

University of Pennsylvania Campus Tree Care Plan

Revised January 2017



University of Pennsylvania - aerial view

Mission Statement

The Arboretum at the University of Pennsylvania stewards a diverse collection of trees, focused on preserving and sustaining the urban forest for the well-being of the community, environmental benefits, research and educational opportunities.

Purpose

The University of Pennsylvania's (Penn) *Campus Tree Care Plan* unifies the University's tree-related practices, policies and procedures into a cohesive document. This document shall serve as the guideline for the stewards of all campus trees by enabling those stewards to protect, preserve and maintain the existing tree stock, while also properly planning for and planting new trees. Additionally, it shall provide a means to remove dead or hazardous trees, or for other predefined reasons, and provide for the proper establishment of replacement trees. More specifically, this plan is meant to:

- Establish a successful urban forest by promoting proper species selection and planning for age and tree species diversity throughout the entire tree population
- Encourage selection of native and adaptive species to aid in creating plant communities and habitat for wildlife
- Develop preventative care and maintenance plans for high-value trees on campus and diligently protect them and, whenever possible, other trees on campus that could be adversely affected by construction activities
- Create a tree replacement strategy in keeping with the overall campus tree strategy
- Incorporate policies and recommendations from local and national agencies, including but not limited to: *Greenworks Philadelphia*, Complete Streets, Philadelphia Parks and Recreation (PPR), Philadelphia Street Tree Ordinance, Sustainable Sites Initiative (SITES), and the ANSI A300 Tree Care Standards and associated Best Management Practices
- Establish a stronger connection between students and staff to the campus and the surrounding neighborhood, allowing them to become stewards of their environment
- Educate the University community about the importance of trees and different tree species, to value and respect trees and urban forests

Responsible Party

The University of Pennsylvania's Facilities and Real Estate Services (FRES) department is responsible for both the *Campus Tree Care Plan* and enforcement of the Plan. Currently within FRES, the Office of the University Architect (OUA) and Urban Park Manager (UPM) hold primary responsibility.

Campus Tree Advisory Committee

The Campus Tree Advisory Committee is comprised of staff and students from various disciplines within the University, as well as other related professionals in the surrounding community:

- Taylor Berkowitz, Senior Planner, FRES
- Allan Bethel, Urban Park Supervisor, FRES
- Yvette Bordeaux, Director, Professional Programs in Earth and Environmental Science, Penn
- Chloe Cerwinka, Landscape Planner, FRES
- Mark Conway, Urban Park Supervisor, FRES
- Josh Darfler, BioPond Greenhouse and Garden Manager, Penn
- Monica Donegan, Masters of Environmental Studies Candidate, Penn
- Daniel Garofalo, Director of Sustainability, FRES
- Curtis Helm, Urban Forestry & Ecosystem Management Coordinator, Philadelphia Parks & Recreation
- Jason Henning, Research Urban Forester, Davey Trees
- David Hewitt, Urban Ecology Lecturer, Penn
- David Hollenberg, University Architect, FRES
- Nate Hommel, Director, Planning & Design, UC District
- Trish Kemper, Urban Forestry Intern, Morris Arboretum
- Jason Lubar, Associate Director of Urban Forestry, Morris Arboretum
- Robert Lundgren, University Landscape Architect, FRES
- Alison McGhie, Senior Director of Operations and Technology, Penn
- Eva Monheim, Landscape Architecture & Horticulture Instructor, Temple University
- Lara Roman, Research Ecologist, USDA Forest Service
- Craig Roncace, Urban Park Manager, FRES
- Esaul Sanchez, Asset Manager for Real Estate, FRES

- Robert Wells, Associate Director of Arboriculture Outreach, Morris Arboretum
- Caitlin Welsh, Masters of Environmental Studies Candidate, Penn
- Sally Willig, Field Ecology Lecturer, Penn
- Heidi Wunder, Associate Director- Communications, FRES

The Committee members are chosen for positions based on expressed knowledge and interest in the University's dedication to tree care. Positions are to be held for one fiscal year, starting on July 1st, with renewal options every year. Committee members are expected to attend as many meetings as possible. At these meetings, active discussions are held to review all current policies and guidelines, as well as any information or research gathered that might positively influence the current plan. Suggestions and changes to the plan can happen via email at any time, however, it is during these meetings that changes to the current plan can be modified by majority vote or review.

