



## **URBAN & COMMUNITY FORESTRY PROGRAM**

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# Management of Elderly Trees



## Table of Contents

<b>Managing Mature Trees</b> .....	<b>1</b>
<b>Decay in Mature Trees</b> .....	<b>4</b>
<b>Managing Risk</b> .....	<b>6</b>
<b>Why are we spending so much time discussing management, and removals, and decay</b> .....	<b>8</b>
<b>Developing a Management Strategy</b> .....	<b>9</b>
<b>Further Comments on Maintenance</b> .....	<b>11</b>

## Figures and Tables

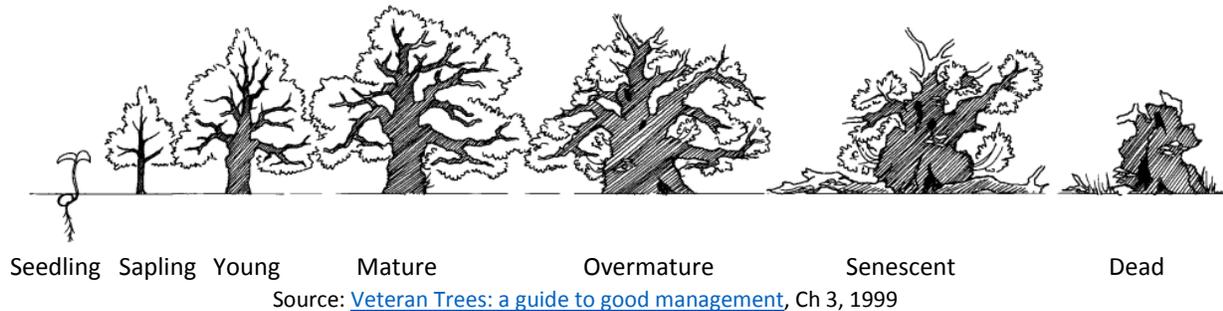
<b>Life Stages of Trees</b> .....	<b>1</b>
<b>Management Decision Table (basic)</b> .....	<b>2</b>
<b>Management Decision Flow-chart (basic)</b> .....	<b>3</b>
<b>Common Decay Fungi</b> .....	<b>4</b>
<b>Tolerable Risk</b> .....	<b>6</b>
<b>Management Decision Flow-chart (complex)</b> .....	<b>7</b>

# Managing Mature Trees

## Introduction

Trees can weather many storms as they progress from seedlings through maturity and old age, some more successfully than others due to species, location, care, or type of damage. Eventually trees become overmature and decline, if not due to age, then because of the damage and stress they have encountered over the years.

Every tree goes through the same stages, some more rapidly than others, but in nature they follow the same sequence:



In nature, the full life cycle of a tree can occur uninterrupted, aside from fire or other catastrophic events, but in a developed landscape or urban environment, such elderly trees require active management decisions. Managing mature and declining trees, particularly when the goal is to keep them on-site, can be challenging as many factors contribute to the management decisions:

1. Use of the site & targets: frequency of people, vehicles, events and maintenance staff
2. Site maintenance: turf management, equipment use and damage caused to trees
3. History of damage: weather events, construction, utility installation, digging
4. History of management: training, structural and cleaning pruning, mulch, fertilization
5. Pests and diseases: severity and outcomes of infestation or infection, treatability
6. Decay: lower tree root and butt rots, cavities in the trunk and scaffold limbs, dead wood

The final factor that must be addressed when managing mature trees is cost. Infinite funds can be spent on every tree to retain it as long as possible – but how long is “as long as possible”? 1 year? 5 years? 10 years? Where funds are finite, decisions must be made on which trees are the best candidates for maintenance, which trees will benefit most and are likely to survive intact longest. Those that are not good long-term candidates require removal.

Where the line is drawn between removal and maintenance, is budget driven. Limited budgets require decisions that prioritize spending to maximize the presence and condition of trees that will be improved by maintenance, and that have long-term potential to remain on-site, along with removal and planting expenditures.

Trees can fall into several different categories, but time or disease or damage can move a tree into another category at any time. Good cultural practices and proper maintenance are recommended to slow that progression as much as possible.

