



2015

# Tree Management and Circulation in an Underused Section of the Natural Lands at the Morris Arboretum

Aaron Greenberg

Follow this and additional works at: [https://repository.upenn.edu/morrisarboretum\\_internreports](https://repository.upenn.edu/morrisarboretum_internreports)

 Part of the [Horticulture Commons](#)

---

An independent study project report by The Walter W. Root Endowed Arboriculture Intern (2014-2015)

This paper is posted at ScholarlyCommons. [https://repository.upenn.edu/morrisarboretum\\_internreports/17](https://repository.upenn.edu/morrisarboretum_internreports/17)  
For more information, please contact [repository@pobox.upenn.edu](mailto:repository@pobox.upenn.edu).

---

# Tree Management and Circulation in an Underused Section of the Natural Lands at the Morris Arboretum

## **Abstract**

The Morris Arboretum has developed large and impressive Natural Areas that have been open to the public over the last several years. There is one part of this section south of the entrance meadows but north of the Wissahickon Creek, between Northwestern Avenue and Paper Mill Run, which is largely untraveled by visitors. This area contains some excellent tree specimens and some very interesting ecological groupings, but lacks visitorship. In an attempt to discover why, I did a thorough inventory and assessment of each tree in this section, and a survey of circulation through this area.

Through my assessment, I was able to identify many trees with inherent interest, as well as trees that could use tree work in the form of pruning or removals. Out of this assessment I was able to formulate recommendations for tree work that should be done, and for an improved system of circulation that will have a less harmful impact on the ecosystem, while also bringing visitors to the trees in this section that are really spectacular. Each tree needing work was given a priority level, and each recommendation made for circulation and maintenance was given a short- or long-term goal. It is my hope that these recommendations will be followed to transform this underused section into a natural field site for ecological education.

## **Disciplines**

Horticulture

## **Comments**

An independent study project report by The Walter W. Root Endowed Arboriculture Intern (2014-2015)

---

**TITLE:** Tree Management and Circulation in an Underused Section of the Natural Lands at the Morris Arboretum

**AUTHOR:** Aaron Greenberg  
The Walter W. Root Endowed Arboriculture Intern

**DATE:** March 2015

**ABSTRACT:**

The Morris Arboretum has developed large and impressive Natural Areas that have been open to the public over the last several years. There is one part of this section south of the entrance meadows but north of the Wissahickon Creek, between Northwestern Avenue and Paper Mill Run, which is largely untraveled by visitors. This area contains some excellent tree specimens and some very interesting ecological groupings, but lacks visitorship. In an attempt to discover why, I did a thorough inventory and assessment of each tree in this section, and a survey of circulation through this area.

Through my assessment, I was able to identify many trees with inherent interest, as well as trees that could use tree work in the form of pruning or removals. Out of this assessment I was able to formulate recommendations for tree work that should be done, and for an improved system of circulation that will have a less harmful impact on the ecosystem, while also bringing visitors to the trees in this section that are really spectacular. Each tree needing work was given a priority level, and each recommendation made for circulation and maintenance was given a short- or long-term goal. It is my hope that these recommendations will be followed to transform this underused section into a natural field site for ecological education.

## Table of Contents

|                                 |       |
|---------------------------------|-------|
| Introduction                    | ..... |
| 2                               |       |
| Project Goals                   | ..... |
| 2                               |       |
| Methods                         | ..... |
| 2                               |       |
| Results                         | ..... |
| 3                               |       |
| Recommendations                 | ..... |
| 5                               |       |
| Conclusion                      | ..... |
| 7                               |       |
| References                      | ..... |
| 8                               |       |
| Acknowledgements                | ..... |
| 9                               |       |
| Appendix A – Points of Interest | ..... |
| 10                              |       |
| Appendix B – Removals           | ..... |
| 12                              |       |
| Appendix C – Pruning            | ..... |
| 14                              |       |

Appendix D – Map of Current and Proposed Vehicle Path

.....  
16

Appendix E – Map of Proposed Footpath

.....  
17

**INTRODUCTION**

The Natural Lands section of Morris Arboretum has in recent years become a major attraction for Arboretum visitors. From the Woodland Path through Penn’s Woods to the beautifully constructed wetland and accompanying interpretation, the Natural Lands offer an excellent representation of the natural landscapes of the Southern PA piedmont ecosystem. Educational opportunities here are all the more illuminating in juxtaposition with the more formally maintained horticultural gardens that compose the rest of the Arboretum. However, as well-constructed trails, careful management, and interesting interpretation have brought visitors into many parts of the Natural Lands, other parts remain almost entirely unvisited. Between the entrance gates and Paper Mill Run are two beautifully managed native meadows that draw the visitor into the formal Arboretum. Beyond the southern meadow is a corner of the Natural Lands bordered to the west by Northwestern Avenue, to the south by the Wissahickon Creek, and to the east by Paper Mill Run. This forgotten corner of the Arboretum contains a seasonally wet meadow, a wet swamp dominated by bald cypress, a riparian buffer in need of restoration, and some beautiful large and old upland tree specimens.

**PROJECT GOALS**

The purpose of my intern project as the Arboriculture Intern at Morris Arboretum was to do a survey of this neglected section of the Natural Lands by doing a complete inventory and assessment of every tree. The reason for doing this assessment was twofold. First and foremost the goal was to identify what trees or groups of trees might be present that would serve as points of interest to draw the public back into this area. The second goal was to determine what would need to be done to improve circulation within this area so that it vehicular traffic could have less of an environmentally degrading impact and foot traffic could be brought more effectively into the space. Concurrently, I have used the tree assessment to make recommendations for each tree as to the potential priority for pruning or complete removal. I hope that my project can help highlight the potential for this area as a key component of the Natural Lands, and recommend some of the tree work that can be done to make that possible.

