without being negatively impacted. However, taking into consideration the species' failure profile and the advanced heartwood decay, the co-dominant stems represent a weak point that could be at increased risk of failure, especially during a period of higher-than-normal load such as a strong wind event. Additionally, the development of infrastructure results in varying levels of root-related impacts, including those associated with grading, soil compaction, trenching for installation of underground utilities (sewer, electrical), and sidewalk installation. Root removal, structural root damage and/or removal, and soil compaction associated with the development and landscaping process may have impacted the tree's roots and root collar. These root impacts may result in the tree being susceptible to secondary diseases—most commonly, those involving fungal pathogens. Injuries to the root collar or trunk during landscape maintenance and renovation can also provide a pathway for fungal pathogens.

Based on the Level 2 Tree Risk Assessment and the findings of the Level 3 Advanced Assessment, Dudek recommends the following management action to mitigate potential tree risk and reduce the likelihood of tree and/or tree part failure (also see Attachment B):

- Removal and Replacement: Due to the location of the tree in the landscape, elevated levels of internal decay in the trunk of the tree, and extensive heartwood decay in the union of the co-dominant stems, Dudek recommends this tree be removed as soon as possible. Street parking access should be restricted under the dripline of the tree while the tree is being scheduled for removal. Tree 5112ETREE should be replaced in accordance with the Downtown Specific Plan, Section 7.5 Street Tree Concept Plan. In particular, a 24" box *Quercus suber* should be planted following the ISA's Best Management Practices for tree planting.

5 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (1918) requires tree removal and potentially disturbing construction activities to occur during certain times of the year to avoid harassment of nesting birds. According to this act, no construction or other disturbing activities can occur within 500 feet of an active bird nest during the period beginning in January and ending in June each year. Biological surveys should be conducted to provide clearance for initiation of any work.

6 Conclusion

This letter report provides conclusions and recommendations based on the assessment of the Indian laurel located at 610 2nd Street within the City's right-of-way in Encinitas, California, by Dudek's ISA Certified Arborist and ISA Tree Risk Assessment Qualified Arborist. The conclusions and findings discussed in this report and the associated tree or tree-part risk opinions are valid for no longer than 12 months and only under normal weather conditions. Arborists are tree specialists who use their education, knowledge, training, 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. No aerial or subterranean evaluations were conducted as part of this assessment. The extent of any internal rot conditions of the trunk were only determined at the point of measurement.

Arborists cannot detect every condition that could possibly lead to the failure of a tree. Trees are living organisms that fail in ways not fully understood. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances or for a specified period of time. There are no guarantees that a tree's condition will not change over a short or long period due to climatic, cultural, or environmental conditions. Trees provide many benefits to those who live near them. They also include inherent risk that can be minimized, but not eliminated.

I would be pleased to answer any questions or respond to any comments regarding this tree evaluation. Feel free to contact me at 760.334.3970 or kburritt@dudek.com.

Sincerely,

Katrina Burritt
Certified Arborist No. WE-10771A
ISA Tree Risk Assessment Qualified
Pest Control Advisor 142466

Attachments:
A Glossary of Terms
B Basic Risk Assessment Matrix
C Photograph Log
D Sonic Tomography Matrix
E Sonic Tomography Images

References

Cal Poly (California Polytechnic State University Urban Forest Ecosystems Institute). 2024. "SelecTree: A Tree Selection Guide." Accessed February 2024. https://selectree.calpoly.edu/.

ISA (International Society of Arboriculture). 2017a. *Tree Risk Assessment Manual, Second Edition*. Julian A. Dunster, principal author; contributing authors E. Thomas Smiley, Nelda Matheny, and Sharon Lilly.

ISA. 2017b. "Tree Risk Assessment Form." https://wwv.isa-arbor.com/education/resources/BasicTreeRiskAssessmentForm_Fillable_FirstEdition.pdf.

Lilly, S.J., Edward F. Gilman, and E. Thomas Smiley. 2019. *Best Management Practices – Pruning*, 3rd Edition. International Society of Arboriculture. https://wwv.isa-arbor.com/store/product/58/cid/117/.

