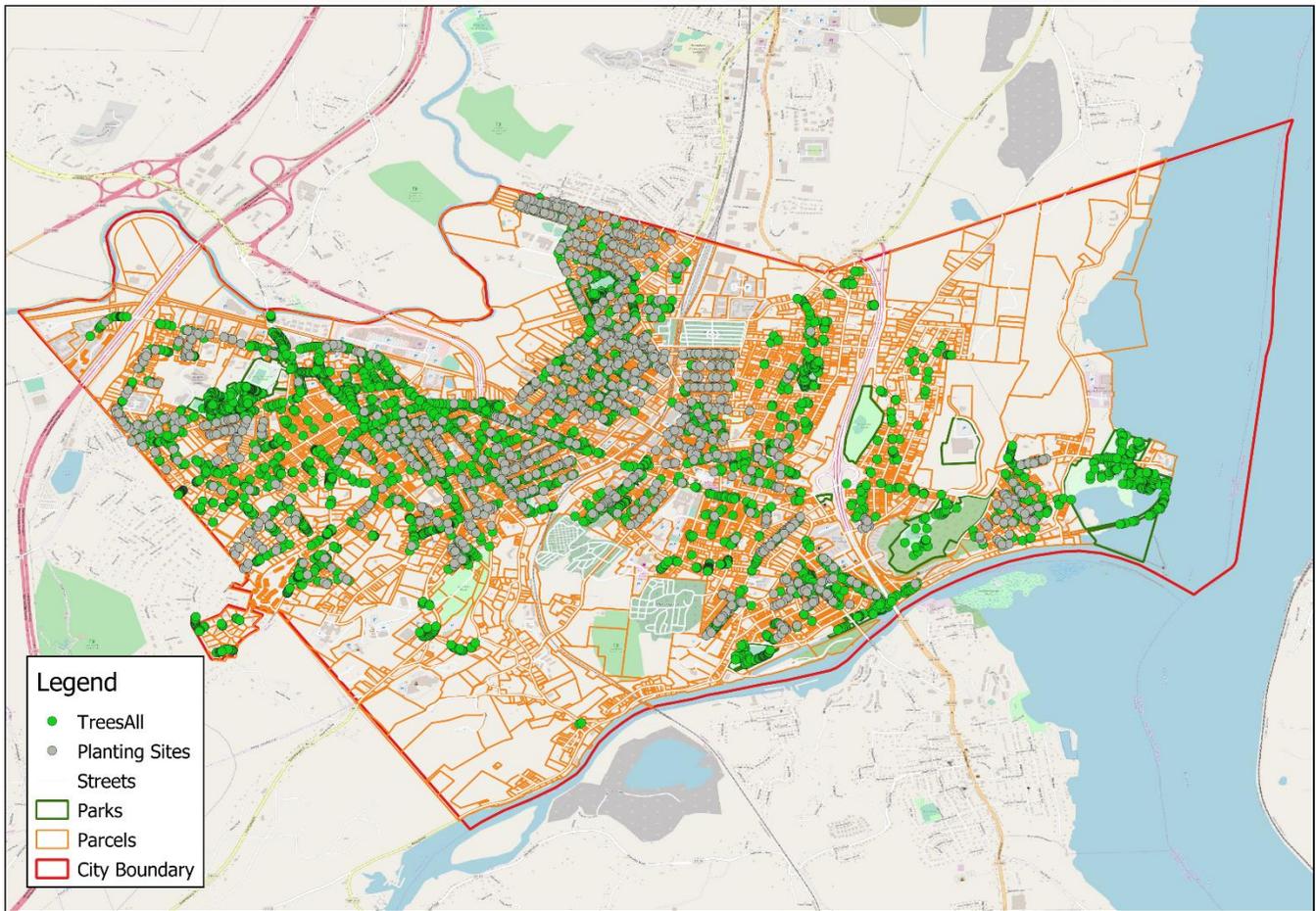


# City of Kingston, NY

## Tree Inventory Summary Report

May 17, 2018



## Report Summary

On April 25, 2018 ArborPro, Inc. began operations on a comprehensive GPS inventory of the trees along street rights-of-way and in public parks in the City of Kingston, NY. ArborPro assigned three ISA Certified Arborists to collect detailed information on the condition, size, species, maintenance recommendations, etc. for all trees owned by the City of Kingston. This summary includes a total of **5,237 sites**, comprised of 3,937 trees (75.2%), 102 stumps (1.9%) and 1,198 vacant planting sites (22.9%).

