Bull's Island Recreation Area: Visual Tree Risk Inventory and Results July 2011

Inventoried & Prepared by:

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Introduction

Background

In June of 2011, a large sycamore failed below the soil surface and fell onto a campsite at Bull Island Recreational Area near Stockton, NJ. After this event, The F.A. Bartlett Tree Expert Company was hired to conduct a tree risk inventory for all trees' 12 inches or large at DBH that could impact buildings, campsites, or roads in the northern section of Bull's Island.

Assignment

Bartlett Tree Experts was requested to locate all the trees using GPS receivers, record tree attributes, and rank trees using the Bartlett Tree Research Laboratories Visual *Tree Risk Assessment system*.

Where needed, arborists examined the root flare. Bartlett uses an air compressor and AirSpade® to excavate the soil around the *root collar*, and a probe to locate large roots adjacent to the stem.

Upon completion of the field assessments Bartlett Tree Experts will provide a written report documenting results and observations.

Limits of Assignment

The focus of this report is the trees' potential for failure. All tree and site observations were made from the ground. Dead, diseased, and declining branches were noted when identified as having a risk of failure.

It must be emphasized however, that all large trees pose a certain degree of inherent risk and this evaluation does not preclude all possibility of failure especially during severe storms.

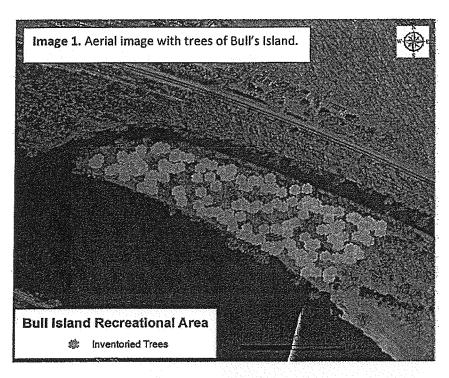
For those trees that the client considers hazardous and representing an immediate safety concern, we recommend placing a sign, tape, or other warning device near those trees until such time as the hazard can be remedied

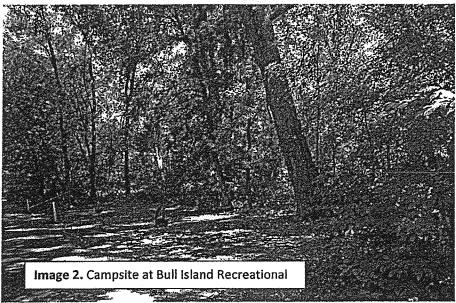
Observations

Bartlett Arborists visited Bull Run Recreational Area on two occasions July 14th-15th, 2011 and July 26th, 2011. Trees 1-101 were inventoried July 14th-15th and trees 102-180 were inventoried July 26th.

Site

The recreational area, with primitive campsites, is set in a forested area in the flood plain of the Delaware River and Delaware & Raritan canal.





Analysis

GPS Tree Risk Inventory

Using a Trimble Geo6000 XT GPS receiver, the Bartlett arborists captured the approximate position of the tree stem (with in 1-3 meters). All trees were physically tagged with a blue anodized aluminum tag and aluminum nail. The following attributes were recorded:

- Tree Number
- Common Name
- Diameter at Breast Height (DBH)
- Estimated canopy radius (nearest five feet)
- Age Class
- Estimated Height Class (nearest 10 feet)
- Condition Class
 - o Dead
 - Poor Most of the canopy is affected with die-back, undesirable leaf color, undesirable leaf size and undesirable new growth. Tree or parts of the tree are in the process of failure.
 - o Fair Parts of the canopy affected by undesirable leaf color, undesirable leaf size and undesirable new growth. Parts of the tree are likely to fail.
 - o Good Tree health and condition are acceptable.
- Potential for Failure (see paragraph below)
- Consequence of Failure (see paragraph below)
- Visual Tree Risk Rating Score (see paragraph below)
- Root Collar Excavation Performed (Yes/No)
- Root Zone Infringement (Based on dripline, estimate grayscape (man-made structures, such as roads, paths, and campsites) impact on root zone)
- Pruning recommendations
 - o Clean Selective pruning to remove one or more of the following parts: dead, diseased, and/or broken branches
 - o Raise Selective pruning to provide vertical clearance
 - o Thin Selective pruning to reduce density of live branches
 - o Reduce Selective pruning to reduce height or spread
- Need for more quantitative tree hazard evaluations or climbing inspection
- Tree removal (Yes/No)
- Defects
- Poisonous Plants Present (Yes/No)
- Other notes

The Bartlett Visual Tree Structure Analysis System ranks the relative degree of risk for prioritizing remedial treatments when managing large tree populations. Bartlett's system uses two criteria: Failure Potential and Consequence of Failure. Failure potential (FP) considers the severity of defect, architecture, site exposure and other biological and site factors that contribute to failure as observed from the ground. Consequence of Failure (CoF) factors in size of the defective plant part, target value and frequency of use and potential for injury/loss should a failure occur as observed from the ground.