TREE	Immediate Removal	Removal	Monitor	Mitigate
1. Trees that require immediate removal due to a compromised structural condition, regardless of their contribution to the site.	✓			
2. Trees that do not make much contribution to the site in appearance, shade or location but do not present any immediate risk factors. Removal decisions may be scheduled according to available budget or based on monitoring observations.		✓ to schedule removal		
3. Trees that contribute to the site in appearance, shade or location but show signs of decay. The type of decay, its rate of advancement, and location on the tree may require removal due to the virulence of the fungi, or structural concerns.	✓ <i>based on assessment</i>	✓ <i>based on assessment</i>	✓ assess for action	
4a. Trees that contribute character to the site and present less immediate risk may not require removal. But whether such trees will also benefit from maintenance must be determined, otherwise the trees may be permitted to continue to decline, with no management or maintenance activities beyond deadwood pruning and a monitoring schedule. Trees may remain for an indefinite period of time.		✓ based on monitoring	✓ assess for action; reassess on schedule if not removed	✓ based on results of assessment
4b. Trees that contribute character to the site and have healthy crowns and crown structure, are usually the best candidates for maintenance and long term presence. Eventually the trees may require a reassessment of on-going budget investment as they age and decline, or develop fungal conks or are damaged by storms.		<i>eventually</i>	✓ assess for action and reassess on schedule	✓ on-going maintenance as long as deemed appropriate
5. Young trees have long-term potential based on species, condition, structure and location, but may not make a significant contribution in their early stages. But managed with care and maintenance, especially in the early years, will pay dividends in the future.		<i>someday, far in the future</i>		✓ on-going maintenance

The most significant issues that most trees face are not the past storm damage or the natural decline of the trees. The most significant issues are:

1. ongoing maintenance damage from management practices and equipment use, and
2. presence of decay fungi, which can be spread due to item 1, above.

The presence of decay fungi is a major complicating factor in assessing and monitoring trees, as many decay fungi increase the rate of decline. And, while fungal species rates of decay and location in the tree may vary, trees must be regularly monitored internally and externally, to make decisions that will address the usage and traffic, the level of acceptable risk and the character of an urban forest, now and into the future.

# TREE appears healthy and green

Evidence of fungi, decay or cavities?

NO

YES

Is there dieback or deadwood?

NO

YES

Inspect & monitor\*; address site and care issues; over time mitigate, prune or remove as needed.

Inspect for source, location and extent of decay, and impact on the structural integrity of the tree.

Proper care: mulch, prune; no topping; avoid damage. Maintain and monitor\* as needed.

Prune: schedule or immediate; assess other concerns; proper care; monitor\* for decline; prune or remove as needed.

Arborist must be experienced with risk and elderly tree care.

Assessment indicates *insufficient* sound wood or root integrity: based on internal and crown inspections.

Assessment indicates *sufficient* sound wood and root integrity: based on internal and crown inspections.

Targets?

Targets?

NO

YES

YES

NO

If there are no target concerns, the tree may be allowed to decline further or scheduled for removal. Otherwise, mitigating risk must consider the cost of treatment and the value or impact of the tree and the benefits it would provide.

Assess the target: Frequency of use? Can it be moved? What would be the impact of failure?

Schedule removal or immediate removal

Schedule removal or mitigation & monitor\*

Even there are no target concerns, the tree should still be maintained with proper care, including pruning, mulching & avoiding damage. Monitor\* for progression of decay or disease, as well as other concerns.

This decision tree is a simplified chart to show the general process, and decisions typically required, for managing elderly trees.

This chart does not address the many exceptions, complications and caveats that each individual tree presents when being assessed, nor the level of risk each individual tree owner is willing to accept. All these factors must be taken into account to make site-specific and responsible decisions about tree maintenance, management and removal. Long-term consultation with an experienced and certified arborist is required.

\*MONITOR: inspect 1x or more per year, for progression of decay or disease, as well as other conditions.

## Decay in Mature Trees

Trees with long-term and repeated injury to the base, basal flare, and surface roots are at a high risk for infection by fungal decay. While some fungal diseases CAN be spread by root grafts between trees of the same species, mechanical damage can be a significant method that the fungal diseases are spread from tree to tree; either by wounding the tree so that fungal spores spread by wind can establish, or by cutting fruiting bodies on one tree and then damaging another tree with those same blades to spread the diseases.