Campus Tree Care Policies

▪ Plant Selection

The philosophy behind plant selection at the University considers many factors. Site evaluations are made and emphasis is placed on choosing the regionally appropriate tree species for the conditions within the site. Preference is for native plant material where possible; however, all plant material should be compliant with SITES credit requirements for obtaining plants locally. Other factors considered are aesthetics, sense of place and place-making, historical interests, storm water management, public safety, and educational value (both living collections and creating outdoor labs/classrooms).

As far as plant species selections, the Philadelphia Parks and Recreation Department offers guidelines to be utilized, as well as recommendations made by the Morris Arboretum specific to campus. In the fall, we avoid planting trees that are considered "Fall planting hazards". Some trees that are successful for fall planting are:

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|-----------------|----------------|-----------------------|
| • Maple | • Hawthorn | • Linden |
| • Buckeye | • Ash | • Kentucky coffeetree |
| • Horsechestnut | • Honey Locust | • Crabapple |
| • Alder | • Sycamore | • Pine |
| • Catalpa | • Elm | • Spruce |

"Fall Hazard" species include:

- | | | |
|------------------------------|-----------------------|-----------------------------|
| • Birch | • American hornbeam | • Sweetgum |
| • Beech | • Black tupelo | • Willow |
| • Cherry | • Hophornbeam | • Bald cypress |
| • Most oaks (except Pin oak) | • Fir | • Silver linden |
| • Magnolia | • American yellowwood | • Salix (weeping varieties) |
| • Hemlock | • Ginkgo | • Yew |
| • Some hackberry | • Larch | • Katsura |
| • Rhododendron | | |

Locust Walk



■ ***Tree Work***

The University has several ways of performing tree work throughout the life of every tree on campus. Landscape contractors, as appropriate within the scope of projects, range their care from protection and removals to installation and replacements. The UPM has crews that provide some regular maintenance and care for trees and perform some removals and replacements. The UPM also has a Landscape Maintenance Contractor (LMC) responsible for large scale and large quantity work, such as pruning, removals and replacements. All professionals performing any tree work or tree care on campus must abide by the accepted industry standards and Best Management Practices (BMPs) acknowledged and incorporated into the University's *Campus Tree Care Plan*. These standards include all applicable American National Standards Institute (ANSI), International Society of Arboriculture (ISA) and Tree Care Industry Association (TCIA) standards and BMPs. The following portion of the plan details typical procedure for all aspects of tree work on campus:

- Site Preparation and Tree Planting

Locations for new trees are to be confirmed prior to planting. Stake locations; identify and confirm nearby utility locations and depths prior to excavating holes. Make adjustments as necessary. Trees may be planted with an approved mechanical tree spade or by hand. Confirm adequate water percolation prior to installation. Dig a hole at least 12 inches wider and no deeper than is necessary to accommodate the rootball keeping the topsoil separate from the subsoil. Trees shall be lifted and handled with suitable support of the soil and root ball

to avoid damage. Balled and burlapped plant material must always be lifted, carried and/or lowered by the root ball, never by the trunk. All newly planted trees shall be pruned (see Pruning) to acceptable standards, including dead wood, crossing branches, shaping, etc. prior to and just after installation, to take into account any damage done during installation. **Locate trunk flare within root ball before planting.** Place trunk flare slightly higher, rather than lower, than the finished grade to accommodate for settling. Use topsoil to fill around the tree. If the topsoil is of extremely poor quality, mix it with at most five percent by volume of humus or well-rotted leaf compost. Loosen burlap at the top of the ball and add water to allow the soil to settle around the roots. While wire baskets are typically not used, at least the top 2/3 of the wire baskets and burlap must be removed completely. Trees must be plumb

College Green



(straight) and centered in the planting hole both before backfilling and after planting is completely done. Refill with soil where settling occurs. Leave a slight basin for water during the first growing season. Keep soil moist, but avoid over-watering the ground, especially if drainage is slow. Keep trees mulched as necessary. Make sure that all plastic tags are removed from branches.