Attachment A

Glossary of Terms

Glossary of Terms

Term	Definition
buttress roots	Extensions of lateral surface roots that form only in certain species and stabilize the tree.
cavity	An open wound in a tree, characterized by the presence of decay and resulting in a hollow.
co-dominant stems	Tree stems of equal size and relative importance, usually associated with either the trunk/stems or scaffold limbs/branches in the crown.
conk	Fungi growing on a tree that can indicate disease.
consequence of failure	Personal injury, property damage, or disruption of activity due to whole tree failure or the failure of a tree part.
constant occupancy	A target for a falling tree (see below) that is present at all times or nearly all times.
decay	Process of degradation of woody tissue by fungi or bacteria through the decomposition of cellulose and lignin.
defect	Injuries, decay, or other abnormalities that directly affect the structural strength of a tree.
diameter at standard height (DSH)	The standard for measuring tree size. DSH refers to the tree diameter measured at 4.5 feet above the ground.
epicormic sprout	A shoot growing from an epicormic bud, which lies underneath the bark of a trunk, stem, or branch of a plant.
fracture	The cracking or breaking of a tree.
frequent occupancy	The target for a falling tree that is in the strike zone for the majority of the day.
fungal fruiting body	Any complex fungal structure that contains or bears spores.
included bark	Pattern of development at branch junctions where bark is turned inward rather than pushed out.
Level 1 Limited Visual Inspection	A walk-by/ground-level visual assessment of a tree that includes an assessment of one or more sides of an individual tree. Obvious and significant defects, such as excessive lean, soil heaving or lifting, severe cracks, hangers, wounds/cankers, large dead or broken branches, and obvious fungal fruiting bodies, are noted during the inspection.
Level 2 Basic Tree Risk Assessment	A Level 2, or basic, assessment is a detailed visual inspection of a tree and its surrounding site, and a synthesis of the information collected. It requires that a tree risk assessor walk completely around a tree looking at the site, buttress roots, trunk, and branches. A basic assessment may include use of simple tools to gain additional information about the tree or its defects.
Level 3 Advanced Assessment	Advanced assessments (generally more time intensive) are performed in conjunction with or after a Level 2 assessment to provide detailed information about specific tree parts, defects, targets, and/or site conditions. Specialized equipment, data collection and analysis, and/or expertise are usually required for advanced assessments. Procedures and methodologies should be selected and applied as appropriate, with consideration for what is reasonable to specific conditions and situations. All technologies involve some uncertainty and have their limitations; any evaluation of an individual tree will not be an accurate measure, but a qualified estimation.
likelihood of failure	The chance of a tree or tree part failure occurring within the specified time frame.
load	The weight on a given defect that may increase the chances of failure.

Glossary of Terms

Term	Definition
measuring points	A series of evenly spaced points set on a tree to evaluate the presence and level of decay, cavities, and/or fractures.
occasional occupancy	The target is in the strike zone infrequently or irregularly.
occupancy rate	The duration of time a target is in the strike zone of a tree should it fail, including rare, occasional, frequent, and constant.
rare occupancy	A target that is very uncommon in the target zone.
residual wall thickness	Amount of un-damaged wood remaining in a tree that is structurally supportive.
risk rating	Derived from the risk rating matrix concerning whether a tree or tree part has a likelihood of impacting the target combined with the consequence of that failure.
root collar	The area on the tree where the roots join the trunk.
scaffold branches	Primary limbs that form a tree's canopy.
sonic tomography	Sonic tomography detects decay, cavities, and fractures in trees by measuring the velocity of sound waves as they pass through wood. Differences in velocity help determine areas of healthy wood and areas of damaged wood, because damaged wood has less elasticity and density than healthy wood.
target	People, property, and activities that could be injured, damaged, or disrupted by a tree.
tree risk assessment	The overall process of tree risk analysis and evaluation.
triangulation method	A process by which the measuring point positions are split into triangles, and the lengths of all sides are measured to accurately measure tree dimensions.

Attachment B

Basic Risk Assessment Matrix

City of Encinitas Tree ID	Species	Number of Stems	Combined DSH (in.)	Individual Stem Diameters			Height (feet)	Crown Spread (feet)	Potential Targets	Crown and Branches						Trunk					Root and Root Collar				LV2 Tree Risk	LV3 Failure Potential	Mitigation	Residual Risk
				S1	S2	S3				Live Crown Ratio	Co-Dominant Branches	Dead Twigs/ Branches	Weak Attachments	Main Concern	Likelihood of Failure	Included Bark	Cankers/ Galls/Burls	Lean Degree	Main Concern	Likelihood of Failure	Collar Buried	Conks	Main Concern	Likelihood of Failure				
5112ETREE	*Ficus microcarpa* 'Nitida'	3	49	20	15	14	35	40	Parked vehicles, moving vehicles, pedestrians, cyclists, pets, building at 610 2nd Street, property at 610 2nd Street (includes yard, gazebo, fence), streetlight	20	Yes	No	Yes	Epicormic growth from reduction cuts	Improbable	Yes	No	10	Heartwood decay	Probable	No	No	Cut roots in close proximity to trunk	Possible	High	Elevated	Removal	None