*Ganoderma lucidum* (or *curtisii*, or both) and *Inonotus dryadeus* are two of the most serious fungi affecting trees and, when their fruiting bodies become evident, trees are in a significant state of decay at the base and present a significant risk of failure. *Bondarzewia berkeleyi*, *Laetiporus sulphureus*, *L. cincinnatus*, and *Meripilus sumstinei* also present serious concerns and, if the decay in the trees is not extensive enough to require immediate removal, they require regular monitoring by a professional experienced in decay assessments. To further expand on the table and decision tree on the previous pages, retention decisions must be based on a determination of the extent of internal decay, the location of the tree, the exposure of the tree to wind and the general appearance of the tree, with respect to thinning of the crown, as well as the level of monitoring possible.

Whether fruiting bodies are observed on a yearly basis does not mean that trees are free from disease. The trees may simply not be at the point where the spread of the decay has produced fruiting bodies. But other indicators, aside from fruiting bodies, can reveal issues. As a rule, the presence of carpenter ants can indicate the presence of internal decay. Also, trees with thinning crowns MAY be an indication of decay, or merely an indication of stress or other factors contributing to decline.

A policy of long-term commitment to monitoring annual conk production is required, with the subsequent removal or mitigation and monitoring decisions, carried out according to the final policy and practices that are established with the community and their consulting arborist.

### Common Decay Fungi



*Bondarzewia berkeleyi*



*Ganoderma lucidum/curtisii*



*Inonotus dryadeus*



*Laetiporus cincinnatus*



*Laetiporus sulphureus*



*Meripilus sumstinei*



*Inonotus ludovicianus*

Since these are all annual conks they may not appear every year, even when the fungus is capable of producing a fruiting body. So where the disease is present on surrounding trees, may mean that other trees, without fruiting indicators, may also have fungi present.

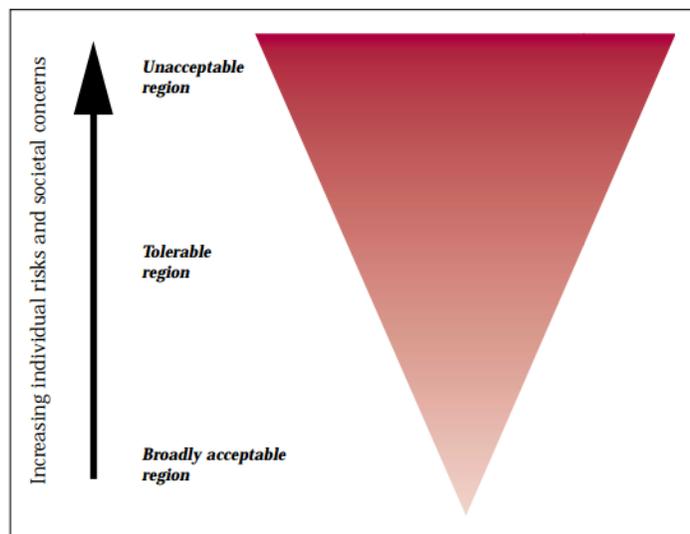
## Managing Risk

Trees can withstand multiple storm events, but commonly they are damaged trees through windthrow and catastrophic limb loss. Proper tree management requires the care of damaged trees to reduce potential for breakage in future storms and the removal of trees that show compromised structural integrity that, should they fail, could cause damage to infrastructure (public or private).

In some situations, especially for communities which are responsible for many trees, the costs for maintaining each and every one of them would be substantial. Therefore, some decisions must be made, based on the budget and on the level of risk acceptable to the Town. Risk level is the acceptance that something could happen to a tree or by a tree. The level of risk acceptance ranges between no risk (e.g. all trees removed, or only small trees replanted) to high risk (e.g. no trees removed or mitigated).

While the list on page 2 and the flow chart on page 3 show the general decision-making processes, and incorporate risk assessment, an explanation of risk and its management may be helpful.

The goal of risk management with respect to trees is to manage the trees so that they can provide the benefits we value in a way that reduces the potential for injury or damage. For trees, that should fall between removing all trees so that they never have the opportunity to fail, and never touching a tree once it has been planted, regardless of its structure or the visible problems.