- Staking and Guying

Staking and guying trees is generally discouraged, however, if the tree is in a particularly vulnerable location where high winds or vandalism by passersby will occur, it may be necessary. Stake trees with 2" x 2" hardwood stakes, at least 1/3 into the ground, and tall enough to protect the first set of branches. Use at least three (3) stakes per tree where caliper is between 2" and 6". Always use strapping, such as ArborTie™, or protective sheathing (rubber hose, flexible piping, etc) between support wire or cordage and bark of tree bark.

- Tree rings and pits

Mulch all tree rings in turf areas with shredded oak bark mulch and edge once per year. Keep fresh as necessary. In street tree pits, mulch with stone fines, and keep raked, even and level, as necessary. In both cases, keep weed-free and check monthly. Keep all mulch at least 3" away from the tree's trunk. Do not allow an excessive amount of old mulch to pile up around the tree.

- Watering

Monitor trees throughout the growing season to determine if supplemental watering is necessary in addition to any existing above-ground irrigation. In the case of drought, provide an additional 1" of water weekly in the root zone. If additional watering is necessary, inject the root system by hand with hand-held soil injection water spike. Apply evenly around tree. Depending on size of the tree, use approximately five gallons of water per 1" in caliper of tree trunk.

- Fertilization

Fertilize trees only if the need to do so is indicated by soil testing. Use injection methods for in-ground application of suspension nitrogen fertilizers, with or without mycorrhizal inoculants. All soils must be moist prior to applications. If dry, irrigation may be necessary. Injections should be spaced using the grid method, from tree trunk to just outside the drip line of the tree. Where street trees are limited to confined pits or strips, apply the appropriate amount of fertilizer based on the square footage and size of the tree.

- Pruning

Any new plant material shall be pruned by an ISA Certified Arborist or other professional approved by the OUA and UPM. Most routine maintenance pruning is completed by the LCM for the University.

Pruning shall consist of the removal of dead, dying, decayed, diseased, interfering, weak, objectionable, and/or obstructing branches, as well as selective thinning to increase light into the ground layer below the trees. This work should not occur until the tree has been planted for a two year minimum, unless an emergency or hazard occurs. The removal of such described branches is to include those on the main trunks in addition to those inside the leaf area. An occasional undesirable branch up to ½" in diameter, as described above, may remain within the main leaf area, to its full length, when it is not practical to remove it. Limb removals may take place around light standards, wires, building windows and façades, gutters or other fixtures, as needed. Do not compromise the tree's health and/or vigor. If such pruning is required, then removal and replacement must be considered. All cuts shall be made as close to the trunk or parent limb as possible, **without cutting into the branch collar** or leaving a protruding stub. Bark on the edge of all pruning cuts should remain firmly attached. All branches too large to support with one hand shall be pre-cut to avoid splitting or tearing of the bark.

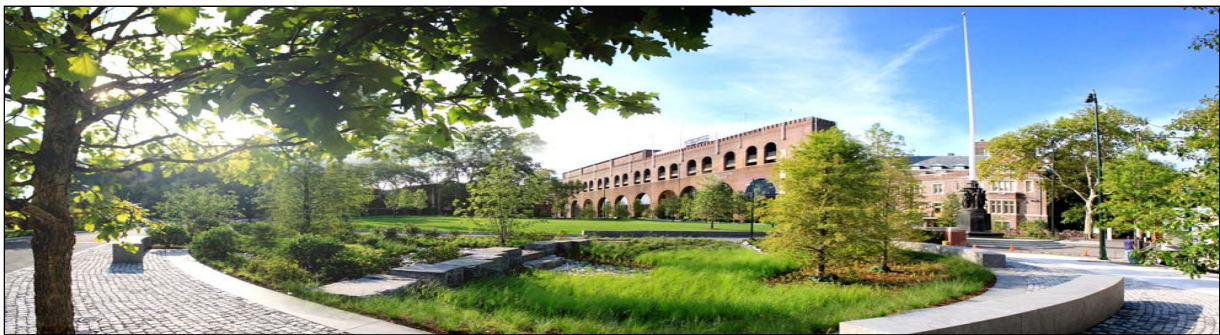
When necessary, ropes or other equipment should be used to lower large branches or stubs to the ground. Equipment that may damage the bark and cambium layer should not be used on or in any tree. For example, the use of climbing spurs (hooks, irons) is an unacceptable work practice for pruning

