Lafayette College
Sustainable Landscaping Policy

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Lafayette College Sustainable Landscaping Policy

I. Overview

The purpose and intention of having an overarching Campus Landscaping Policy is to establish a new standard of ecologically minded landscaping decisions at Lafayette College. This Policy will enhance and promote ecological sustainability at Lafayette College while remaining loyal to pre-existing environmental values and aesthetic ideals. The Policy puts forth guidelines for landscaping, water use, and chemical use in accordance with current landscape industry standards.

Adherence to these guidelines will promote a campus that is beautiful, physically self-sustaining, and ecologically stable. Compliance with these standards will result in an invigorated community awareness regarding actions and their impacts, and the relevance and importance of living sustainably here at Lafayette.

Lafayette College is amongst a growing number of American colleges and universities that has committed to act in accordance with the American College and University Presidents Climate Commitment (ACUPCC) in an effort to evaluate and address environmental concerns. This initiative is in agreement with various modern studies that have shown the importance of natural environments as they pertain to mental health and productivity. The Policy supports climate neutrality initiatives and thereby the College's Master Plan by strategically planting near buildings to provide cooling or shading. Lafayette College's Master Plan promotes sustainable landscaping as it continues to develop the campus grounds. The College's commitment to maintaining the ecological integrity of our community is through the transition to increased native plant species use, replacing identified invasives with native species, and fewer chemical inputs. These goals align with the following Landscaping Policy suggestions.

II. Scope

This sustainable landscaping policy addresses all lands of Lafayette College, including main campus, 3rd Street Arts Campus and the Bushkill Creek corridor, and Metzgar Fields.

III. General Procedures

1. Plantings

   Landscaping projects will prioritize ecological value and ecosystem services. Some of these services include creating habitats for a variety of animals, managing the local watershed, producing clean air, supporting food webs, and attracting pollinators. In order to develop these ecosystem services it is crucial to incorporate more native species and phase out invasives that are present on Lafayette's campus while keeping with the overall campus aesthetic.

2. Chemical Use

   To maintain the ecological integrity of the flora and fauna of Lafayette's campus, it is imperative that all contractors support regionally native and non-native plant life, reduce weeds and pests, and sustain a healthy ecosystem by using best management practices for herbicides, pesticides, soil amendments and fertilizers. In accordance with the College's

focus on health and safety within the campus environment, limiting chemical use is beneficial to humans and nonhumans alike and will help enrich the growing conditions of a more self-sustaining natural landscape.

3. Water Use

   Given that water conservation is a popular and feasible means of sustainable resource management, streamlining our irrigation and stormwater policies will be beneficial financially and ecologically. This is a benefit to all involved parties, and can be implemented with minimal alterations to physical spaces and groundskeeping practices. The installation of soaker hose for newly planted areas is encouraged due to low initial cost, lessened system maintenance, and the capability of system removal once the landscape has become established.

IV. Participating Groups and Members

Implementation requires endorsement from Lafayette College Administration, and commitment to The Policy by faculty, staff, students and other members of the Lafayette College community. All newly designed plans must be approved by the campus Landscape Architect prior to approval for implementation. Any changes will be clearly noted & adhered to during the installation process. These guidelines will thus serve as the standard for conduct expected from contractors and other outside groups.

End Here

Lafayette College Sustainable Landscaping Policy Rationale

This campus policy document aims to establish a comprehensive plan that promotes a Lafayette landscape that is able to sustain itself with more efficient grounds maintenance, that focuses on the overall health of the ecosystem in which it exists, and that recognizes the impact of landscaping decisions on the Hill as they pertain to the ecosystems which surround it.

I. Overall Policy Rationale

In conjunction with this document's proposal for improved sustainability, the College's values in relation to landscaping and development are critical to understanding the intentions of the College as a whole. The ecological impact, aesthetic value, and long term health of the landscapes that comprise Lafayette's campus are integral to fostering a setting in which this diversely interested community can thrive.