Attachment C
Photograph Log

5112ETREE overview facing southeast

5112ETREE overview facing west

5112ETREE overview facing southwest

Detail photo showing reduced crown

Detail photo of measuring points placed at 24 inches above soil grade and of heartwood decay in stem

Detail photo of measuring points placed at 30 inches above soil grade and of heart wood decay in codominant stem union

Detail photo of measuring points placed at 38 inches above soil grade

Trunk and sonic tomography unit facing northeast

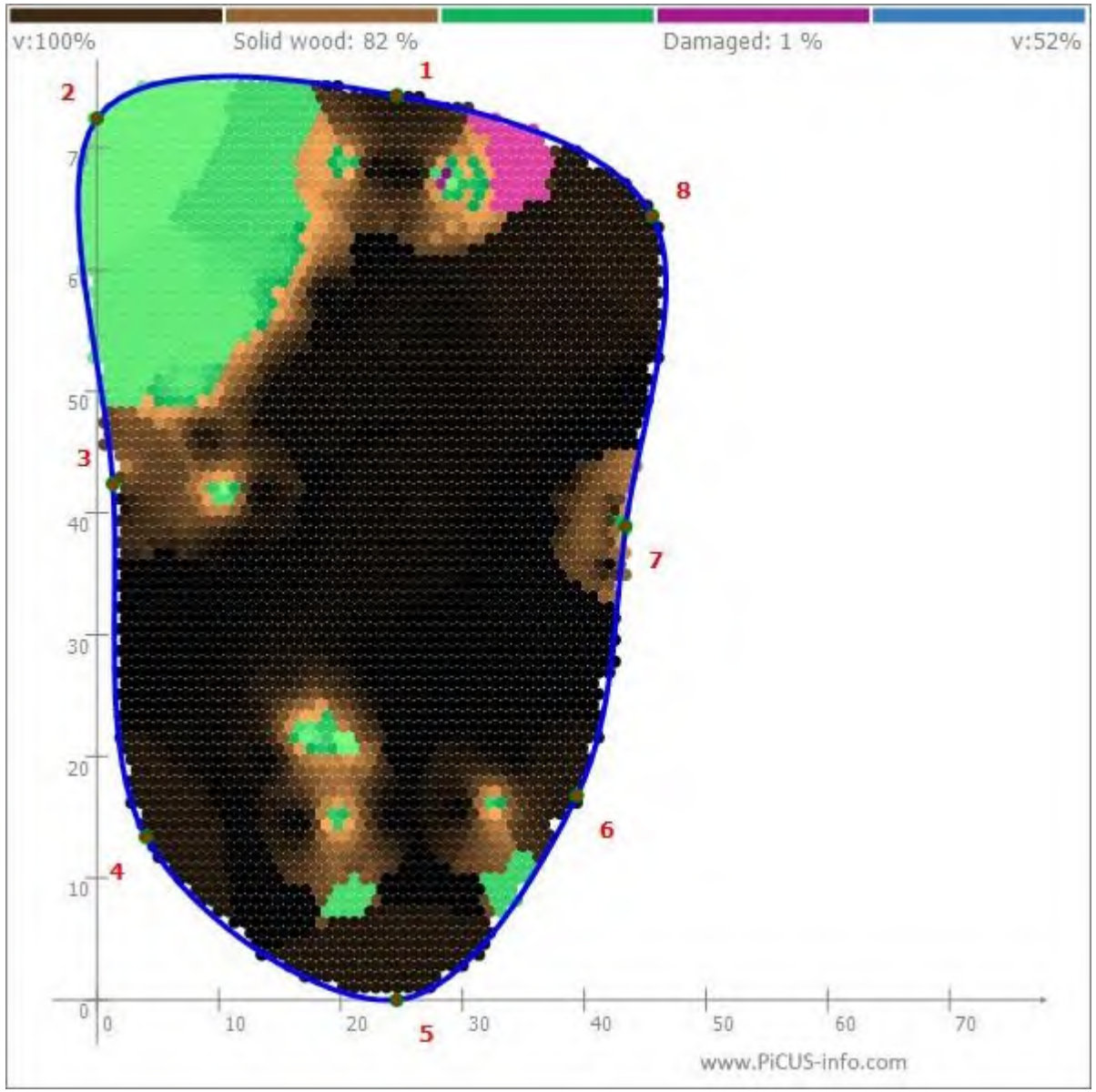
Attachment D

Sonic Tomography Matrix