operations on a live tree. Sharp tools must be used so that clean cuts will be made at all times. All pruning tools should be sterilized when moving between trees. All cut limbs must be removed from the crown upon completion of the pruning. Trees susceptible to serious infectious diseases should not be pruned at the time of year during which the pathogens causing the diseases, or insect vectors, are most active. Similarly, if pruning wounds may attract harmful insects, pruning should be timed so as to avoid insect infestation. Remove the weaker or less desirable of crossed or rubbing branches. Such removal, if possible, should not leave large, open spaces in the general outline of the tree.

Where practical, all visible girdling roots shall be treated as follows:

- 1) Cut root at either end,
- 2) Sever root in center with a chisel and allow growing tree to push root away, or
- 3) Remove section of the root.

The presence of any disease conditions, fungus fruit bodies, decayed trunk or branches, split crotches or branches, cracks, or other structural weakness, should be reported to the Urban Park Manager or the University Landscape Architect.



Shoemaker Green Raingarden

- Transplanting

Trees are to be transplanted when they are dormant, avoiding movement of “Fall Hazard” species (previously listed), which should be moved only in early spring. Optimally, trees that are to be moved should be prepared for the move by root pruning for one or two seasons prior to move. The size of the root ball should conform to ANSI Z60.1 Standards for Nursery Practices. Fill freshly dug pit with water and assure that drainage is positive by letting the water drain out. If the pit does not drain, loosen subsoil or provide drainage holes in the base of the pit. Avoid exposing the root ball to air for too long. If not to be installed immediately, heal in tree with mulch or loosely cover with soil until the time of planting. Again, dig a hole at least 12 inches wider and no deeper than is necessary to accommodate the ball of the tree, keeping the topsoil separate from the subsoil. The tree shall be lifted, carried and/or lowered by the root ball, never by the trunk. It is better to plant the trunk flare slightly higher than the finished grade of surrounding soil. Use topsoil to fill around the tree. If the topsoil is of extremely poor quality, mix it with humus or well-rotted leaf compost. Add water to the hole to allow the soil to settle around the roots. Tree must be plumb (straight) and centered in the planting hole both before backfilling and after planting is completely done. Refill with soil where settling occurs. Leave a slight basin for water during the first growing season after transplantation. Keep soil moist, but avoid over-watering the ground, especially if drainage is slow. Keep tree mulched as necessary.

- Inspections

In the interest of public safety, inspection of trees in high traffic areas is important and periodic inspections of campus trees must be made. Younger trees shall be inspected at least once every two years. Mature trees shall be inspected annually, as well as after significant storm events. Inspections shall follow the “visible tree assessment” protocols; a standardized form will be utilized for this process. More in-depth hazard inspections will be conducted as warranted and recommendations for

amelioration and/or removal will be issued. Persons with concerns about safety and health of a particular tree or an emergency situation should contact the Urban Park Manager or the University Landscape Architect.

- Removals

Trees to be removed shall be dug out if recently planted and small in caliper. A tree in the ground for more than two to three years with an established root system, or trees larger than 6"-8" in caliper, should be sawn at the base and root-ground to 12" below grade. Remove tree in sections, or as necessary, to reduce risk of impact to nearby pedestrian or vehicular traffic. Backfill hole and compact as necessary, with soil, mulch or material appropriate for location.

- Replacement

As a rule of thumb, trees that are removed by development or construction should be replaced in the same area with a new 2 ½" to 3" caliper tree. For replacing trees larger than the corresponding 3" caliper size, a caliper equivalency should be used to calculate replacements. For example, if a 24" diameter (at 54" above grade) tree is removed, six 4" caliper trees are expected for replacement. Generally, in-kind replacements are expected, however substitutions can be made based on the overall campus diversity of species and recommendations made within this document. In either case, the final species selection of the replacement, as well as quantity and size, is to be confirmed by the University Landscape Architect.