While not currently outlined in explicit terms in the College's master plan, sustainable efforts are a major goal of the College. In order to effectively achieve goals related to sustainability, a cohesive landscaping policy is necessary. The guidelines and materials provided herein are intended to supplement existing ideals and propel the College toward a sustainable culture. This will not only enhance the ecological value of the landscape, and the Lehigh Valley ecosystem it exists in, but will establish a campus culture that operates with genuine sustainability in mind. Doing so will foster a mindset that will transcend the academic experience, and become a part of what it means to be a Lafayette College community member.

Through observation of campus activity and dissection of existing literature pertaining to Lafayette College's commitment to sustainable development, it is evident that certain areas of landscape maintenance can be updated, to improve ecological health. The areas specified in this document pertain to planting choices, chemical use, and water use. These are all critical components of an ecologically sound landscape that, when implemented loyally, will establish a sustainable culture. These changes toward a more sustainable landscape also serve to support existing levels of safety and aesthetic appeal at Lafayette College.

Over the last five years, the College has increased relationships with outside contractors to supplement Facilities and Plant Operations' limited full-time groundskeeping staff. This outsourced help is functionally critical especially during winter months. While the transition to contractors reduces stress on the College's grounds staff, it increases the possibility of discrepancy in landscaping implementation, which in turn increases the risk to ecological integrity on campus. To ensure that College standards are met, staff and contractors alike need to maintain consistent communication regarding the College's best management practices identified in the planting and chemical use sections below.

II. Plantings

This Policy is rooted in the idea that Lafayette College's landscape needs to be designed to have ecological value and to provide ecosystem services. Some of these services include creating habitats for a variety of animals, managing the local watershed, producing clean air, supporting food webs, and attracting pollinators.

In order to facilitate ecosystem services on our campus it is crucial to plant native species and phase out the presence of invasive species. Not all plants are ecologically equal, as non-native and invasive plants do not support the local insects, birds, and small mammals that are needed to create a vibrant ecosystem. While these non-natives and invasives may look beautiful or may seem more durable, they are not as capable of adding value to the local ecology. Many invasive species go so far as to overtake flourishing native plant populations, further threatening the precarious ecological integrity necessary for sustainable function.

In order for Lafayette College and the greater Lehigh Valley to have a healthy ecosystem, it is imperative that the College transitions away from planting invasive and harmful species of plants. Over time, an ecosystem that is comprised of native species will nurture itself with less maintenance, and will sustain a more positive impact.

In order to transition away from invasive plant species on Lafayette grounds, these guidelines are to be followed:

1. After the adoption of The Policy no new invasives are to be planted by Lafayette College or its hired contractors.
2. All native annuals that die out are to be replanted the following planting season with another species of a native annual.
3. All invasive annuals that die out are to be replaced the following planting season with a species of a native annual.
4. All invasive perennials are to be replaced in the appropriate planting season with a species of a native perennial.

For the lists of plant species which can and cannot be planted on campus please refer to the Appendix.

B. <u>Aesthetic Presentation:</u>

As addressed by the College, an important objective in landscaping is to create a sense of unity in an architecturally varied campus setting. This is in part for the benefit of existing members of the Lafayette and Easton community. It is also for the sake of attracting prospective students and faculty who might seek this setting as their home. It is lastly a point of attraction and assurance of continued institutional quality for alumni and donors as they interact with the College after matriculation.

Landscaping adds significant aesthetic value to Lafayette's campus by shaping spaces and adding color to the campus grounds. These beautiful spaces on campus provide a sense of home and comfort for students, and an accessible way to connect with nature. Since aesthetics are highly valued, plants are often chosen based on their aesthetic value rather than their ecological role. This can lead to the introduction of invasive species and/or non-natives to campus. Because an ecologically thriving landscape would be a visually appealing landscape, forfeiture of aesthetic value is not an inherent consequence of transitioning from non-native to native species use.

A comprehensive sample of aesthetically appealing native plant species can be found in the Appendix.