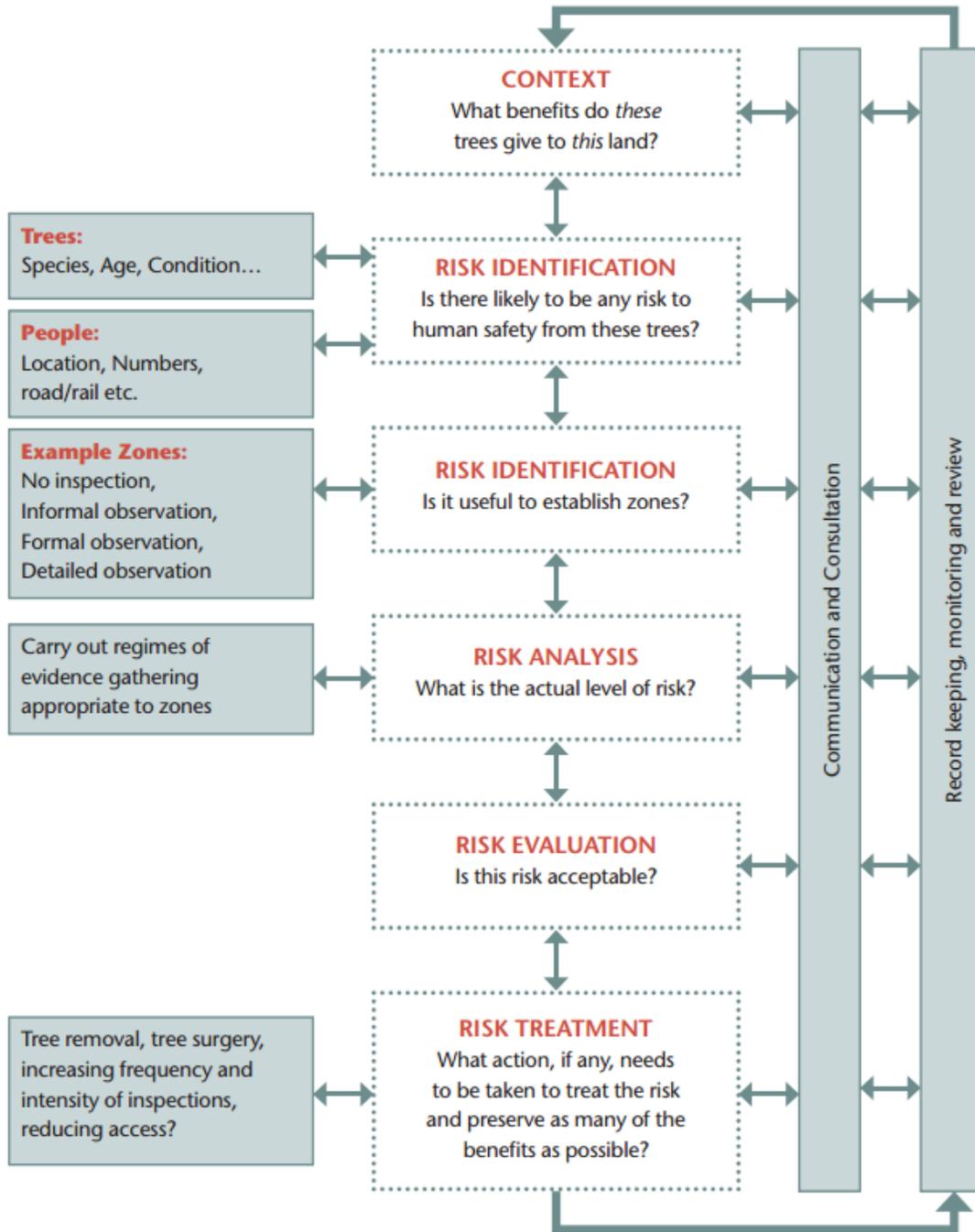


Source: [Reducing Risks, Protecting People](#), 2001

Assessing tree risk requires the knowledge of a Certified Arborist with [Tree Risk Assessment Qualification](#). The qualification itself and the methodology for assessing risk utilize industry-accepted [Best Management Practices](#). This is the basis on which a community can determine its tolerable or acceptable risk. While simply removing all trees might be the easiest way to reduce risk, it is not the best way to have the benefits that trees provide – and that requires action, whether pruning, removal, or planting – and to do so in a way that retains the existing character of the community, creates a basis for its future character, establishes a management policy for the future to reach its goals and be financially sustainable.