Failure Potential (FP) Critical Risk - Failure imminent	Points 10
High Risk - Failure likely especially in storms	7 - 9
Moderate Risk- Failure possible especially in severe storms	4 - 6
Low Risk – Failure unlikely	1-3

Consequence of Failure (CoF)

This criteria considers potential for injury/loss should a failure occur based on such factors as size of defective plant part, target value and frequency of use.

Severe Consequence – High potential for injury/property loss	5
Moderate Consequence - Moderate potential for injury/ property damage	3 – 4
Low Consequence – Low Potential for any loss	1 - 2

Total Visual Tree Structure Analysis = Failure Potential +Consequence of Failure

<u>Total Visual Tree Structure Analysis</u>(VTSA) <u>Comments</u>

13-15	Critical Risk- Failure imminent; Personal injury and/or property damage inevitable.
10-12	High Risk- Failure likely especially during storms; Personal injury and/or property damage likely.

7-9 Moderate Risk-Failure unlikely, and/or high risk

of failure and low risk of property

damage/personal injury

<7 Low Risk-Failure unlikely and low risk of</p>

property damage

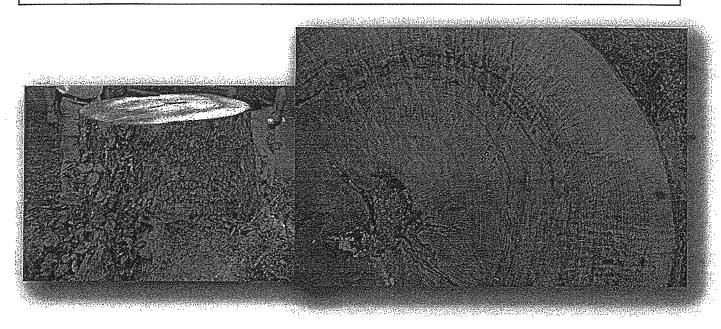
Root Collar Excavations

A Bartlett technician used a 185 CFM air compressor and an AirSpade® tool to remove soil near the root collar to expose the tree stem and *buttress roots* at or below the soil level. A root collar excavation will also expose the presence of *adventitious roots* and/or girdling roots.

Discussion and Findings

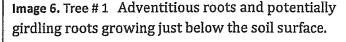
The species composition for this area is a mix of American sycamore, maple species (silver and red), black walnut, boxeleder, and black locust. The largest of these trees are the American Sycamores with an average DBH of 46 in. and average canopy spread of 60 ft and an average height of 100 feet. Based on a count of visible annual growth rings of a recently removed 42 inch (at 3.5 ft) sycamore stump in another section of Bull Island recreational area, it is estimated that the age of all the sycamores on the section of the island is > 120 years.

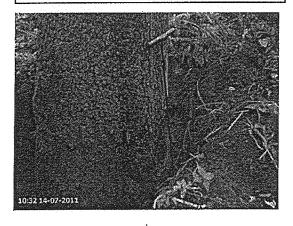
Image 3 & 4. Recently removed sycamore tree showing ring count (each black mark representing approximately ten years of growth) near the inventory area Bull's Island Recreational Area



Although visible above-ground defects were documented, the main area of concern was the transition area from trunk to roots and in the root system of these trees, because the tree that failed in June did so in this general section of the recreational area. Based on the excavation of soil around the stems and the probing (using a metal irrigation probe) of the inventoried trees, the root collars the majority of the trees inventoried were buried from 6" to 18" or greater below their original soil level. For most of the walnut trees a root collar was not found despite probing up to approximately 2 feet below the current soils level.