- ***Protection and Preservation Policies and Procedures***

Optimally, protection and preservation begins in the earliest phases of any project or design. Any professional working on a University project needs to be aware of the importance of the urban forest established within its limits. Unnecessary tree removal due to insufficient planning in the design process will not be tolerated.

- Protection During Construction

Site Evaluation and Preparation:

- 1) Audit location and condition of trees and other landscape material. Provide a list of potential replacements to contractor or project manager prior to construction
- 2) Photograph the existing project site to be affected by construction.
- 3) Identify protective tree and shrub root zones. Arrange for protective measures around plant material to remain. Transplant and relocate any trees and other plant material as needed well in advance of the start of construction.

- Protection of Existing Trees and Plantings

- 1) Install 6-foot high chain-link fence (no barbed-wire) around the tree protection zone for trees to be saved.
- 2) Where fencing to prevent construction traffic is not possible, use temporary wood chip mulch, gravel mulch or bridges to prevent soil compaction around tree roots. Place wood chips or gravel mulch 6 to 12 inches deep on top of geotextile landscape fabric placed over the root zones of the trees to be protected.
- 3) The contractor will be responsible for tying back branches where deemed necessary by the OUA. This work is to be completed by a Certified Arborist or other professional approved by the OUA. Every 60 days, the ropes must be loosened and re-tied.

- Site Use During Construction

- 1) No materials should be stored within the tree protection zone (TPZ). If lay down is necessary within the TPZ, materials shall be no closer than two feet to tree root buttress flairs and shall remain no longer than 24 hours.

- 2) If soil tests results indicate the need for fertilization, fertilize the root zone of any trees impacted by construction by applying soluble fertilizers. Additionally, various construction activities may impact soil pH, and thus, unless otherwise specified, soil pH of the site shall be restored to a range of 6.0-6.5.
- 3) Any restoration work must be planned and documented prior to construction and approved by the OUA. Plans shall be revisited as the project progresses to address any changes or losses of existing plant materials planned to be saved, or if any other unforeseen site conditions arise. All restoration costs are to be included in the project's cost.

■ **Tree Damage Assessment**

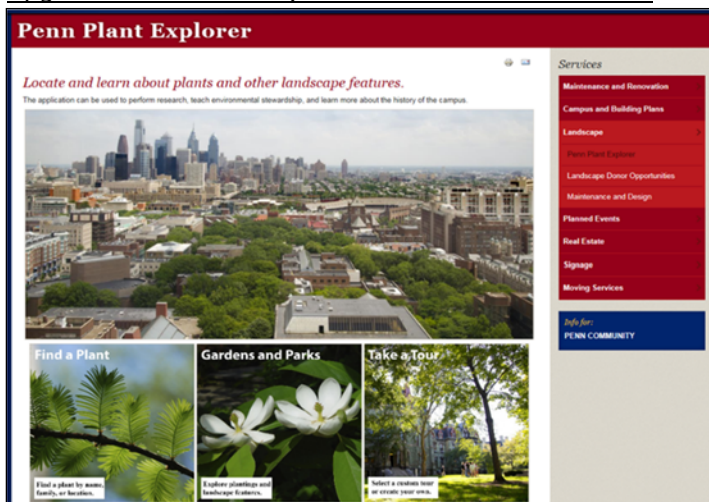
Tree damage may be observed and reported by any member of the University community, however, no actions are taken without the review and approval of an ISA Certified Arborist, unless in an emergency situation. When an emergency arises, review and approval of any work must still be obtained from the OUA. Enforcement of all protection and preservation measures during construction projects is the responsibility of project managers and on-site design professionals. Any damage that is determined to be the direct result of failure to comply with these measures will yield a written notification to the party responsible for the damage, and shall be given five (5) working days, conditions permitting, unless discussed with the University Landscape Architect, to correct the condition. If no action is taken, this will be documented and submitted to the responsible party. At that time, it will be assumed that any damage incurred will need to be appropriately replaced at the cost of the responsible party, and a temporary suspension from the approved vendors list will result.