III. **Chemical Use**

To maintain the ecological integrity of the flora and fauna on Lafayette College's campus, it is imperative that the grounds staff and contractors support all campus plant life, reduce weeds and pests, and sustain a healthy ecosystem by using the best management practices for herbicides, pesticides, and fertilizers. Due to high costs and limited staff, contractors are the most viable option for the amount of pesticide necessary for lawnscape use. However, given their intrinsically decreased familiarity with campus function and features, contractors pose an additional potential risk to ecological integrity at Lafayette. To address these concerns, it is necessary for the College to ensure that contracted operators administer chemicals safely, and use appropriate publication techniques so residents and visitors of the campus are made aware of their potential interactions with chemically treated areas.

A. <u>Herbicide:</u>

A variety of herbicides can be trusted to serve as weed control. Traditional Lafayette groundskeeping standards for staff and contracted operations incorporate selective herbicides as the standard for lawn areas and non-selective herbicides for areas being transitioned or transformed.

Selective-style chemical brands kill only the weeds that negatively impact grass lawn spaces, and non-selective brands, typically Round-Up©, kill all existing plant species present at the site of administration. These traditional chemical brands are not ecologically responsible because they degrade soil quality, and disrupt the natural processes in lawn and plant landscapes.

A reduction in chemical use is preferable and most immediately plausible, particularly in areas where non-selective herbicides are being used to destroy existing plants to make way for new ones. This outcome is also equally achievable through manual or mechanical plant removal. Manual or mechanical plant removal is more time-intensive upfront, but allows for immediate replanting, whereas chemical application leaves the target area in a compromised state unfit for planting for a number of weeks.

B. Pesticide:

Pesticide use at Lafayette is primarily used to manage aphids and scale on plant bed species. It is a systemic insecticide, usually Cross-Check©, that is sprayed directly onto the plant to protect it from insect harm. Recently, contractors have been enlisted to spray more broadly on lawn areas to limit weed growth. This is in order to help the grass spaces self-sustain by eliminating weeds that stifle even grass growth. This is important for the aesthetic presentation of spaces like the Quad and Anderson Courtyard, where students, faculty, and prospective students and their families interact with the landscape.

Currently, contractors and Lafayette groundskeeping staff are encouraged to post signage indicating when and where pesticides have been sprayed but often this step is overlooked. To improve the safety of these practices, more effective dissemination of spray schedules would be beneficial.

C. Fertilizer:

There is not a significant difference in effectiveness for organic or synthetic fertilizers, though there is naturally some variation brand-to-brand. In the coming years, it is expected that mainstream fertilizer companies will produce more mainstream organic options for plant fertilization. Given this prediction, a gradual transition to organic use is in the best interest of the College, for ecological well-being, and human and animal safety. A part of campus fertilization that is in need of exploration and development is whether organic winterizer is feasible on a broad scale.

D. Considerations for Winter Maintenance:

Seasonally specific factors, particularly for winter months, are necessary considerations when executing appropriately sustainable chemical management. This most commonly pertains to snow removal and salting for ice on paths and roads. Both actions are tied into safety and general campus functionality, but can also often harmfully play into plant health and safety.

a. Salting:

Salt is used on campus to melt ice and allow for safe vehicular and pedestrian access on campus. Although salt effectively melts ice it also damages crops and soil, by entering soils when dissolved in water, and replacing nutrients that would otherwise prevent root dehydration. It leads to a chemical imbalance that limits plant growth and often accelerates plant death. It can also lead to illness and death in plant leaves upon contact, leaving the affected plants less able to combat harsh weather conditions. Salt damage continues to impact plant and soil quality long after it has initially entered the soil. Additionally, salt from road and pathway salting travels into local waterways, such as the Bushkill Creek as runoff where it continues to cause ecological damage by disrupting aquatic ecosystems and streambank plant life.