## METHODS

Once the focus area of my project was defined, the bulk of the activity was to conduct a thorough inventory and assessment of every tree in the area. Beginning at the corner of the property where the Wissahickon Creek meets Northwestern Avenue, I surveyed each tree with a caliper of 6" or greater. This resulted in a total of 284 trees. The following Information was collected using the ArcGIS Collector™ application for the iPad:

- ID number - each tree had been tagged with an ID number in previous work done by staff members Anne Brennan, Rebecca Bakker and Tracy Beerley.
- Species – full specific epithet, or just genus when species ID was impractical or unnecessary
- Circumference at Breast Height (CBH) – Trunk circumference at approximately 4 feet, measured in inches. Up to five CBHs were measured for multi-stemmed trees. For trees that could not be measured at breast height, “measured-at” height was recorded.
- Spread – unidirectional measure of the length of canopy cover
- Height – estimated using heights of known objects or “stick trick”\*
- Work Needs – Trees needing pruning given a value of P, trees needing removal given a value of R, trees needing neither given a value of X.
- Pruning Details – For trees marked P, further details noted such as pruning type (deadwooding, hangers, crown cleaning, subordination pruning, structural pruning, etc.) and pruning priority (hazards over the path = high priority, structural pruning = low priority for a natural area)
- Removal details – For trees marked R, further details noted on reason for removal and priority of removal.
- Points of Interest – for trees with particular interest, details noted on the nature of the interest (Specimen tree, habitat tree, tree of particular educational value, etc.)
- Comments – any other relevant details noted
- Coordinates – ArcGIS Collector™ automatically adds a GPS data point to an uploadable map, with an accuracy of only 5 meters.

While collecting all of this data, notes were also taken on landscape features. For instance, for future planning it was important to note where the riparian buffer was minimal or nonexistent

and needed restoring, and which areas had permanent standing water and so could be considered impassible for circulation.

Once all of this data was collected, each tree could be given a level of priority for pruning or removal, so that the arborist team could begin tree work in this section. Each tree was also given a priority assignment for “Interest” so that trees of high aesthetic or educational value could be highlighted in my circulation plan, and trees of high ecosystem value could be protected.

All tree data collected using Collector was available for mapping using ArcGIS online. In November and December of 2014, Natural Lands Section Leader Tracy Beerley rented a highly accurate GPS tool to map the locations of every tree in all of the natural lands to a 2 cm degree of accuracy. My data was merged with Tracy’s so that I could attach my thorough quantitative and qualitative recorded data with her highly-accurate location points. Using this highly-accurate map I was then able to add the current basic circulation system present in this section. Finally, I was able to use known geographical details and data collected on points of interest to create a recommended circulation path through this back section of the Natural Areas.

## RESULTS

### Points of Interest

By far the most important results of my tree assessment were the number and variety of trees and assemblages of trees in this section that have incredible value as interesting specimens, opportunities for education, and/or provision of key ecosystem services such as wildlife habitat or stream bank stabilization. Specimens include a massive two-stemmed sycamore and a majestic shagbark hickory that are at least 100 years old, and two impressive groves of naturalized bald cypress complete with characteristic cypress “knees.” There are also three magnificent dawn redwoods from the original 1948 introduction of this species to the U.S., and a sizeable grove of the relatively rare Kentucky coffee trees. Trees that could lend themselves easily to educational opportunities include several large hollowed-out ash trees that make excellent wildlife habitat, and a large silver maple with a deer stand in it that could demonstrate the necessity of deer management (especially when noted along with the apparent lack of understory in the forest). For a comprehensive, prioritized list of points of interest identified in this study along with a map that identifies them, see appendix A.

### Tree Work – Removals

From the perspective of a highly-managed landscape, 73 trees were identified that could be removed for various reasons. However, in the context of a natural area, it would be unnecessary to remove most of these, and indeed removing many trees without immediate plans for replanting with more native species would only open up the opportunity for invasive species to infiltrate more easily. For this reason, each tree was given a removal priority level. Priority One trees are primarily invasive species that should be eradicated from a managed natural area. There were only about 20 trees in this section that could be considered invasive, including a cluster of eight Norway maples, several *Paulownia* trees, and a few crab apple and pear species. Also included in Priority One are trees that pose a direct hazard over a defined target. Should my recommendations for moving the truck path through the meadow (see below) be followed, there

would only be two trees in this section that could be considered hazardous enough to warrant removal. These are a walnut and a box elder that are growing towards electrical and communication lines on Northwestern Avenue by the Wissahickon.

Priority Two removals are trees that could be removed to favor superior specimens. This section is dominated by box elders and walnut trees. Should this area be opened to highlight certain points of interest, it may be advisable to remove some box elders or walnuts that are in direct competition with these more desirable trees. Trees blocking the view of a desirable tree could be felled, while trees competing with desirable trees for light or resources could simply be girdled and left standing to provide wildlife habitat.

Priorities Three and Four are trees that could be removed in the future to favor more diverse plantings of native tree species. These are inferior specimens of box elder, walnut and ash that have been identified as particularly ugly or having bad form that would be good candidates for removal should native plants be available to replace them. Without a plan for replanting and maintenance, there would be no reason to remove these trees, and they should be left in place as part of the natural forest structure. For a detailed list of possible removals with accompanying map, see Appendix B.

### Tree Work – Pruning

When doing a tree assessment with a seasoned arborist who specializes in structural pruning, it is easy to see pruning needs on almost any naturalized (unplanted) tree. It was necessary to assign priority ratings to those trees that needed pruning so that the goals of pruning in this natural area could be clear. Priority One pruning jobs include trees that have limbs that could be considered a hazard over the path. Any tree with dead wood, hangers, overextended limbs or limbs with bad branch connections over a path should be pruned to remove the hazard. Priority One also includes clearance pruning for paths. This would be trees on which the crown could be raised or limbs reduced to create clearance. On truck paths the crown should be raised to 12 feet – on pedestrian paths, raising the crown to eight feet is sufficient.