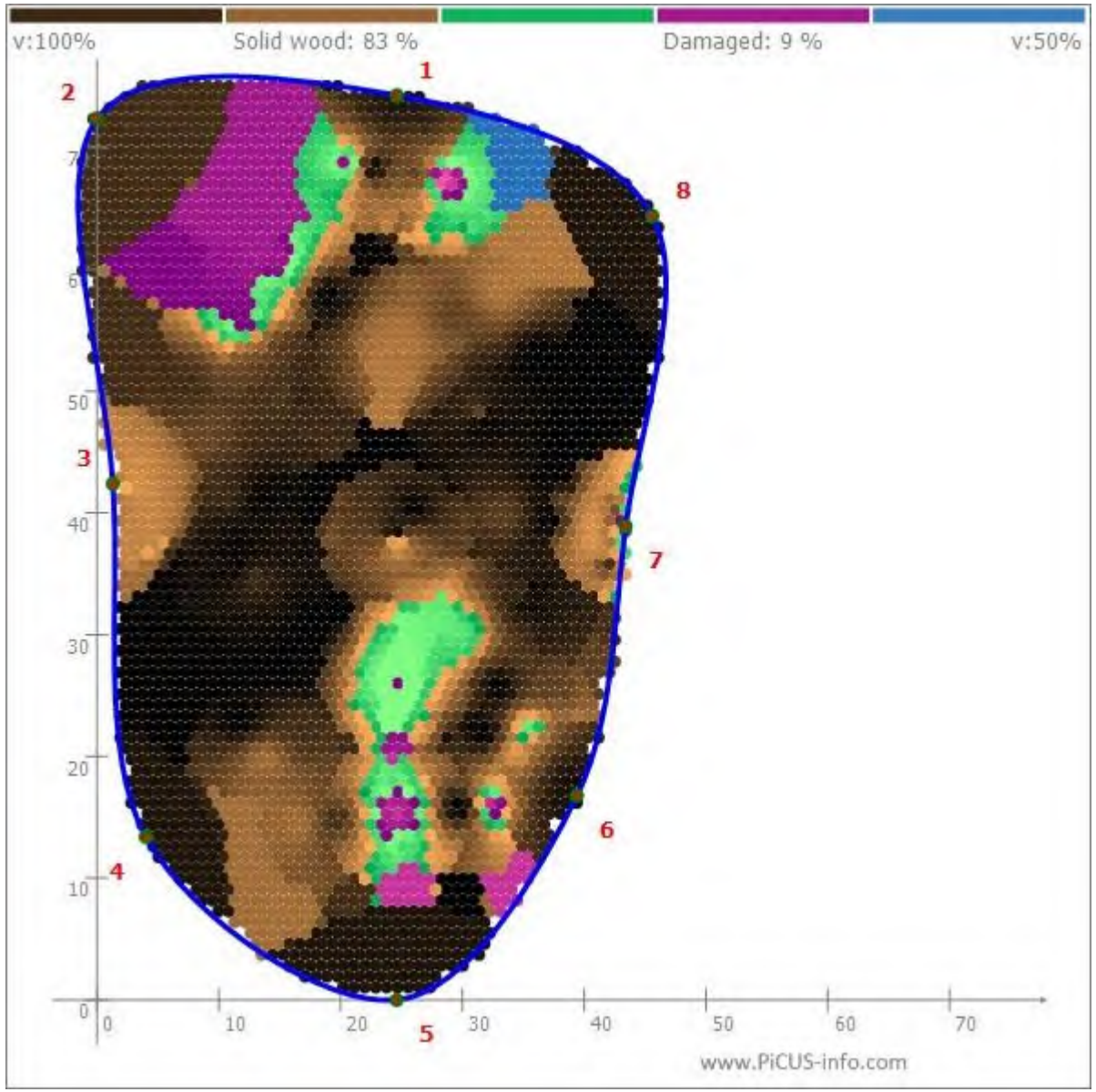
City of Encinitas Tree ID	PiCUS Data File ID	Tomograph Details							Failure Potential	Management Recommendation
		Approximate Location of Tomogram Reading	No Damage (percent)	Damage / Decay / Rot (percent)	Incipient Decay (percent)	Overall Damaged Wood Detected (percent)	Damaged Wood (percent)	Undamaged Wood (percent)		
5112ETREE	20240124_230445	24 inches	82	1	17	18	18	82	Elevated	Removal
5112ETREE	20240124_224743	30 inches	83	9	8	17	17	83	Elevated	Removal
5112ETREE	20240124_225727	38 inches	81	13	6	19	19	81	Elevated	Removal