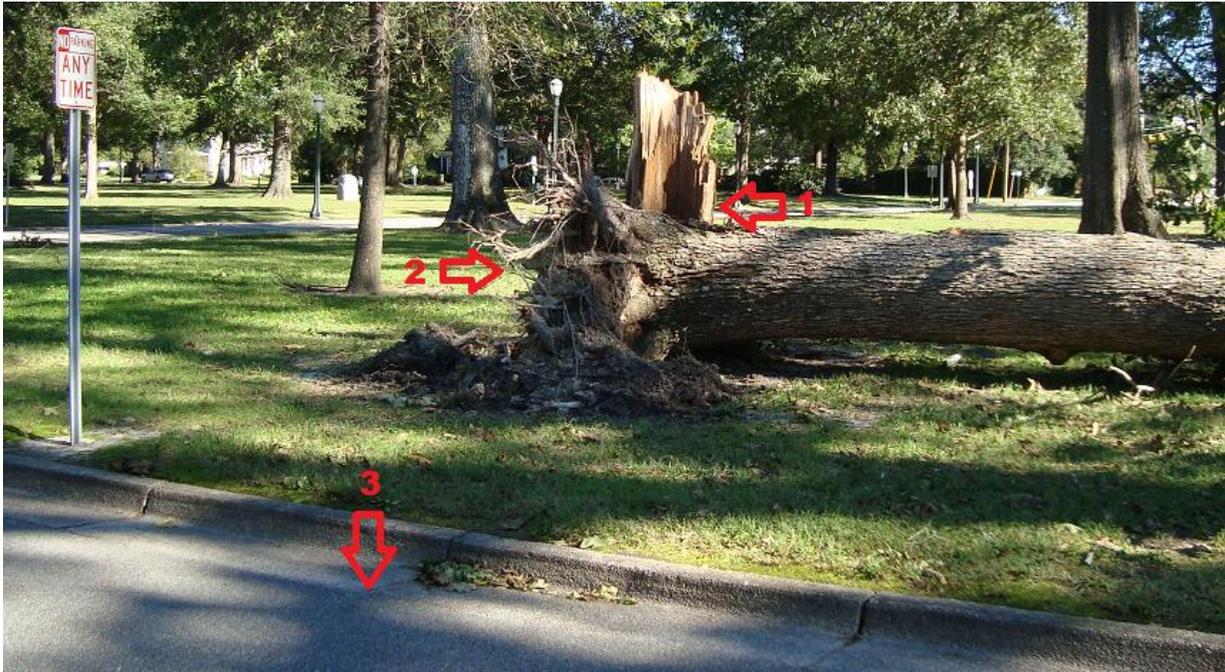
The “many exceptions, complications and caveats that each individual tree presents when being assessed” as noted in the flowchart on page 3, is expanded for more detail in the flow chart below. This is why long-term consultation with an experienced and certified arborist is strongly recommended; and why an accepted industry standard for assessing tree risk exists.

And this is also why an established management policy for the trees and risk should be developed and then carried out: to demonstrate the duty of care in a rational and cost-effective basis to and for the residents of a community.



Source: [Common Sense Risk Management of Trees](#), 2011

## Why are we spending so much time discussing management, and removals, and decay:



The manner in which the tree failed shows 3 concerns that are shared by many of the other trees on the site, regardless of how green/leafy they may look.

1. Basal Decay – Decay does not have to be externally visible to weaken the structural integrity of a tree; the presence of basal decay fungi is a concern.
2. Root decay – Root decay is generally not visible above ground but the impact can be seen here with a very small root plate that supports and feeds the tree; the presence of decay fungi that affect tree roots is a concern.
3. Target – The street, traffic and parked cars, or even a house across the street, could have been impacted, had the tree fallen in a slightly different direction.

Budgeting to manage trees properly and mitigate existing risk requires context and knowledge.

It should be noted that crown reduction can be a very effective way to mitigate risk as it reduces the size of the crown and leaf area, so that a tree presents less sail to strong winds which are a typical force that results in tree failure. However, trees also need their leaf area to support cell function and tree growth. So any trees treated in this way must have sufficient crown and leaf area remaining so that they can continue to grow and survive.