Priority Two is pruning vines and surrounding invasive shrubs from trees. Several large trees in this section are covered in vines, some of which are invasive or should be removed. There are also several trees being choked out by invasive honeysuckle, which should also be removed, although careful planning is necessary to prevent opening new areas for reinvasion from new or repeated invasives.

Priority Three is pruning certain trees to favor more desirable trees. This priority level of pruning would only become necessary when paths, benches, or interpretation signs are put in to actually feature some of the trees of interest in this section. At that point, there are many trees (mostly box elders) that compete with more desirable trees for space and could be pruned to give the desirable trees more room to thrive and be viewed by visitors.

Priority Four would be pruning of trees to remove deadwood, structural pruning, crown cleaning, or other pruning practices common in a landscape setting. While it is often important to practice these pruning techniques on landscape trees, this would be a low priority for trees in a natural area, where natural forms and deadwood are desirable to maintain a natural forest



ecology. For detailed information on pruning priorities and an accompanying map, see Appendix C.

## **RECOMMENDATIONS**

### Short-Term Recommendations: What can be done now?

One thing that could be done immediately to improve this section of the Natural Lands is to begin to remove the invasive tree species. Specifically, on a ridged outcrop above the permanently swampy area is a mixed assemblage of mature sycamores and Norway maples. The Norway maples could be removed immediately without fear of opening up edge habitat to invasion, because the sycamores are large enough to dominate the canopy in this area. Likewise, the few crabapple and pear trees could be removed from the understory very easily.

Another easy management step that can be taken immediately is improvement of the vehicle path through the lower meadow. As it stands now, the vehicle path, which is also the only pedestrian path through this area, sweeps the perimeter of the meadow. This brings the path much too close to the stream banks of the Wissahickon Creek and Paper Mill Run, which means that the riparian buffer along these waterways has no chance of being restored. The path also leads over many tree roots, which can lead to soil compaction and subsequent root death and tree health decline. I have proposed a modification of the vehicle circulation path that brings it around the meadow in a more central loop, far away from the riparian zone and adequately far from trees. For a map that shows both the current and proposed vehicle paths, see Appendix D.

These are remedies that could be accomplished immediately with little or no budget and that could have a substantial impact in this area. Removing the invasive Norway maples and crab apples could be accomplished in three days by the arborist crew. Establishing a new vehicle path is as simple as redirecting the mowing operations in the spring and closing off the old path with some limbs (from the Norway maple). Some clearance and hazard pruning will then be necessary along the route of the new path. The invasive tree seedbank will be reduced, and the riparian buffer can begin to be restored.

### Middle-Term Recommendations: Site Improvements to draw in visitors.

With somewhat more effort, a pedestrian path could be built through this section that takes advantage of the natural contours of the land and highlights the trees identified as points of interest. By using my tree data and contour maps, and actually walking the grounds myself, I have created a proposed foot path that will bring visitors away from the main vehicle path and into this section of woods. The path stays mostly on the elevated ridges present in the land, and allows visitors to view the lower bald cypress swamps with their fascinating cypress knees, the grove of Kentucky coffee trees, and each of the other interesting tree specimens identified in my survey. Where points of interest (such as a pair of honey locusts that exhibit variable thorny forms, and the confluence of the two waterways) require visitors to enter the riparian zone, they are brought there with smaller loops or spurs off of the main vehicle path. For a map with my proposed footpath and the points of interest that it highlights, see Appendix E.

As more visitors enter this part of the natural area, it will be important to manage the understory as well. Currently this area is highly accessible to deer who may enter freely from the Wissahickon Creek corridor. As such, there is little forest regeneration, and what understory exists is composed primarily of invasive species. Most notably, Japanese honeysuckle bushes and oriental bittersweet vines dominate. These species should be removed. However, simply removing invasive species without a plan for continual management of understory regeneration will only lead to reinvasion. Concurrent with invasive plant removal should be active deer management, and selective replanting of native species within deer exclosures. Visible deer stands and exclosures, while they may be inappropriate for a garden setting, provide excellent opportunities for education in a natural area. I would also recommend removing the invasive *Paulownia* trees at the north end of this study area and replanting this very open, sunny woodland edge with a variety of native trees and shrubs. This would also necessitate deer protection and consistent maintenance which, funds and time allowing, could be folded into the maintenance schedule of the Natural Areas and the arborist crew.

### Long-Term Recommendations: Nature Education

This tucked-away section of the Natural Areas has incredible potential as an educational tool. There are some very interesting ecological phenomena going on here that could be used for hands-on education, particularly for an older middle school or high school science class. For instance:

- Two honey locusts with two drastically different forms illustrate how through genetic mutation, or breeding two trees of the same species, can have very different characteristics.
- Low wet areas dominated by bald cypress illustrate how trees may adapt to their environment. Wetland species have different adaptations for surviving in wet soil, including the production of “knees” for stability and gas exchange.
- Evident deer exclosures and deer hunting stands illustrate the overpopulation of deer and open up discussion for the effects of deer on forests. Deer overpopulation can be showed as a human-caused problem that now needs a human management solution.
- Access to the point where Paper Mill Run enters the Wissahickon Creek introduces the concept of a watershed, where small tributaries drain into larger ones.

These points and many others are perfect for showing young people both how nature works and how nature *takes* work to manage. While other sections of the Natural Area have interpretation and host school groups, there is no area with a specific focus on education. By looking thoroughly into this one five-acre section of Natural Areas, I have seen splendid examples of ecological processes and potential management practices. With some cooperation between the Arboretum and local secondary schools, this area could provide an excellent environmental curriculum. The first step, however, must be to manage and provide access to this area’s wonderful trees.

## CONCLUSION

It is my sincere hope that my recommendations can be followed to improve visitorship to this section of the Natural Lands. Because I recognize that time and money are limiting factors, I have split my recommendations into short- and long-term goals so that what can be done immediately will be more likely to be done. Should the Arboretum eventually want to invest in this section, I believe my assessment could be a resource to begin that process. I also think that just doing a thorough inventory and assessment of trees using Collector and analyzing the data from that assessment using GIS could be useful for a myriad of applications at the Arboretum and beyond.

