III. Hazard Tree Summary

Methodology

The sheer numbers of trees as well as the difficulty in determining precise tree ownerships has hampered hazard tree identification on the SVCA property. We did identify twenty-eight trees or groups of trees as high risk hazards and those are marked with pink ribbon. (We note that upon re-inspection, some ribbons had been removed) In addition we identified groves of trees with significant defects and have indicated those on maps and in tables in Addendum IV and in the back cover. These areas would need on the ground property line identification in order to determine ownership.

Tree hazards include dead or dying trees, dead parts of live trees, or unstable live trees (due to structural defects or other factors) that are within striking distance of people or property (a target). Hazard trees are those with defects that have the potential to cause property damage, personal injury or fatality in the event of a failure. (Hazard Tree Guidelines for Forest Service Facilities. USDA Report #RO-12-01). In a nutshell, a tree with a defect (decay, mechanical failure, etc.) that is likely to cause failure of all or part of the tree that is within striking distance of a man made structure or human use area is a hazard.

The standard process for assessing risk is termed Visual Tree Assessment (VTA). This process is a visual inspection that looks for obvious indications of defect and targets.

The tree assessment process involves the examination of many factors:

- The **crown** of the tree is examined for current vigor. This is comprised of inspecting the crown (foliage, buds and branches) for color, density, form, and annual shoot growth, limb **dieback** and disease.

- The **bole** or main stem of the tree is inspected for decay, which includes cavities, wounds, fruiting bodies of decay (conks or mushrooms), seams, insects, bleeding, callus development, broken or dead tops, structural defects and unnatural leans. Structural defects include crooks, forks with V-shaped crotches, multiple attachments, and excessive sweep.

- The **root collar** and roots are inspected for the presence of decay, insects and/or damage, as well as if they have been injured, undermined or exposed, or original grade has been altered.

- The vicinity of human occupations or use, and potential property damage.

Inspection methods included examining the trees from ground level that may include binoculars and sounding trunks with a mallet. At SVCA, no invasive methods were utilized to assess defects in trees.

Defects are indicators of potential failure and can include mechanical (leaning trees, broken limbs, splintered trunks, heaving root systems) or the presence or disease that affect the structural integrity of wood (wood decaying fungus).

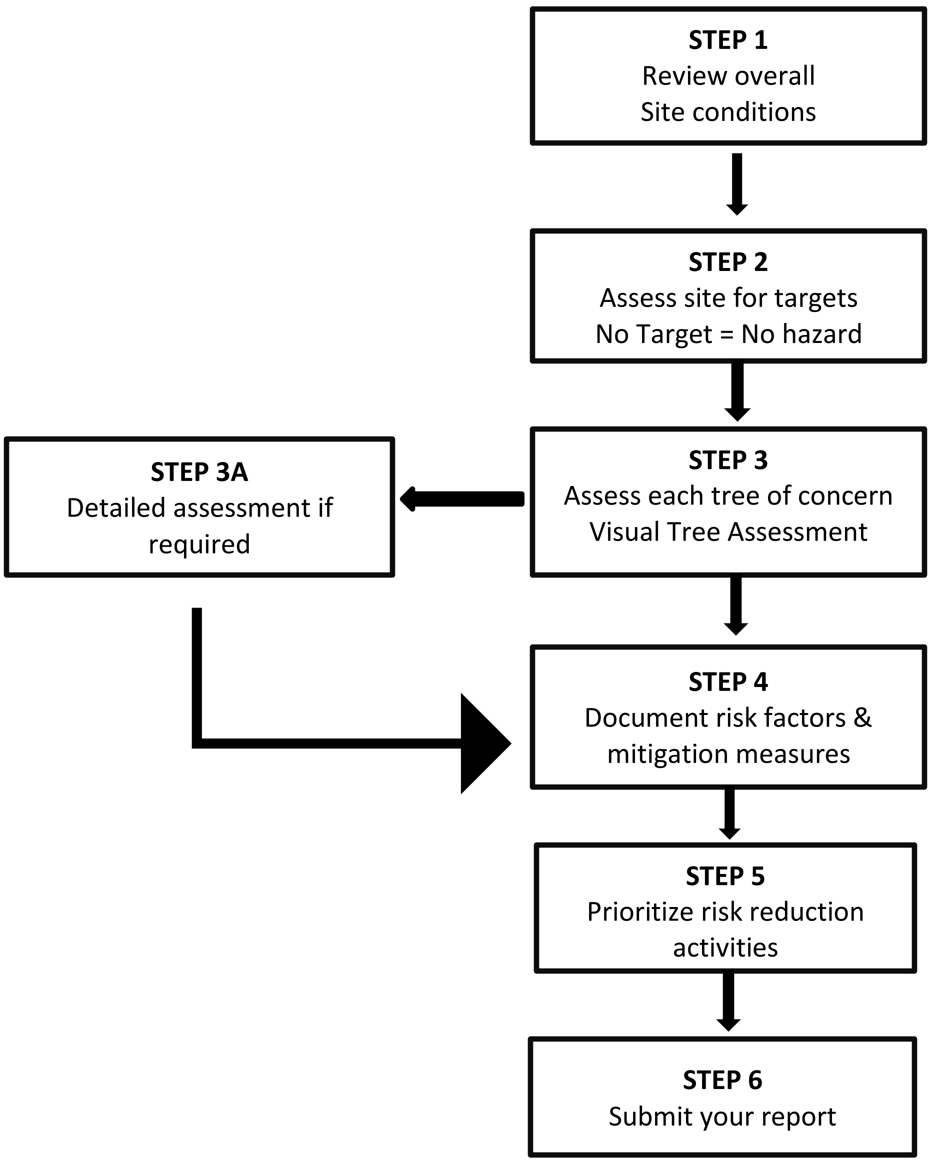
Risk Assessment

Tree Risk Assessment is a complex undertaking. It involves a stepwise process similar to that shown in the following flow chart. Risk is defined as "…the probability that an undesirable event will or will not occur. It is the product of the probability of the event taking place, the probability of being exposed to the event, and the probability of certain outcomes occurring if exposure did take place. Risk can be statistically quantified in a risk assessment. Acknowledgement for the foregoing to: (Dunster and Dunster in Tree Risk Assessment in Urban Areas and Urban/Rural Interface—Course Manual. PNW International Society of Arboriculture.)