Image 5. Tree # 12 Soil removed 24" from a tree stem and no buttress roots







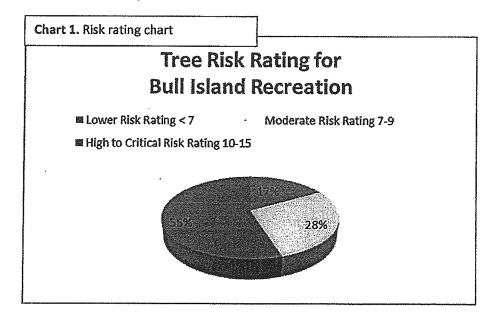
The excessive amount of soil burying the root collars of most trees can be attributed to the frequent flooding of the Delaware River (see table 1). Three of the top six highest flooding events have occurred in the last seven years. During each flooding event, soil is deposited on the island. Observations indicated that some soil might be washed away by subsequent floods, or more accumulated depending on the severity of a given event. More soil might accumulate around trees and on roots by the mechanical moving of soil to maintain roads and campsites. Over time this soil has accumulated to a depth from several inches to approximately three feet over the buttress roots and large lateral roots. The excess soil may be inducing stress to the root systems of these trees. Excess soil over root systems can reduce soil oxygen and other gas exchange, alter drainage, limit root growth, and even cause decline and death of major roots. In response to excess soil over their original root system, trees sometime produce adventitious roots – those which arise from stem tissue above the root flare.

(1) 38.85 ft on 08/20/1955	(13) 25.00 ft on 03/28/1913
(2) 35.90 ft on 10/10/1903	(14) 24.46 ft on 05/30/1984
(3) 34.07 ft on 04/03/2005	(15) 24.36 ft on 06/30/1973
(4) 33.62 ft on 06/29/2006	(16) 24.17 ft on 04/17/1983
(5) 32.45 ft on 03/19/1936	(17) 23.80 ft on 10/16/1955
(6) 30.95 ft on 09/19/2004	(18) 22.55 ft on 12/22/1973
(7) 28.72 ft on 01/20/1996	(19) 22.38 ft on 01/28/1996
(8) 27.50 ft on 05/24/1942	(20) 22.35 ft on 03/08/2011
(9) 26.47 ft on 04/01/1940	(21) 21.66 ft on 04/02/1993
(10) 25.40 ft on 12/12/1952	(22) 20.33 ft on 10/02/2010
(11) 25.20 ft on 03/12/2011	(23) 18.35 ft on 10/30/2003
(12) 25.16 ft on 03/16/1986	(24) 17.66 ft on 04/15/1994

The presence of adventitious roots may be an indication that the buttress and lateral roots are unable to function due to anaerobic conditions. This condition can predispose the roots to decay pathogens. The presence of decay can cause strength loss and reduce the vigor of the tree.

Conclusion

Based on the catastrophic failure of a large sycamore in June 2011, and the subsequent tree inventory, and examination of the root collars of the trees in this section, we conclude that a majority of trees do pose a *high to critical risk of failure*. Traffic in this section should be limited to reduced or excluded, or to eliminate risk of tree failure to people and property (the Consequence of Failure).



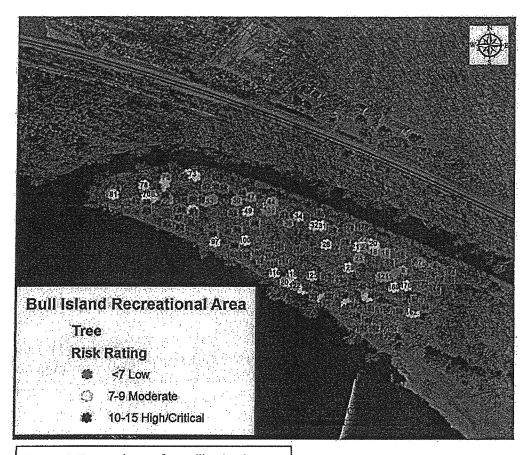


Image 7. Tree Risk Map for Bull's Island

Bibliography

Glossary

Adventitious roots - roots arising from stem tissue rather than root – a potential indicator of loss of structural roots

Buttress roots: Lateral surface roots that aid in stabilizing the tree.

Large, woody, lignified roots that arise at the base of the trunk and support the transition from trunk to roots. Structural roots that function to transfer compression and tension from the trunk to the roots and soil.

Critical Risk of Failure: Trees or tree parts are in the process of failing or prone to failure at any time.

Diameter at Breast Height (DBH): standard measure of truck diameter at 4.5 feet above the ground

High Risk of Failure: Trees or tree parts are likely to fail during periods of stress such as wind and ice storms.

Root Collar: The transition zone between the trunk and the root system.

Root Flare or Trunk Flare: The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk. (ANSI Z60.1-2004 Nursery Stock) (ANSI A300 (Part 6)-2005 Transplanting).

Tree Risk Assessment: Closer inspection of visibly damaged, dead, defected, diseased, leaning or dying tree to determine management needs.

Trunk: That portion of a stem or stems of a tree before branching occurs

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