## REFERENCES

Beerley, T. (2014). *An Adaptive Management Plan for the Natural Lands Section of Morris Arboretum of the University of Pennsylvania*. (Master's Thesis – Unpublished).

Bond, J. (2013). *Best Management Practices: Tree Inventories*. Champaign, IL: International Society of Arboriculture.

Gilman, E. F. (2012). *An Illustrated Guide to Pruning*. Clifton Park, NY: Delmar.

Latham, R. E. and M. McGeehin. (2012). *Unionville Serpentine Barrens Restoration and Management Plan*. Media, PA: Continental Conservation, Rose Valley, Pennsylvania and Natural Lands Trust.

Lilly, S. J. (2010). *Arborists' Certification Study Guide*. Champaign, IL: International Society of Arboriculture.

Steckel, D. B. and H. Harper. (2008). *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania*. Media, PA: Natural Lands Trust.

### ACKNOWLEDGEMENTS

- I would like to thank my project supervisor **Andrew Hawkes** for leading me through the entire tree assessment process and guiding all recommendations, and for getting excited about this project with me.
- I would like to thank **Corey Bassett**, the Urban Forestry Intern and my friend, for helping me to do everything that involved making maps using GIS
- I would like to thank **Tracy Beerley**, the Natural Lands section leader, for supporting my research and making recommendations in her section, for sharing her accurate GPS data with me, and for providing me with advice and resources. I am especially grateful to Tracy for sharing parts of her Management Plan that pertained to this section with me, and I hope my work and recommendations will help her meet some of those management goals.
- I would like to thank **Jason Lubar** and **Bob Wells** of the Urban Forestry Department for initially teaching me the mechanics and values of doing tree inventories, and for allowing me to use the iPad GIS Collector program to collect my data.

- I would like to thank former Arboriculture Intern **Daniel Weitosh** for encouraging me to pursue this particular project and helping me collect data while quizzing me on tree ID and biology.