Some trees may be good candidates for crown reduction, while others would not benefit from the treatment sufficiently to warrant the cost. This is why prioritizing the trees for treatment and working with a certified arborist to monitor and treat the trees is so essential.

## Developing a Management Strategy

### Step 1

An inventory of urban trees is the first step to develop a management strategy that will serve the community for years to come.

### Step 2

The second step is carrying out the immediate recommendations of that inventory report. The immediate removals and pruning are based on mitigating any immediate risk presented by trees that may be structurally compromised by decay, damage or death and where, should failure occur, the possibility of damage or injury exists. Following through on the immediate recommendations of the inventory is a very important step.

### Step 3

Once the immediate work has been completed, the third, longer and more involved, task of managing for the priorities must occur:

1. Healthy mature trees.
2. Structurally sound trees able to withstand extreme weather events with reduced breakage.
3. Canopy and shade that provides a setting for community events and a welcoming place for residents to enjoy.
4. Contributing to the character and quality of life within the community.
5. Maintaining the history of the community.

*But when a community has a predominantly mature tree population, managing existing trees while building a new and more resilient tree populations is challenging. Before Step 3 can be fully accomplished, the community must navigate the management of an aging population of trees in a way that retains the existing character and creates a basis for its future character. Out of those efforts, not only will the framework for a management policy become clearer, but the budget requirements and long-term commitments will be more clearly understood.*

### Step 2.5

The interim step that must occur, before Step 3, is at the crossroads of budget and need. Depending on the number of older trees and their general decline, many trees will require some sort of work to improve their present structure. While each tree might benefit from maintenance work to some degree, the question is: Would that work make a difference in how long the tree would possibly survive and the level it could contribute to the site during that time? What is the cost:benefit ratio of treatment:longevity.

Investing limited funds in the trees that have the best potential for a long-term presence is the main priority, now and in the future. But at the start, it must be expected that many of the older trees will require removal and replacement in the next 1-10 years, which will skew the tree population to young trees and change its character for many years to come.

So the priority for Step 2.5 is buffering the impact of removal and replacement, in order to allow the community to retain a degree of its existing character, keeping some its older mature trees intact. So selecting some older trees which would benefit from maintenance and ensure their longevity for 5 or 10 years *or more*, is essential.

To expand on the description in the table on page 2, and some of the considerations, exceptions, complications and caveats that must be considered:

1. **IMMEDIATE REMOVAL:** That some trees must be removed now, refers mainly to trees with internal or external decay that compromises structural stability and where there is a target. The extent of the decay, and the age and species of the trees, as well as the tree location, are additional factors in this decision.
2. **SCHEDULED REMOVAL:** Tree may be in a similar condition as the trees listed above, but they do not have the same target potential.

Considerations for both 1 and 2:

- Even if the problems could be mitigated, or reduced in severity, the length of contribution by the tree must be considered to the cost of treating them. Ultimately, the tree will still require removal. This decision should be impacted by cost for multiple treatments and final removal.
  - The low risk option would be removal; mitigating the trees now and in the future would be a moderate to moderate/high risk, depending on the condition of the tree, with maintenance and, ultimately, removal costs.
3. **MONITORED DECLINE to scheduled removal:** Some trees are structurally sound enough to be left in place and observed. As long as they do not present a risk of failure and do not have large dead limbs or hangers, they can remain until their status changes. These trees may be in fair, or even poor, condition, e.g. show signs of past storm damage and/or signs of decline (thin or thinning crowns, dieback of small branches, epicormic shoots along main limbs).
    - When the tree status changes, the Town may choose to mitigate risk and retain the tree, or to remove the tree. It will depend on the Town budget and its priorities at the time, for example, if several trees in the area around such a tree had required removal for some reason, maintaining that one declining tree may be determined to be important. Or it could be decided that the tree must be removed so when new trees are planted, they will not be impacted when the time DOES come to remove that long-declining tree.
    - The low risk option would be removal, while leaving the trees and only removing large dead limbs or hangers as required would be a moderate to low risk, as long as the trees were regularly inspected for changes in status.
  - 4a&b **MONITORED & MITIGATED:** Some trees are reasonably healthy and may withstand being neglected, but they would benefit from pruning maintenance for structure and for health. This can help extend the life of the tree before it begins to decline, and reduce branching habits that make the tree more prone to damage from storms. These may be younger trees or older trees that have good crown density.
    - Managing these trees and budgeting for maintenance it is recommended.
    - Low risk could be doing nothing for a long time, but it could also mean that these trees will require removal sooner than if they had been managed properly. Routine maintenance for deadwood and broken limbs is a wise investment.
  5. **YOUNG TREES:** Most young trees are un-managed until they reach a size where their issues are more costly to address. While tree selection, planting and post-planting care are very important, so is training pruning. Trees that are 20' or less can be very inexpensively pruned from the ground to improve their mature structure. This is a cost-effective approach that will pay large dividends as the trees mature.