■ **Prohibited Practices**

The University of Pennsylvania does not allow bikes to be locked to trees on its campus. In coordination with the University's 'Climate Action Plan', 'Bicycle Policy' and its emphasis on enhancing alternative transportation, we continue to add additional bike parking throughout campus and on streets, to reduce damage to trees. Those bikes locked to trees may receive written warning for this violation. If it is a repeat offense, the lock may be cut and the bike confiscated by the Department of Public Safety.

■ **Ongoing Goals and Targets**

- Upgraded Tree Inventory and Interactive Tree Website



Recently Launched Penn Plant Explorer Website

The University maintains up to date tree data for over 6500 campus trees using tree inventory software, BG-Base, BG-Map and Garden Notepad+. In spring 2016, we launched a visual interactive website, *Penn Plant Explorer*, where the public can learn compelling stories about historic trees, specialty gardens, and urban parks as well as take virtual tours of the campus. This has become a critical tool to communicate the significance and beauty of Penn's urban forest while allowing for efficient tree maintenance and research.

Throughout summer 2015, using I-Tree Eco Suite and Garden Notepad, and partnering

with the National Forest Service's Philadelphia

Field Station, we collected tree data in order to determine the ecosystem service financial values, including storm water management holding capacities, canopy cover, air pollution, carbon sequestration,

energy savings and expected growth patterns for forecasting, budgeting, maintenance and life expectancy trends. For the first time, we now have metrics on the ecosystem services of our urban forest, and consider them a vital tool for educating the Penn community about this essential environmental resource.

Recently published research from *The Environmental Benefits of Trees on an Urban University Campus*, shows that trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits. Multiple ecosystem benefits were quantified on the Penn campus: trees within the Core Campus were estimated to store a total of 1,576,717 lbs of carbon, prevented \$51,871 in building heating/cooling energy costs, and the total structural value was estimated at \$4.9 million.



2016 Creating Canopy Tree Giveaway

-Creating Canopy Tree Giveaway Program

Since 2011, Penn has sponsored “Creating Canopy” tree giveaways to University employees. This past year, Penn partnered with Tree Philly of Philadelphia Parks and Recreation in order to give away 275 trees to interested Penn employees. Participants expressed so much interest that we now plan to host events annually, as opposed to biannually. To date, we’ve given away over 1375 trees.

-Shoemaker Green Monitoring Program

As an expansion of our Sustainable SITES designation, the University, along with students, faculty and external partners, continues to use Shoemaker Green as a living laboratory, collecting data on how well the green infrastructure is working. These metrics help us improve our design and management practices and better understand how they affect soils, hydrology, vegetation, and human health and well-being. This project is a springboard to expand this investigation to the rest of our campus.

-Penn Class Tree Program

Since 2011, thanks to the generous donation of a Penn alumnus, the Morris Arboretum and Penn, partnering with students, have planted a Class Tree. This tree program invites members of the freshman class to select a new tree to be dedicated and planted on campus, in honor of their class. The tree choices, at the direction of the University Landscape Architect, are species with urban tolerance and site specific characteristics, in addition to fulfilling part of the *Campus Tree Care Plan*. These trees will often be located in areas where the canopy has suffered through tree loss or where there is room for planned canopy growth. In fall 2016, the class of 2020 planted a *Cedrus deodara* – Deodar cedar in prestigious College Green.



2020 Penn Class Tree – fall 2016

-Ash and Elm Management Program

Now that the Emerald Ash Borer is in Philadelphia, FRES partnered with urban foresters from the Morris Arboretum to select and treat 30 significant ash trees. We continue to care for over 15 heritage American elm trees as well. Treated trees were chosen based on size, health, provided amenities, cultural value and cost.

-Root Collar Excavation Plan

In summer 2015, we began an extensive root collar excavation pilot plan for over 65 campus trees with buried root flares and/or girdling roots. Not only were the root collars excavated, but the areas surrounding the trees were aerated to allow for improved growth and general health. Using lessons learned and best practices, we continue to expand this program to additional campus trees.

-Bare Root Trees

Beginning in fall 2015, we partnered with the Pennsylvania Horticultural Society to source over 25 bare root trees from a regional nursery that our Urban Park staff planted in different types of sites throughout campus. Bare root trees are low-cost, easy to plant, and have high survivability rates due to their visible root flares and extensive root systems. We continue to source bare root trees as appropriate.