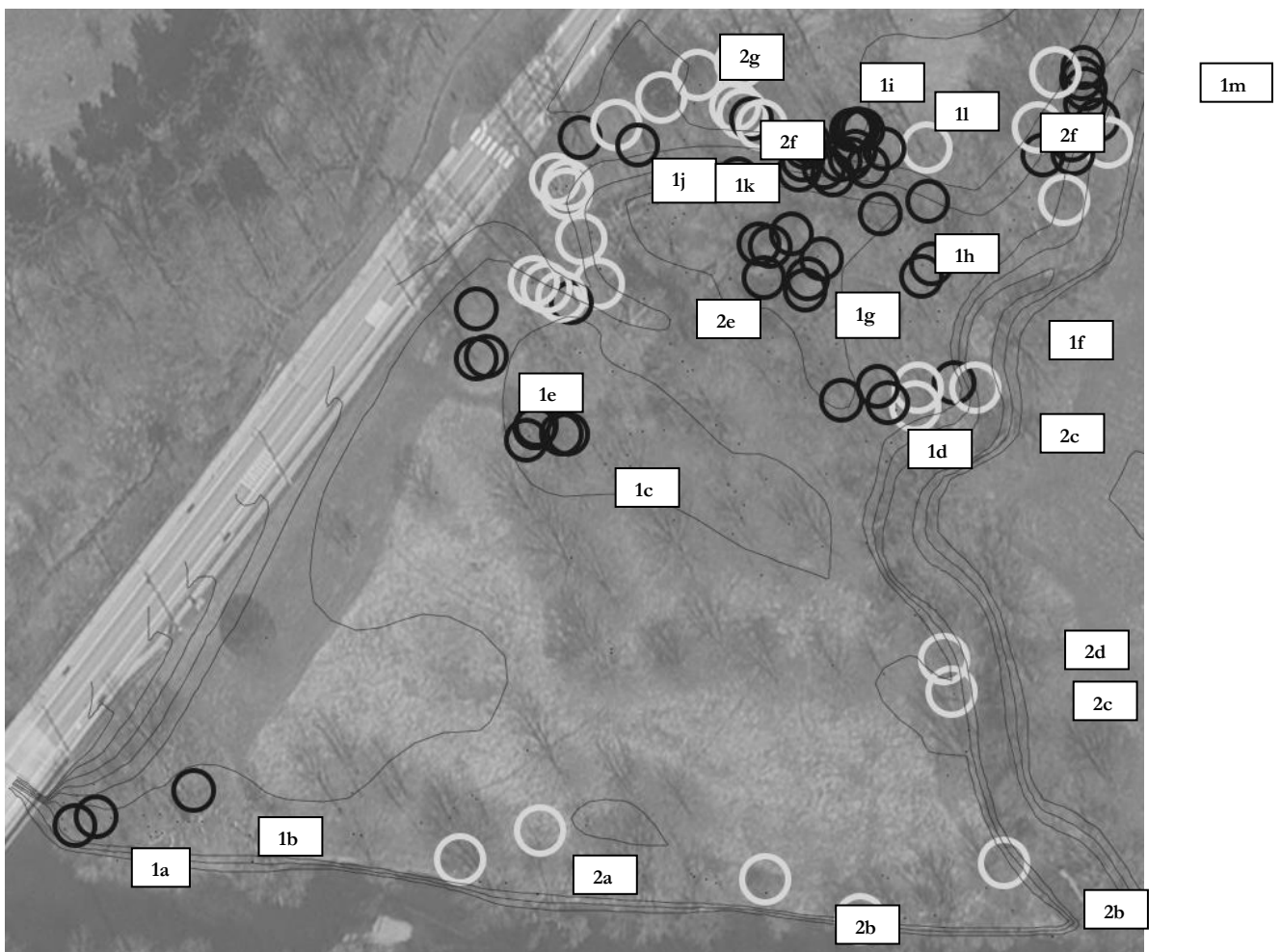
## APPENDIX A - POINTS OF INTEREST

### ○ Primary Interest – trees of particular rarity or special import

- 1a) Pair of *Gleditsia triacanthos*, one with spines and one without. Highlights the variety of forms
- 1b) Enormous two-stemmed *Platanus occidentalis*. Appears on 1909 Atlas
- 1c) Grove of 6 *Diospyros virginiana*. Native fruit tree for humans and animals.
- 1d) Giant *Acer saccharinum* with a deer stand in it. Surrounding trees lean away. Highlights both the importance of deer control and the tendency of small trees to grow away from dominant trees.
- 1e) 3 Large *Metasequoia glyptostroboides*. Excellent tall specimens.
- 1f) A single *Maclura pomifera* tree in idyllic spot overlooking Paper Mill Run
- 1g) A large grove of 12 *Taxodium distichum* with impressive Cypress Knees. Highlights wetland adaptations.
- 1h) Large fallen *Acer negundo* with multiple resprouts lined along it. Highlights tree regeneration.
- 1i) One impressive sprawling *Crataegus*.
- 1j) One giant *Carya ovata* along Northwestern Ave. Appears on 1909 Atlas.
- 1k) Giant hollow snag of an old dead *Fraxinus* that appeared on the 1909 Atlas.
- 1l) A grove of 16 *Gymnocladus dioica* trees. Highlights rare native trees with human uses.
- 1m) A grove of 8 *Taxodium* along Paper Mill Run, this one without knees, but larger trees.

○ Secondary Interest – beautiful native trees that maintain the diversity of the area and should be preserved but do not necessarily need to be highlighted

- 2a) 2 *Betula nigra* in the riparian corridor along the wissahickon
- 2b) 2 Native *Morus rubra* along the wissahickon. In poor shape, but good native fruit shrub.
- 2c) 4 large *Acer saccharinum* along Paper Mill Run.
- 2d) 1 *Catalpa* with bizarre form along Paper Mill Run.
- 2e) 8 Large *Platanus occidentalis* that line a raised ridge leading into the *Taxodium* Swamp.
- 2f) 3 Large *Liriodendron tulipifera* on the high ground north of the swamp. 1-2 appear on the 1909 Atlas.
- 2g) A *Tsuga canadensis*, a *Tilia*, a *Carya cordiformis*, and several *Prunus* along Northwestern Ave.