While it is ideal to use a de-icing product that is less harmful than salt, these options are relatively more expensive. Therefore salt must be applied strategically, and salt-tolerant plants must be planted in areas that are most often exposed to salt during the winter months. This would likely include walkways, stairways, and campus roads. However, it is recommended that Lafayette Facilities and Plant Operations transitions to using alternative de-icing products in addition to the previously mentioned strategic practices. Some alternative de-icing products are listed in Section 8.

See appendix for salt tolerant plants that are to be planted in salt exposed areas of campus.

IV. **Water Use**

A. Irrigation:

Increased resource management is to center on the regulation of water use as it pertains to irrigation on campus. As such, unsustainable irrigation mechanisms are to be replaced by modern technologies. Despite the usual abundance of rain and snow in the Lehigh Valley throughout the year, it is crucial to implement sustainable irrigation methods to reduce water usage costs and to prepare for a changing climate. Current irrigation strategies often result in unnecessary water loss; indirect sprinkler placement and watering schedules that are independent of the weather lead to wasteful irrigation that is inefficient and expensive. To reduce unnecessary water usage, the College should invest in additional irrigation equipment such as drip irrigation and rain sensor technology.

a. Drip Irrigation:

Where appropriate, non-permanent sprinkler systems should be replaced with drip tubing. Drip irrigation system delivers water directly to the root zone of a plant, minimizing the amount of water that is lost through surface runoff or evaporation. Drip tubing can be connected to a standard lawn hose and inconspicuously placed around the bases of plants. This irrigation strategy would be most effective in small to medium sized plant beds.

b. Rain Sensors:

Rain sensors and similar technologies are used to minimize unnecessary water usage during or after rain events. If possible, the College should invest in similar technology to avoid the use of sprinkler systems when they are not needed. If such technology isn't possible, the College should strive to manually disengage the sprinkler systems during storms.

B. Stormwater:

Stormwater runoff is to be reevaluated and reformed through improved landscaping (as addressed under Plantings, above), reduction of hardscapes, and increased implementation of rain gardens on campus. Lafayette College's campus impacts water quality and aquatic habitat in the Bushkill Creek and ultimately the Delaware River. Currently there is no water quality treatment, or adequate detention measures in place on Lafayette's campus to limit stormwater runoff. Outfall locations are contributing to gully formation as a result of erosion namely from steep slopes with non native and invasive plant species. Rainfall onto extensive impervious surfaces generates large volumes of uncontrolled runoff which contain pollutants, specifically from water running down Sullivan Drive. To help mitigate pollution from stormwater runoff from the College, the campus should enhance forest communities on steep slopes (areas at high potential for erosion) to increase their ability to act as buffers for reducing the quantity of water that enters the floodplain. These forests can perform valuable functions under the right conditions.

Assessments below are sourced from the Lafayette College 2009 Master Plan Appendix by Biohabitats Inc., an ecological restoration organization who used rapid field reconnaissance strategy in May, 2008.

C. Forest Resources Improvement Plan:

1. Removal of the most invasive and detrimental species to ecology, considering impact on stormwater runoff and erosion
2. Phase in native and ecologically supportive trees, shrubs, and ground cover over time with precaution. Use plants appropriate for designated slope characteristics, such as exposure, soil type, and land use.
3. Professionally assess all plant growth periodically: bi-monthly for first two years and then bi-annually.
4. Continue removal of invasive and non-native species.

D. General Water Use, Water Conservation, and Stormwater Management Improvement Plan:

1. Sustain rain gardens throughout the year, identify more areas on College Hill and around the Arts Campus for stormwater runoff capture, and continue to implement rain gardens to replace unsustainable hardscapes and landscapes.
2. Capture stormwater runoff from impervious surfaces in shallow depressions where possible, direct water into proper storm drains.
3. Renovate hardscapes on steep slopes to aid in stormwater runoff reduction; increasing permeable surfaces and natural landscapes can counteract runoff into the Bushkill Creek.