-Propagate Historic American Elm

The American elm in front of College Hall, a direct descendant of William Penn's Treaty Elm, was planted in 1896 and is one of only a few Treaty Elms left in the region. Beginning in 2012, we have taken cuttings from this historic tree, and continue growing them out at the Morris Arboretum for replanting on campus.

-Urban Park Pruning Training

As part of our outreach and education initiatives, Morris Arboretum provides structural pruning training to our Urban Park staff. We plan to organize yearly training sessions for University Urban Park staff.

-Arboretum Tree Donation

Beginning in spring 2015, Penn began planting and maintaining interesting trees from the Morris Arboretum, including trees grown from plant explorations, unusual/notable species and species for trial in urban areas. Morris has collected seeds from the northern most live oak (*Quercus virginiana*) population, currently growing in Virginia, and they are propagating them to trial on our campus, as we prepare for climate change. They have also wild-collected Chinese ash, which are likely resistant to Emerald Ash Borer, which we also plan to trial on our campus. Every year, we plan to continue planting out 5-10 unique specimens from Morris Arboretum.

-Dynamic Canopy

The University continues to partner with the US Forest Service's Philadelphia Field Station to analyze how our tree canopy has changed in population, species composition and size class distribution, by interpreting multiple sets of detailed records and aerial photographs. Preliminary results show that within our core campus, we have increased our canopy cover from 8% in 1970 to over 20% in 2012. We anticipate a journal article being published early next year.

-Climate Action Plan – 2.0

In 2014, the University launched Climate Action Plan 2.0 (CAP2.0), which mapped out our collective renewed commitment to sustainability, stewardship and community outreach. CAP2.0 institutionalizes the creation and expansion of sustainable and productive landscapes such as our new demonstration educational orchard. Other goals include promoting biodiversity and ecological environments on campus, such as bird friendly building glazing to minimize bird strikes. In 2015, we applied bird friendly film to two glass pedestrian bridge locations on campus that were known for bird strikes as a pilot project, and successfully reduced the number of birds killed. We continue looking into whether we can expand this pilot project to other campus sites.

- Peer-to-Peer Campus Tree Tours

In order to educate and engage more students around our campus tree collection and sustainability, we are partnering with Penn Eco-Rep students to develop programming for peer-to-peer campus ecology tours. Students have a deep interest in learning more about the landscape around them and are more likely to connect with peers.

-Expanded Pilot Penn Park Orchard



Penn and POP (Philadelphia Orchard Project) partnered to expand the Penn Park Orchard in fall 2016. Penn Park grounds crews worked together with volunteers from POP and the broader Penn community to plant perennials, a mixture of native and adaptive groundcovers, wildflowers, medicinal plants, and herbs to create the final layer of a true food forest. All of these plants attract pollinators and add to the biodiversity of the Penn Park Orchard. Next year, we plan to partner with interested Penn groups to share in the harvest.

Penn Park Orchard Expansion – Fall 2016

Tree ID Tagging Program

Penn tags significant trees with 3.5" x 5" metal tree identification tags using stainless steel screws and springs. Penn increased the tree ID tagging program to 300 trees, raising awareness in the University community about trees. These tags are maintained every year by the Morris Arboretum's Urban Forestry Intern. We will continue to increase the number of tree tags on campus, as appropriate.

Increased coordination of outreach

There are many student organizations and programs on campus, like Penn Environmental Group, the Green Campus Partnership Student Association and Eco-Reps, as well as local groups, like UC Green, UC District, Bartram's Gardens and the Morris Arboretum. The University will strive to create more projects and opportunities for collaboration between as many of these relevant groups as possible.

-Update University's Tree Specifications and Standards

We continue to work with Morris Arboretum to update the Penn Tree Policy, including but not limited to Tree Planting, Removal, and Placement Procedures, Trees and Construction Policy & Procedures, and Tree Inventory, Evaluation and Inspection Policy & Procedures, Tree Tagging, and Root Collar Excavation. These will provide updated recommended seasonal care and maintenance procedures for pruning, pest control, fertilization and any special requirements for specimen trees on a 1, 5, and 10 year basis. Prioritize "high profile" trees or areas as needed or as identified. Update Tree-related specifications for construction, recommended tree list, and the tree management plan and propose heritage tree guidelines. Work closely with the FRES Design & Construction department to implement a coordinated communication effort across all disciplines.