## Further Comments on Maintenance and Trees

Other common issues that must be addressed in any tree management program include mechanical damage. Physical damage by mowers is not only a common problem for many landscape trees but this damage is the primary cause of the spread the fungal decay organisms from tree to tree. Many trees in the landscape are repeatedly injured, not only on the surface roots but on the trunks as well. And the small trees are no less impacted in most situations.



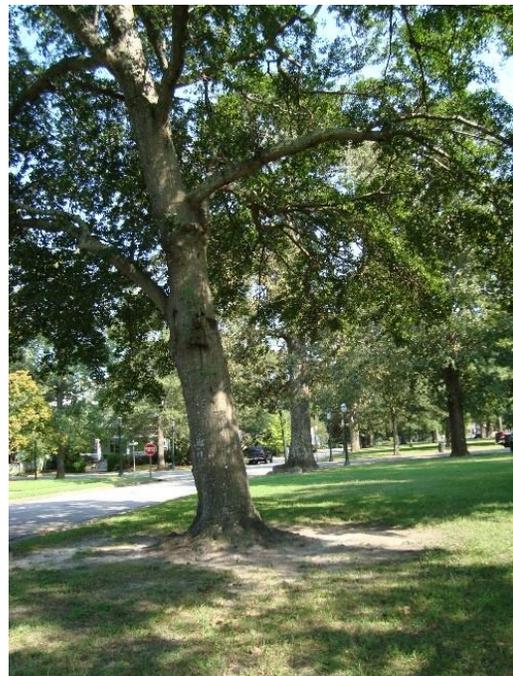
This damage is between the curb and the street, there is no grass here to mow. The “ledge” where damage has been occurring for many years is very visible. The tree continues to try and grow over the wound, its natural response to damage.

Repeated damage to roots cause stress to the trees and opens the trees to decay. Here, even without any fungal decay organisms present, the combination of repeat damage and tree growth response creates a concave area where water can collect.



Maintenance policies and training are essential for mowing staff.

*Mulch is STRONGLY recommended for each tree, or for groups of trees. This may slow the speed of the mowers, as they must not drive over the mulch or mulch beds, but management must decide which investment to protect, staff hours or the trees. Mulch 2-3” in depth, to a maximum of 4”, and place so that it is not piled against the base of the trees.*



Other management or maintenance issues to be addressed when managing trees, not just elderly trees:

1. Re-seeding grass or planting around trees: The majority of tree roots are in the top 6-18" of soil and the small feeder roots are necessary for the trees to access water and nutrients and maintain their health and vitality. Disturbance such as soil preparation, adding or removing fill, etc., will affect the tree roots.
2. Any utility installation, improvement or repair should be done in consultation with a certified arborist, preferably one with a good understanding of the site and the trees, as well as the management and concerns for the specific trees affected. This should also be required if planning to attach any infrastructure to any trees.
4. Mulch needs to be refreshed periodically. Wind and rain, foot traffic and composting reduce mulch thickness, as will mowers on the edges of the installed mulch. Woodchips are preferred over bark chips, and dyeing is not necessary. Smaller chips break down more quickly, which is not a bad thing, and are also less likely to blow around. Partnering with utility contractors and having a site where chips can be dumped, and even partially composted, can be a way to reduce mulch replacement costs.
5. Where decay fungi are present, a recommendation to fertilize trees with thin crowns is not advisable, as increasing the weight of the crown could put more stress on any invisible internal weak or decayed areas of the trees. Fertilization decisions should be made in consultation with a professional experienced in decay assessments.
6. *Establishing a long-term working relationship with a consultant who can advise, recommend, review, and treat elderly trees is essential. A consistent management approach and clear communication between all parties involved is essential for the success of the long-term management of your trees.*