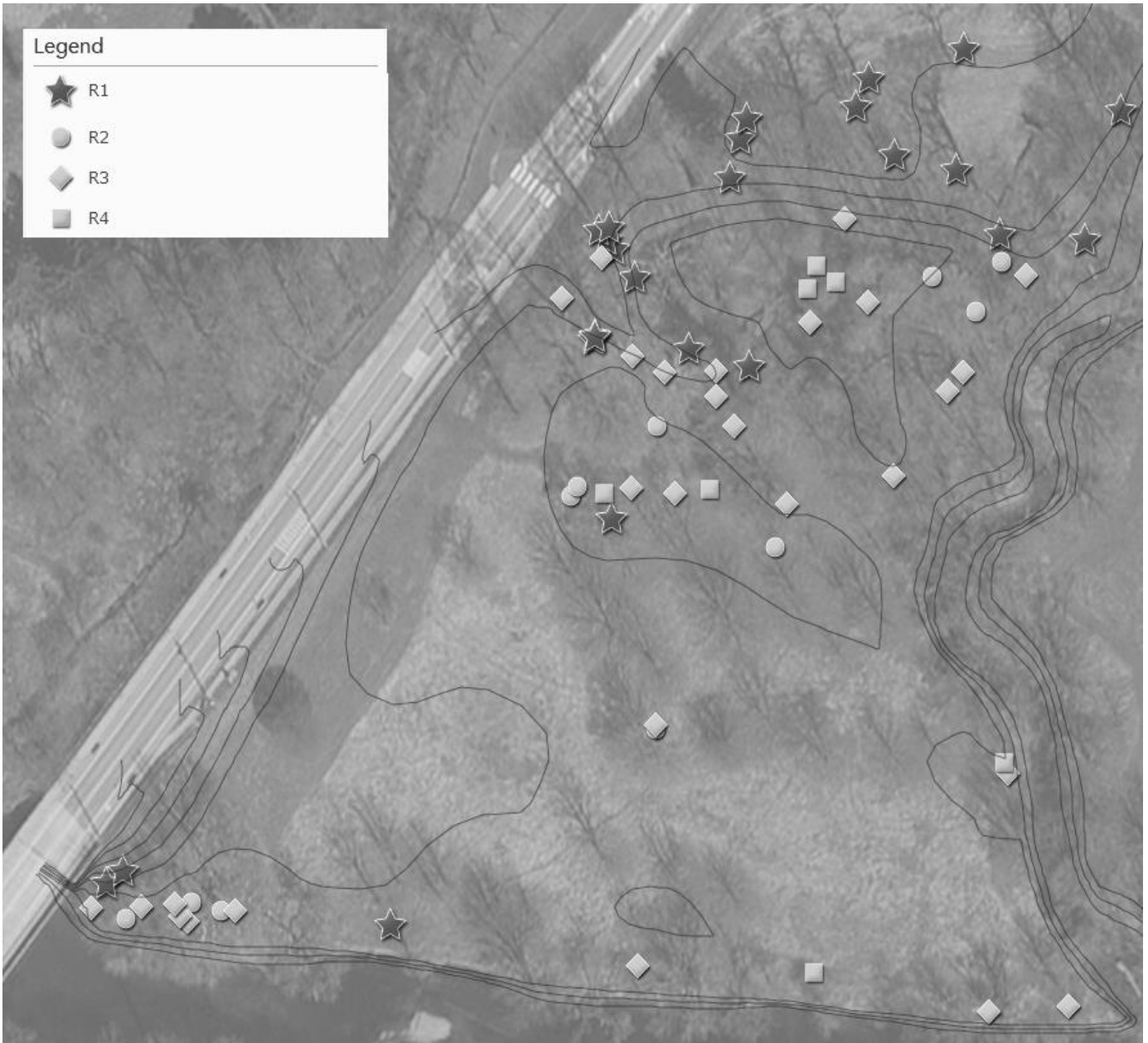




## APPENDIX B – REMOVALS

| ID Number  | Species              | CBH1 | Sprd | Ht | Work | Removal  |
|------------|----------------------|------|------|----|------|--|
| 165        | acer negundo         | 34   | 20   | 45 | R2   | r for willow   |
| 168        | Acer negundo         | 36   | 18   | 40 | R3   | Top dead, ugly understory  |
| 187        | Acer sp.             | 21   | 8    | 12 | R4   | Dead- remove for replanting  |
| 190        | Acer negundo         | 24   | 25   | 13 | R3   | Eventual removal, neighbor stabilizes bank   |
| 195        | Juglans nigra        | 44   | 35   | 45 | R3   | Eventual R- poor specimen  |
| 196        | Acer negundo         | 37   | 25   | 20 | R3   | Eventual removal for replanting  |
| 209        | malus sp.            | 18   | 16   | 15 | R1   | invasive   |
| 216        | ulmus parvifolia     | 27   | 26   | 20 | R1   | invasive   |
| 227        | Pyrus sp.            | 34   | 33   | 40 | R1   | invasivs   |
| 228        | acer negundo         | 21   | 12   | 40 | R3   | remov to highlight taxo and KCG  |
| 238        | Paulownia tomentosa  | 24   | 24   | 40 | R1   | invasive   |
| 239        | Paulownia tomentosa  | 45   | 32   | 40 | R1   | invasive   |
| 245        | Acer platanoides     | 4    | 16   | 55 | R1   | Invasive   |
| 246        | Acer negundo         | 19   | 17   | 30 | R3   | Remove to favor view of better trees   |
| 251        | Acer negundo         | 29   | 24   | 25 | R3   | Ugly- remove to improve view to sycamores and woods                                |
| 257        | Acer negundo         | 32   | 25   | 20 | R3   | R for replant  |
| 258        | Acer negundo         | 22   | 28   | 15 | R3   | R for replant  |
| 260        | Acer platanoides     | 26   | 0    | 0  | R1   | Invasive   |
| 264        | Acer negundo         | 52   | 32   | 50 | R3   | Eventual R   |
| 268        | Acer negundo         | 18   | 16   | 30 | R3   | Eventual R for replanting  |
| 283        | acer negundo         | 40   | 41   | 55 | R2   | could R- growing up into willows and taxos   |
| 289        | acer negundo         | 43   | 27   | 50 | R3   | fine, but maybe eventual R for taxodium  |
| 295        | acer saccharinum     | 39   | 28   | 50 | R4   | potential removal for taxodium   |
| 296        | Fraxinus sp.         | 32   | 17   | 55 | R4   | cracked- could fail on cypress- remove?  |
| 303        | Malus sp             | 20   | 10   | 10 | R1   | Dead and non native  |
| 1431       | Juglans nigra        | 26   | 19   | 25 | R2   | Remove to favor other w better form & small hicko                                  |
| 1450       | Juglans nigra        | 22   | 15   | 35 | R1   | Close to wires, eventual removal   |
| 1467       | Juglans nigra        | 19   | 32   | 25 | R3   | Eventual R for replanting  |
| 2322       | acer negundo         | 23   | 30   | 20 | R3   | R for replanting   |
| 2324       | Acer negundo         | 16   | 17   | 30 | R3   | Ugly small mostly dead   |
| 2325       | Acer negundo         | 19   | 18   | 30 | R3   | Eventual   |
| 2326       | fraxinus sp.         | 22   | 8    | 25 | R4   | potent remov for PMRTAX  |
| 2330       | Acer negundo         | 19   | 24   | 12 | R3   | Eventual for replanting  |
| 2331       | Acer negundo         | 20   | 18   | 22 | R2   | Eventual to favor walnut   |
| 2333       | Acer negundo         | 23   | 12   | 25 | R3   | Eventual R for replant   |