Risk Assessment steps are demonstrated by the following Chart.

Figure 4

Tree Risk Assessment



Risk Assessment typically considers:

- The size of the tree component that might fail
- The probability of it failing
- The probability of a target being hit in the event of failure
- The damage/harm likely to result to the target.

Risk Assessment is undertaken to:

- Limit the amount of risk to people
- Limit the amount of risk to property
- Limit the amount of risk to tree owners
- Identify the highest risk trees
- Prescribe actions to reduce risk (Risk Management)

A hazard tree exists when the sum of the risk factors assessed equals or exceeds a predetermined threshold of risk. In its simplest terms, trees with defects and near targets are higher risk than healthy trees away from targets. Risk Assessment attempts to quantify risk even though the uncertainty factor requires judgement on the part of the assessor. The key concepts of assessing risk besides uncertainty are probability and significance. Risk assessment is not hard and fast—nor is the level of risk one would tolerate. Much of the risk assessment process is driven not only by biomechanics, but also by litigation. Importantly, risk assessment is dependent on that seen or predicted at the time of the assessment.

Risk Assessment is used to determine which trees are actively failing (extreme), which will fail soon (high) and which might fail soon (moderate). There are no guarantees in risk assessment and no “for sure” categories of safe or unsafe. Risk assessment is a subjective process, based on an understanding of biological and mechanical factors. The task of the risk manager (entity responsible for the tree) is to balance tree risk issues against economic, social, political and regulatory requirements.

Most assessment protocols are ordinal---factors that might lead to tree collapse and damage to humans or structures are assigned numbers. For instance the International Society of Arboriculture Tree Risk Rating System “scores” trees as summarized following.

Table 4

Risk Rating System

Size of Part			Potential to Fail			Target	
Score	Range		Score	Narrative		Score	Narrative
1	1-6"		1	Low		1	Low
2	6-18"		2	Medium		2	Medium
3	18-30"		3	High		3	High
4	>30"		4	Severe		4	Severe

Scores are totaled for each tree. Scores above 9 are considered “high risk” and those ranging toward 12 are those in imminent danger of failing.

At SVCA we focused on those trees totaling 9 and above recognizing that lower ranked trees could fail as well. (An interesting feature of the system is that although there are many more tree limbs in a forest under 6" in diameter, those limbs are ranked lower than large limbs even though the probability of failure is greater based solely on their frequency.)

Rather than describe each tree and target in detail, we simply noted the tree size and defect indicator with the understanding that targets were in obvious reach for each. The majority of the hazard trees we noted are over 18-inches in diameter, had a high to severe failure potential and had high to severe targets (ranges 9-12). We abbreviated the reporting procedures and developed the Hazard Tree Summary table in Addendum V.

Hazard trees were located and mapped using **GPS** tools. See Addendum V.

Summary of Findings

At SVCA we located twenty-eight hazard trees or small groups of trees defective and within striking distance of human activities or structures. We also noted several areas or groups of hazard trees where ownership was undetermined. The primary defects are root and bole decay as evidenced by fruiting bodies, known as **conks** and/or dead and declining tops and crowns. In Addendum V we have provided visual aids that describe the decay diseases found. Those major diseases are categorized as affecting either roots or the bole or stem of the trees. They are further categorized as white, brown or soft decays. In each case, the structural integrity of the wood is affected, decreasing the ability of the tree to stand. The most common fungi noted are those following.

Root Diseases:

> <u>Red-Brown Cubical Rot:</u> Affects Douglas-fir by destroying the connective tissue **(lignin)** of root wood. It enters through root or lower stem wounds. It is often exacerbated by hoofed animals, root zone soil compaction. It affects the center of the tree (heartwood) first and trees infected may stand for many years. The fungal **conk** is found on the ground and looks somewhat like a cow-pie.

Laminated Root Rot (yellow ring rot): Affects Douglas-fir by destroying the cell walls **(cellulose)** of root wood and lower bole. It is typically transmitted tree to tree underground. Initial identification is often the appearance of a dead and dying tree top. Fungal conks are inconspicuous, often underground, when found look like a white mat. Identification is often made by the presence of thin tree crowns.

Armillaria Root Rot breaks down both the lignin and cellulose in plant tissue, particularly tree roots. It is often first noticed by thinning or dying tree crowns. The fungal fruiting body is sometimes called "honey mushroom".

Stem or bole diseases:

Red Ring Rot: Affects Douglas-fir by destroying the lignin in the bole or stem of the trees. It often lives in trees for many years without detection--- as it runs out of healthy wood to live on it produces a conk on the stem of the tree. The conk is shelf-like.

All of these diseases are exacerbated by stress--- changes in micro climate or root disturbance. Cultural control measures are limited generally to removal of the diseased trees and their stumps. Chemical fumigation has had limited results.