VI. Next Steps and Suggestions

The following section includes recommendations that the College should transition into using in order to make a complete and comprehensive landscaping policy. These recommendations are extensions of sections that have been previously rationalized in this policy.

A. Salt:

Once a minimization strategy for salting practices has been successfully adopted, the most appropriate next step would be to shift to materials considered and/or known to be less harmful to humans, animals, and the earth. These materials can be more expensive than traditional salting methods but given that the previously stated objectives consider decreased salt use, overall costs would likely not be dramatically increased. The College does currently use *Environment*, a de-icing product that is composed of Calcium Magnesium Acetate, but going forward the use of similar products should be expanded in order to ultimately replace the use of traditional Sodium Chloride Pellets. The following deicing products are alternatives to the traditional Sodium Chloride pellets. These alternatives are effective at melting snow and will protect pedestrians and drivers from the dangers of ice in the winter.

1. Calcium Chloride: Has the capacity to melt ice to -25 °F, is effective at temperatures as low as -59 °F and does not cause harm to vegetation. [1]
2. Calcium Magnesium Acetate: Is effective below 0 °F, adds necessary plant nutrients like Ca and Mg to soil, has a low toxicity and is biodegradable. [1]
3. Magnesium Chloride: Is effective until temperatures as low as 5 °F and will not harm vegetation. [1]
4. Potassium Chloride: Is effective until temperatures as low as to 12 °F and will not harm vegetation. [1]

B. Fertilizers:

Following the successful implementation of a reductive-use strategy regarding fertilizers, the College could move toward an alternative-use strategy. With the development of a native-species-based landscape that will require less maintenance, and thus less funding, the use of resources previously allocated to the purchasing of traditional fertilizers could be invested in alternative forms of soil-enriching products and/or processes. Some sustainable suggestions in this regard might be:

1. A revamped campus composting program
2. Frequent soil testing of pH levels

[1] Janna, Beckerman and B. Rosie Lerner, Salt Damage in Landscape Plants (Purdue University, 2009).

3. Use of alternatives from popular sources
    a. Scott's Miracle Grow

C. Pesticides:

Pesticide use is another area that could be subject to revision following the successful implementation of revised pest management efforts. Optimally, pesticide use would be eliminated entirely for the benefit of animals, plants, and the ecosystem at large yet reducing the quantity of Cross-Check should be the first objective, especially on high-use areas like the Quad, March Field, and all athletic fields. Methods for sustainable pesticide use follow the guidelines under IPM, and complete removal of pesticides can be achieved using the following strategies:

1. Integrated Pest Management (IPM) is an environmentally mindful approach to decreased pesticide use in ecologically sensitive or high traffic areas. The plan reduces unnecessary chemical exposure to the College community through a set of control measures. In coordination with a pest management contractor, the College should conduct formal inspections twice annually, train all personnel that might be involved in IPM, and provide proper notification.
2. Strategies to minimize pests without chemicals include: pest exclusion, host-free periods, crop rotation, biological control, and weed control.

D. Herbicides:

A transition to native plantings will lessen the College's dependence on chemicals to reduce weeds. A hands-off approach is ideal but unlikely because the College is charged with maintaining high standards in the appearance of grounds, so using herbicides sparingly or organic herbicides will replace the current method for reducing weeds. Organic herbicides should be certified under the Organic Materials Review Institute (OMRI). Common ingredients in organic herbicides include: concentrated d-limonene (orange rind), clove oil, cinnamon oil, vinegar, and citric acid. Most organic herbicides fall under the categories of non-selective, contact, and broad spectrum.

E. Mulch & Unused Areas:

Mulched areas are heavily represented on Lafayette's campus. This is because they require low maintenance, are aesthetically pleasing and are fairly self sufficient in controlling weeds. The campus also has many unused grassy areas between academic buildings, residence halls and walkways. These areas currently have little purpose and are relatively void of plant and insect life. However, these spaces also have the potential to

improve our campus aesthetics and make the College's landscape more dynamic. Replanting these mulch plots and unused parcels of the campus landscape with native plants will increase the ecosystem services on our campus and in the long term will create self sustaining landscapes. Despite their potential benefits, this conversion will be more labor intensive as there will be a need for upfront labor to plant the new beds. In the long term there will also be fewer mulched areas needed for effective weed control. The following list contains proposed suggestions for addressing the labor requirements for weed control and plant bed conversion.