Attachment E

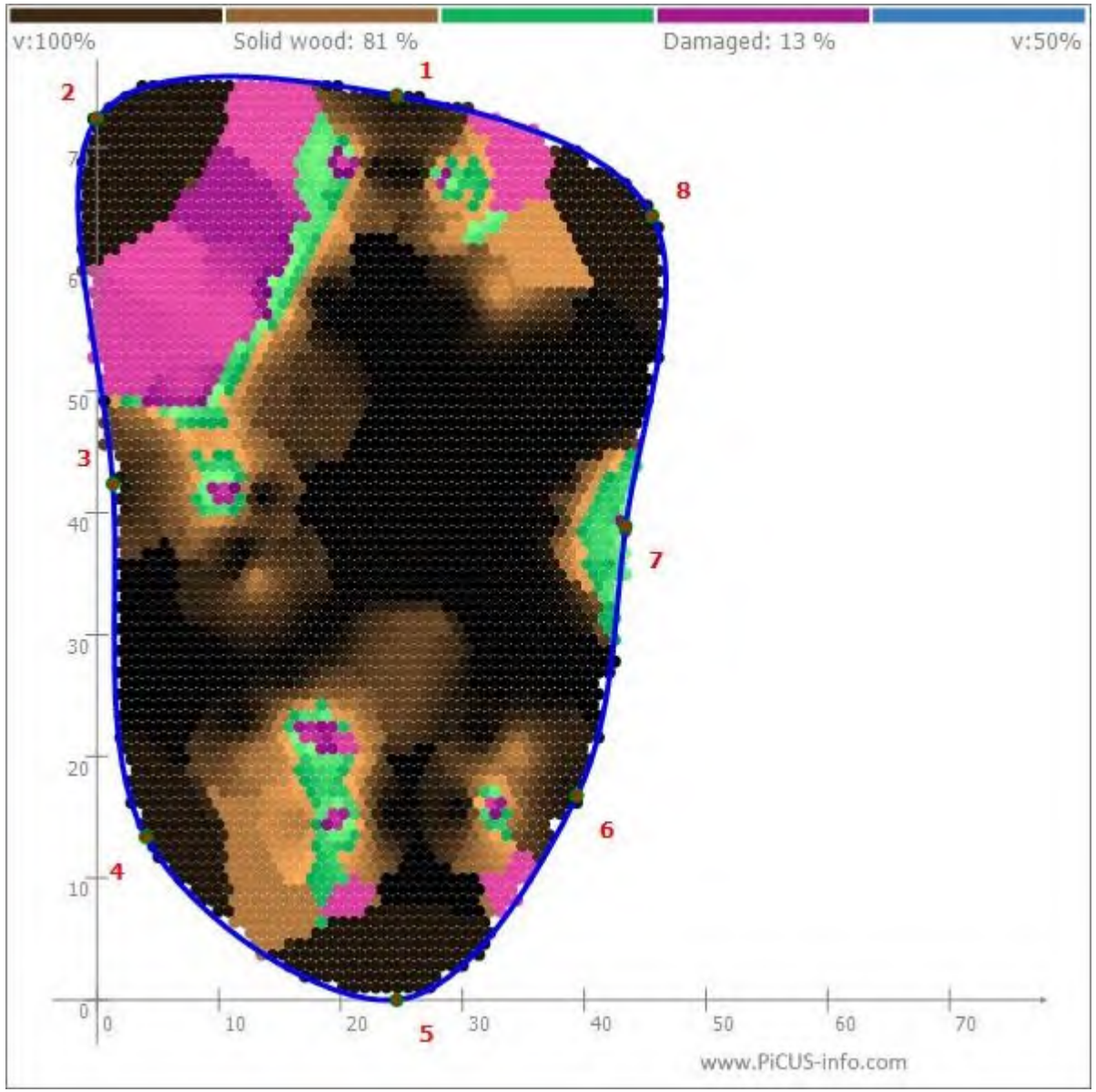
Sonic Tomography Images



Tree 5112ETREE sonic tomography reading at 24 inches above soil grade



Tree 5112ETREE sonic tomography reading at 30 inches above soil grade



Tree 5112ETREE sonic tomography reading at 38 inches above soil grade