| 2338       | Diopteris virginiani | 19   | 15   | 40 | R4   | Remove to favor sister persimmon   |
| 2339       | Acer negundo         | 23   | 18   | 22 | R3   | Eventual for replant   |
| 2341       | Diopteris virginiana | 17   | 22   | 35 | R2   | The one to remove  |
| 2343       | Acer negundo         | 44   | 27   | 35 | R2   | Eventual R to favor persimmon  |
| 2345       | paulownia tomentosa  | 50   | 33   | 40 | R1   | Invasive   |
| 2346       | Acer negundo         | 50   | 60   | 40 | R3   | Eventual R for replanting?   |
| 2347       | Acer negundo         | 29   | 23   | 40 | R2   | Removal to favor other negundo or better specimen                                  |
| 2352       | Larix                | 43   | 20   | 50 | R1   | Hazard over path   |
| 2354       | Acer negundo         | 24   | 34   | 45 | R3   | Eventual R for replanting  |
| 2356       | Acer negundo         | 24   | 26   | 40 | R2   | Remove to favor 2355. Competes w plane limb  |
| 2358       | Acer negundo         | 24   | 8    | 25 | R3   | Eventual R for replanting  |
| 2360       | Acer negundo         | 22   | 12   | 30 | R3   | Eventual   |
| 2361       | Acer negundo         | 38   | 27   | 35 | R3   | Eventual for replanting  |
| 2362       | Acer negundo         | 19   | 10   | 30 | R2   | Too close to sycamore  |
| 2363       | Acer negundo         | 17   | 12   | 25 | R1   | Possible Removal,too close to road   |
| 2365       | Acer negundo         | 30   | 20   | 45 | R2   | Eventual R or reduction to favor Gleditsia   |
| 2367       | Acer negundo         | 21   | 10   | 10 | R3   | Leaning, exposed roots, on bank, eventual removal                                  |
| 2370       | Acer negundo         | 25   | 28   | 30 | R3   | Possible eventual removal for replanting   |
| 2378       | Acer negundo         | 22   | 41   | 20 | R3   | Eventual R   |
| 2379       | Acer platanoides     | 34   | 46   | 50 | R1   | Remove- invasive   |
| 2380       | Acer platanoides     | 18   | 23   | 30 | R1   | Remove- invasive   |
| 2381       | Acer platanoides     | 29   | 21   | 35 | R1   | Invasive   |
| 2382       | Acer platanoides     | 26   | 23   | 55 | R1   | Invasive   |
| 2384       | Acer platanoides     | 29   | 14   | 60 | R1   | Invasive   |
| 2385       | Acer platanoides     | 28   | 20   | 55 | R1   | Invasive   |
| 2386       | malus sp.            | 23   | 25   | 30 | R1   | invasive   |
| 2394       | acer negundo         | 14   | 12   | 25 | R3   | little negundo remove for view of taxodium   |
| 2401       | paulownia tomentosa  | 92   | 40   | 50 | R1   | invasive   |
| 2402       | paulownia tomentosa  | 104  | 40   | 65 | R1   | invasive   |
| 2406       | malus sp.            | 14   | 8    | 10 | R1   | invasive   |
| 2506       | Mora rubra           | 22   | 26   | 30 | R4   | Possible R - not in great shape  |
| 2511       | Fraxinus sp.         | 55   | 50   | 65 | R3   | Eventual R   |
| 2546       | Acer negundo         | 20   | 22   | 25 | R3   | Eventual for canopy  |
| 2547       | Acer negundo         | 20   | 20   | 25 | R3   | Remove w honeysuckle for replanting  |
| 2618       | acer negundo         | 21   | 30   | 35 | R2   | remove to favor taxo and laying negundo  |
| 1984-100-C | Zelkova serata       | 60   | 44   | 40 | R4   | Maybe doesn't belong in natural area - non-native and could be considered invasive |
| 2006-142-H | taxodium distichum   | 22   | 18   | 15 | R4   | eventual remove for path?  |
| 2613       | Paulownia tomentosa  | 47   | 35   | 55 | R1   | Invasive   |