1. The hiring of part-time Facilities and Plant Operations staff members, proportional to the need, whose main duties would revolve around minor but consistent tasks. These tasks could include weeding and keeping track of the health of the beds.
2. An initiative to contract students to do weeding and bed conversion labor for hourly compensation.
3. An organized network of groups on campus contributing to the weeding and conversion of beds. This network could include sports teams, Greek chapters, and interested clubs. These groups would coordinate with Facilities and Plant Operations to contribute volunteer time at seasonal transition times and visitor-heavy weekends to support existing College maintenance staff.

V. Appendix

A. <u>Stormwater Management Suggestions for College Hill Slopes:</u>

a. South-facing slope assessment: very disturbed with a majority of the vegetation being non-native and/or invasive in the subcanopy and understory/groundcover. Shrubs and small trees/saplings of the sub-canopy are fairly dense and primarily invasive plants. A lot of the ground level vegetation is invasive, dominated by vines and includes: poison ivy, English ivy, bittersweet, periwinkle, garlic mustard, Japanese hops with some maple and hickory seedlings present.

b. Northwestern facing slope assessment: mixed hardwood as well, shrub layer contains fewer invasive plants than southern slope, ground level cover is sparser due to lower light levels and dense beech canopy. The edges of this community resemble the southern slope and are dominated by poison ivy, garlic mustard, and Japanese honeysuckle.

c. The Pennsylvania Science Office of the Nature Conservancy's document, "A Natural Areas Inventory of Lehigh and Northampton Counties,

Pennsylvania Update 2005," refers to the southern slope of Lafayette College as a "sparsely vegetated limestone cliff". The Nature Conservancy then lists Ebony Sedge (carex eburnea), a PA Endangered native plant species, *as found on the slope*. Although secure globally, this native plant is listed as "S1 = critically imperiled in state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state." Ebony Sedge is the only native plant or animal listed within the Lafayette College Boundary as either rare, threatened or endangered.

B. <u>Native Shrubs Reference Sheet:</u>

Key:
Small = 0-5'
Medium =5-15'
Large = 15'+

Native Shrubs		Moisture Requirements					Size
Botanical Name	Common Name	Wet	Moist	Dry	Light	pH	S/M/L
Amelanchier laevis	Serviceberry		x	x	Sun / Shade	Prefers Acid	L
Aronia arbutifolia	Red Chokeberry	x	x	x	Sun / Shade		M
Aronia melanocarpa	Chockeberry	x	x	x	Sun / Shade	Tolerant	S
Clethra alnifolia	Summersweet		x	x	Shade		M
Cornus amomum	Silky Dogwood	x	x	x	Sun / Shade		M
Corylus americana	Hazelnut			x	Sun / Shade		M
Hamamelis virginiana	Witchhazel		x		Sun / Shade	Sensitive	L
Hydrangea arborescens	Smooth Hydrangea		x		Shade		S
Hydrangea quercifolia	Oakleaf Hydrangea		x		Sun / Shade	Sensitive	S
Ilex glabra	Inkberry	x	x	x	Sun / Partial Shade	Prefers Acid	M
Ilex Verticillata	Winterberry		x				M
Kalmia latifolia	Mountain Laurel		x	x	Sun / Shade	Prefers Acid	M
Lindera benzoin	Spicebush		x	x	Sun / Shade		M
Rhododendron maximum	Rosebay Rhododendron	x	x		Shade	Prefers Acid	M
Rhododendron periclymenoides	Pinxterbloom Azalea		x	x	Sun	Prefers Acid	S
Rhus aromatica	Fragrant Sumac		x	x	Sun	Prefers Acid	S
Rhus glabra	Smooth Sumac		x	x			M
Sambucus canadensis	Elderberry		x	x	Sun		M
Spirea latifolia	Meadowsweet		x	x	Sun		S
Spirea tomentosa	Steeplebush		x		Sun		S
Vaccinium corymbosum	Highbush Blueberry				Sun / Shade	Prefers Acid	M
Viburnum prunifolium	Black-haw	x	x	x	Sun / Shade		L
Viburnum nudum	Smooth Witherod		x	x	Sun / Shade		M
Wisteria frutescens	American Wisteria		x		Sun		L