-Ecological Landscape Stewardship Plan

Early next year, we will complete Penn's Ecological Landscape Stewardship Plan, a year-long pilot study which will build on best practices learned from the Shoemaker Green Sustainable SITES program, and aims to improve Penn's landscape management through ecological techniques while maintaining a beautiful campus.

▪ **New Goals and Targets**

- Plant Health Care Program

Expand Penn's Plant Health Care Program, starting with urgent and important needs such as the honey locust canker management, working our way towards a comprehensive and holistic management program for all of our campus trees.

-ID unidentified tree species

Though we have a detailed tree inventory, we still have some trees that are only identified down to their genus. We anticipate choosing one genus / year to categorically identify all the trees down to their species. This past year, we identified all the *Ulmus* trees; next spring, we will take advantage of expert knowledge at the Morris Arboretum to identify all the *Prunus* trees down to species, in order to create a public cherry tree tour.

-Community Partnerships



Service Learning Project – April 2016

Penn recently supported a community tree planting and service learning project partnership with UC Green. Though we made it to the final round, unfortunately, we did not win the voting portion of the Tree Campus USA Service Learning Contest. In the process, we learned that a lot of people (over 2,800 votes) supported our vision to plant close to 30 trees in nearby low-income neighborhoods with UC Green and Penn students. With this project shovel-ready, and so many partners already excited and onboard, Penn decided to

fund this project anyway, allowing us to engage students and the broader community in a meaningful way that has a long-term impact. We continue looking for significant community partnerships around the urban forest.

-Community Gleaning Program – Continue partnering with The Philadelphia Orchard Project and interested community members to harvest excess fruit from campus trees, such as junoberries and crabapples, educating the Penn community in the process.

▪ **Communication Strategy**

Publicizing the University's *Arboretum Plan* will showcase established tree management guidelines to the University community. In doing so, all members of the University community may act as informed stewards of all campus trees to protect, preserve and maintain the existing trees, while also planning for

additions. The *Campus Tree Care Plan*, as approved by the University of Pennsylvania, will be produced and disseminated through print and online publication sources of the staff and students, including University Communications external media outreach and publications internal to Penn, the FRES website, e-newsletters and student newspaper.

Definitions

- Appropriate tree species – Trees adapted to the site conditions, climate and design intent. Native and non-native trees are appropriate if these points are met; however, invasive species are never appropriate.
- Bike corral – A University defined area of bike parking which consists of University standard hoop bike racks in groups of 10 racks at a minimum, for a 20-bike capacity. These areas are installed as specified within the University standard.
- Caliper – The diameter or thickness of the main stem of a young tree or sapling measured at six (6”) inches above ground level. This measurement is accepted for nursery-grown trees having a diameter of four (4”) inches or less.
- Canopy tree – A tree that will grow to a mature height of at least 40 feet, with a spread of at least 30 feet.
- DBH (Diameter, breast height) – The diameter or width of the main stem of a tree as measured 4.5 feet from the natural grade at its base. If there is an obstruction or abnormality to the main stem at this area, DBH shall be measured at the nearest point above or below 4.5 feet at which a normal diameter occurs.
- Invasive species – Plant species that are not native to the ecosystem under consideration and that cause, or are likely to cause, economic or environmental harm, or harm to human, animal, or plant health (as referenced in the SITES and its associated references).
- Native plant communities – Plant species, composition and structure typical of communities native to the EPA Level III eco-region or known to naturally occur within 200 miles of the site. At least two reference (or local reference sites) are needed to determine the dominant plant species, relative species abundances, and other characteristic elements of the plant community/communities to be preserved or restored. These communities include, but are not limited to, wetlands, grasslands, riparian buffers, and habitat for wildlife species of concern within the region (as referenced in the SITES).
- Native tree – Any tree species which occurs naturally and indigenously within 200 miles of the site in which it is being planted. Naturally occurring hybrids, varieties and cultivars to the eco-region are also acceptable.