- R1 – Invasive / Hazardous
- R2 – Remove to favor superior specimens
- R3 – Removals to favor future plantings
- R4 – Removal possible but not necessary

## APPENDIX C – PRUNING

| ID Number   | Species               | CBH1 | Sprd | Ht | Work | Pruning   |
|-------------|-----------------------|------|------|----|------|---|
| 169         | Acer negundo          | 71   | 57   | 75 | P1   | DWP haz   |
| 170         | Maclura pomifera      | 28   | 25   | 30 | P1   | Lower dead breakout                               |
| 178         | Juglans nigra         | 28   | 24   | 35 | P4   | DWP, Reduce wounded limb                          |
| 179         | Acer negundo          | 38   | 42   | 45 | P4   | DWP above stream bank to replanting in bare spot  |
| 182         | Juglans nigra         | 43   | 40   | 40 | P1   | CP, DWP   |
| 184         | Juglans nigra         | 79   | 51   | 55 | P1   | DWP, CP   |
| 185         | Acer negundo          | 82   | 37   | 35 | P1   | CP  |
| 188         | Catalpa sp.           | 20   | 25   | 25 | P2   | V   |
| 189         | Acer saccharinum      | 50   | 28   | 50 | P2   | DWP, subordinate, V                               |
| 191         | Juglans nigra         | 80   | 50   | 65 | P1   | CP, Endweight reduction                           |
| 194         | Moras rubra           | 24   | 20   | 12 | P2   | V, SP   |
| 195         | Juglans nigra         | 44   | 35   | 45 | P2   | V, DWP  |
| 220         | Gymnocladus dioicus   | 41   | 15   | 55 | P2   | V- Pi   |
| 235         | carya cordiformis     | 36   | 24   | 50 | P1   | CP over road                                      |
| 236         | prunus serrotina      | 43   | 38   | 55 | P1   | SP- reduce over path                              |
| 249         | Platanus x acerifolia | 34   | 37   | 60 | P4   | GR  |
| 255         | Acer negundo          | 26   | 16   | 25 | P2   | V, CR   |
| 262         | Fraxinus sp.          | 128  | 50   | 85 | P2   | V   |
| 263         | Juglans nigra         | 29   | 32   | 50 | P4   | SP  |
| 264         | Acer negundo          | 52   | 32   | 50 | P2   | Honeysuckles and vines all around, side dead red  |
| 267         | Acer negundo          | 38   | 34   | 30 | P1   | CP, haz over path                                 |
| 274         | Acer negundo          | 64   | 39   | 70 | P2   | V   |
| 279         | fraxinus sp.          | 43   | 29   | 60 | P4   | DWP lower, little lead cut, otherwise s fine tree |
| 281         | acer negundo          | 50   | 38   | 50 | P3   | prune away from taxo                              |
| 304         | Fraxinus sp.          | 26   | 19   | 45 | P2   | V   |
| 306         | Fraxinus sp.          | 31   | 21   | 50 | P2   | V   |
| 424         | Fraxinus sp.          | 30   | 27   | 46 | P4   | Possible reduction on aggressive lateral, CR      |
| 478         | Fraxinus sp.          | 114  | 50   | 65 | P1   | DWP for lower haz, reduce lead over path          |
| 480         | Fraxinus sp.          | 130  | 46   | 42 | P1   | Hazard prune off path                             |
| 1440        | Juglans nigra         | 61   | 55   | 45 | P1   | SP , EWR, hazards over path                       |
| 1443        | Juglans nigra         | 34   | 25   | 40 | P2   | V   |
| 1451        | Juglans nigra         | 37   | 26   | 55 | P4   | GR  |
| 1453        | Juglans nigra         | 45   | 53   | 64 | P1   | Path prune  |
| 1455        | Juglans nigra         | 34   | 20   | 53 | P1   | DWP - Prune Off path                              |
| 1457        | Juglans nigra         | 40   | 38   | 49 | P2   | DWP, V  |
| 1458        | Juglans nigra         | 24   | 23   | 33 | P1   | DWP, SP for dominance, CR for path                |
| 1459        | Juglans nigra         | 25   | 32   | 47 | P4   | Remove center lead and side lead                  |
| 1460        | Juglans nigra         | 26   | 28   | 50 | P4   | Prune out middle lead, reduce r lead              |
| 1461        | Juglans nigra         | 18   | 20   | 32 | P4   | Lightn  |
| 1462        | Juglans nigra         | 22   | 28   | 45 | P1   | Prune out one lead(middle), eventually just keep1 |
| 1463        | Juglans nigra         | 91   | 60   | 80 | P3   | Prune off birch, DWP                              |
| 1469        | Juglans nigra         | 34   | 35   | 36 | P1   | Reduce lower lat. CR for path                     |
| 1473        | Juglans nigra         | 24   | 27   | 45 | P4   | Hanger  |
| 1475        | Juglans nigra         | 33   | 25   | 49 | P4   | Hanger. CR, reductions on laterals                |
| 1476        | Juglans nigra         | 32   | 43   | 40 | P1   | CP off path                                       |
| 1477        | Juglans nigra         | 42   | 48   | 35 | P4   | DWP, sub aggressive lead                          |
| 1479        | Juglans               | 31   | 32   | 25 | P4   | Formative prune, subord                           |
| 1481        | Juglans nigra         | 32   | 29   | 35 | P4   | SP  |
| 1488        | Juglans nigra         | 31   | 26   | 30 | P1   | Hazard prune, SP                                  |
| 1488        | Juglans nigra         | 31   | 24   | 40 | P1   | Haz over path, reduce codom                       |
| 2325        | Acer negundo          | 19   | 18   | 30 | P2   | V   |
| 2333        | Acer negundo          | 23   | 12   | 25 | P4   | DWP   |
| 2334        | Acer negundo          | 19   | 11   | 25 | P1   | Sub side lead over path                           |
| 2343        | Acer negundo          | 44   | 27   | 35 | P3   | Prune off to favor persimmon                      |
| 2346        | Acer negundo          | 50   | 60   | 40 | P4   | Heavy reduction?                                  |
| 2348        | Juglans nigra         | 67   | 46   | 64 | P1   | Prune off new path                                |
| 2349        | Juglans nigra         | 28   | 25   | 35 | P3   | Prune off neighbor? SP                            |
| 2350        | Betula nigra          | 24   | 35   | 37 | P1   | CR for path, reduce aggressive laterals           |
| 2353        | Fraxinus sp.          | 78   | 42   | 57 | P1   | Hazard removal                                    |
| 2355        | Acer negundo          | 35   | 35   | 45 | P3   | DWP - away from Platanus , cut base suckers       |
| 2356        | Acer negundo          | 24   | 26   | 40 | P4   | Reduce lead at first to limit competing           |
| 2360        | Acer negundo          | 22   | 12   | 30 | P4   | DWP   |
| 2361        | Acer negundo          | 38   | 27   | 35 | P4   | DWP   |
| 2363        | Acer negundo          | 17   | 12   | 25 | P4   | DWP   |
| 2364        | Gleditsia triacanthos | 29   | 16   | 50 | P1   | DWP, V, little competing lead Lean twds rd        |
| 2366        | Gleditsia triacanthos | 28   | 25   | 45 | P4   | GR, DWP, cut spines to 6 ft?                      |
| 2369        | Acer negundo          | 24   | 20   | 30 | P4   | Prune codom, DWP                                  |
| 2371        | Fraxinus sp.          | 34   | 22   | 35 | P2   | V   |
| 2373        | Salix nigra           | 18   | 36   | 25 | P4   | 3 leads. Prune lower dead. Select best?           |
| 2374        | Fraxinus sp.          | 52   | 43   | 30 | P1   | CR for mower, SP                                  |
| 2393        | Fraxinus sp.          | 22   | 12   | 30 | P2   | V   |
| 2405        | platanus occidentalis | 68   | 31   | 55 | P2   | invasive viburnum below                           |
| 2501        | Acer negundo          | 13   | 10   | 12 | P2   | Big vines   |
| 2504        | Acer negundo          | 108  | 54   | 50 | P1   | Hazard prune, endweight reduction on laterals DWP |
| 2505        | Acer negundo          | 70   | 40   | 45 | P4   | Upper lead decayed- reduce fail likelihood.offwal |
| 2506        | Mora rubra            | 22   | 26   | 30 | P4   | SP,   |
| 2507        | Acer negundo          | 56   | 23   | 30 | P3   | Prune off mulberry?                               |
| 2509        | Juglans nigra         | 30   | 32   | 35 | P1   | SP, CP  |
| 2512        | Fraxinus sp.          | 20   | 18   | 20 | P2   | V   |
| 2515        | Acer negundo          | 32   | 25   | 30 | P1   | CP  |
| 1432 / 265  | Juglans nigra         | 45   | 42   | 50 | P1   | CP over path                                      |
| 1954-0838-A | quercus rubra         | 146  | 41   | 60 | P1   | DWP haz over exclus and PMRTAX                    |
| 1954-1096-A | Platanus occidentalis | 115  | 100  | 95 | P1   | DWP, CP? EWP?                                     |
| 1984-100-C  | Zelkova serata        | 60   | 44   | 40 | P1   | 15 H,Xcavate,StructuralPruning,GirdlingRoot       |
| 2006-142-I  | taxodium distichum    | 40   | 22   | 50 | P4   | hanger  |



- P1 – Hazards / Clearance for Path
- P2 – Vines / surrounding invasives
- P3 – Favor superior specimens
- P4 – Structural Pruning / Deadwooding

**APPENDIX D – MAP OF CURRENT AND PROPOSED VEHICLE PATH**



**APPENDIX E – MAP OF PROPOSED FOOTPATH**