C. Native Trees Reference Sheet:

Key:
Small = 0-5'
Medium =5-15'
Large = 15'+

Native Trees		Moisture Requirements					Size
Botanical Name	Common Name	Wet	Moist	Dry	Light	pH	S/M/L
Acer rubrum	Red Maple	x	x		Full Sun / Part Shade	Prefers Acidic	M
Acer saccharum	Sugar Maple		x	x	Full Sun / Part Shade	N/A	L
Carpinus Caroliniana	American Hornbeam			x	Shade	N/A	M
Celtis occidentalis	Hackberry	x	x	x	Full Sun	Tolerant	L
Cercis canadensis	Eastern Redbud		x	x	Part Shade / Full Sun	Tolerant	S
Cornus alternifolia	Pagoda Dogwood		x	x	Part Shade / Full Sun	Prefers Acidic	S
Cornus florida	Dogwood		x	x	Part Shade / Full Sun	Prefers Acidic	S
Diospyros virginiana	Common Persimmon		x	x	Full Sun / Part Shade	Tolerant	M
Fraxinus americana	White Ash		x		Full Sun	Tolerant	L
Ilex opaca	American Holly		x	x	Part Shade / Full Sun	Prefers Acidic	M
Magnolia virginiana	Sweetbay Magnolia	x	x	x	Full Sun / Part Shade	Tolerant	S
Nyssa sylvatica	Sour-gum	x	x	x	Full Sun / Part Shade	Prefers Acidic	M
Quercus alba	White Oak		x	x	Full Sun		L
Quercus coccinea	Scarlet Oak			x	Full Sun	Prefers Acid	L
Quercus palustris	Pin Oak	x	x		Full Sun / Part Shade	Sensitive	L
Quercus rubra	Red Oak		x	x	Full Sun	N/A	L
Prunus serotina	Black Cherry		x	x	Full Sun	N/A	M
Sassafras albidum	Sassafras		x	x	Full Sun / Part Shade	Prefers Acid	M
Tilia americana	American Basswood		x	x	Full Sun / Part Shade	Tolerant	L

D. Perennials Reference Sheet:

Key:
Small = 0-1'
Medium =2-3'
Large = 3'+

Perennials		Moisture Requirements						Size
Botanical Name	**Common Name**	Wet	Moist	Dry	Light	Color	Flowers	S/M/L
Agastache foeniculum	Anise Hyssop				Sun	Blue	Yes	L
Amsonia hubrichtii	Arkansas Amsonia		x	x	Sun / Shade	Blue/Yellows	Yes	M
Amsonia tabernaemontana	Eastern Bluestar		x		Sun	Blue	Yes	M
Anemonella thalictroides	Rue Anemone			x	Sun / Shade	White/ Pink	Yes	S
Tiarella cordifolia	Wild Columbine		x	x	Sun / Shade	Red/Yellow	Yes	M
Arisaema Triphyllum	Jack-in-the-pulpit	x	x		Shade	Green	Yes	S
Aruncus dioicus	Goats beard		x		Shade	White	Yes	L
Asarum canadense	Wild Ginger			x	Shade	NA	No	S
Asclepias incarnata	Swamp Milkweed		x		Sun	Pink	Yes	L
Asclepias tuberosa	Butterfly Weed		x		Sun	Orange	Yes	L
Aster divaricatus	White Wood Aster		x	x	Sun/ Shade	Yellow/ Red	Yes	M
Aster lateriflorus	Calico Aster		x	x	Sun/ Shade	White	Yes	L
Aster novae-angliae	New England Aster		x	x	Sun	Purple	Yes	L
Baptisia australis	Blue False Indigo			x	Sun	Violet	Yes	L
Boltonia asteroides	Boltonia False Aster			x	Sun	Pink	Yes	L
Callirhoe involucrata	Purple Poppy-mallow			x	Sun	Red	Yes	L
Campanula rotundifolia	Harebell			x	Sun/ Shade	Blue	Yes	S
Chrysogonum virginianum	Golden Star		x		Shade	Yellow	Yes	S
Cimicifuga racemosa	Black Cohosh		x		Sun/ Shade	White	Yes	L
Coreopsis threadleaf	Threadleaf Coreopsis			x	Sun	Yellow	Yes	M
Coreopsis tripteris	Tall Tickseed		x	x	Sun	Yellow	Yes	L
Delphinium tricorne	Dwarf Larkspur	x	x		Sun/ Shade	Blue	Yes	M
Dicentra cucullaria	Dutchman's-breeches		x		Shade	White	Yes	S
Dicentra eximia	Wild Bleeding-heart		x	x	Shade	Red	Yes	M
Echinacea purpurea	Purple Coneflower			x	Sun/ Shade	Pink	Yes	L
Gaultheria procumbens	Wintergreen Teaberry		x		Shade	White	Yes	S
Geranium maculatum	Wild Geranium		x		Shade	Rose	Yes	M
Heliopsis helianthoides	False Sunflower		x		Sun/ Shade	Yellow	Yes	L
Heuchera americana	Alumroot		x	x	Shade	White	Yes	M
Heuchera villosa	Coral Bells		x		Shade	White	Yes	M
Iris cristata	Dwarf Crested Iris			x	Shade	Blue/Yellows	Yes	S
Liatris aspera	Rough Blazing Star			x	Sun	Purple	Yes	L
Liatris microcephala	Dwarf Blazing Star		x	x	Sun/ Shade	Purple	Yes	M
Liatris scicata	Grey Feather		x		Sun/ Shade	Purple	Yes	L
Monarda fistulosa	Wild Bergamot		x	x	Sun/ Shade	Pink	Yes	L
Oenothera fruticosa	Sundrops			x	Sun/ Shade	NA	No	S
Packyandra procumbens	Allegheny Spurge		x		Shade	NA	No	S
Penstemon digitalis	Foxglove Beardtongue			x	Sun/ Shade	Red	Yes	L
Phlox divaricata	Woodland Phlox		x		Shade	Blue	Yes	M
Phlox paniculata	Tall Garden Phlox		x		Sun	Orange	Yes	L
Phlox subulata	Prairie Phlox		x	x	Sun/ Shade	Pink/White	Yes	M
Phlox stolonifera	Creeping Phlox		x	x	Sun/ Shade	Blue Pink White	Yes	S
Phlox subulata	Moss Pink			x	Sun	Blue Pink White	Yes	S
Physostegia virginiana	Obedient Plant		x		Sun	Pink	Yes	L
Rudbeckia fulgida	Orange Coneflower			x	Sun	Orange	Yes	L
Rudbeckia triloba	Three-leaved Coneflower		x	x	Sun	Yellow	Yes	L
Sanguinaria canadensis	Bloodroot			x	Shade	White	Yes	S
Silene caroliniana	Wild Pinks			x	Shade/ Sun	Pink	Yes	M
Sisyrinchium angustifolium	Blue-eyed grass		x	x	Sun/ Shade	NA	No	S
Smilacina racemosa	False Solomon's Seal		x	x	Shade	Yellow	Yes	L
Tiarella cordifolia	FoamFlower		x		Shade	Pink	Yes	S