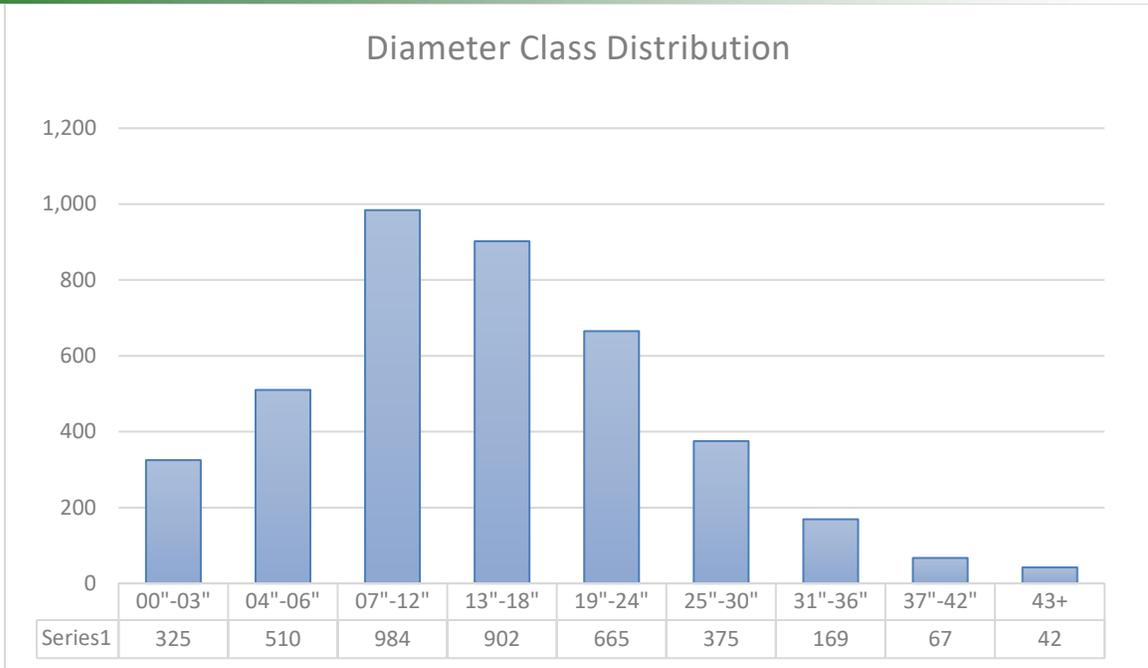
## Distribution of Trees by Location

The table to the below provides a summary of the number of trees recorded in each location type.

Area	Count	%
Academy Green Park	46	0.88%
Block Park	44	0.84%
Cornell Park	34	0.65%
Forsyth Park	326	6.22%
Hasbrouck Park	32	0.61%
Hutton Park	59	1.13%
Kingston Point Park	166	3.17%
Loughran Park	79	1.51%
TR Gallo Park	45	0.86%
<b>Total Parks</b>	<b>831</b>	
Street Trees	4,406	84.13%
<b>Grand Total</b>	<b>5,237</b>	

## Size Characteristics

The general size of a tree provides insight into the age and value of the tree as well as the overall age of the urban forest. There are two industry-wide recognized size characteristics, height and diameter at breast height. Diameter at breast height (DBH) is determined by the diameter of the tree at 4.5 feet above grade. DBH range distribution can be used to analyze the relative age distribution of an urban forest. This allows a city to adjust their planting plans to ensure that there are enough young trees to replace aging and over-mature trees. It is important that all age classes are adequately represented throughout the urban forest to ensure a healthy, vibrant tree canopy for future generations.



## Tree Condition

**Good** – The tree has no major structural problems; no significant damage from diseases or pests; no significant mechanical damage; a full, balanced crown, and normal twig condition and vigor for its species.

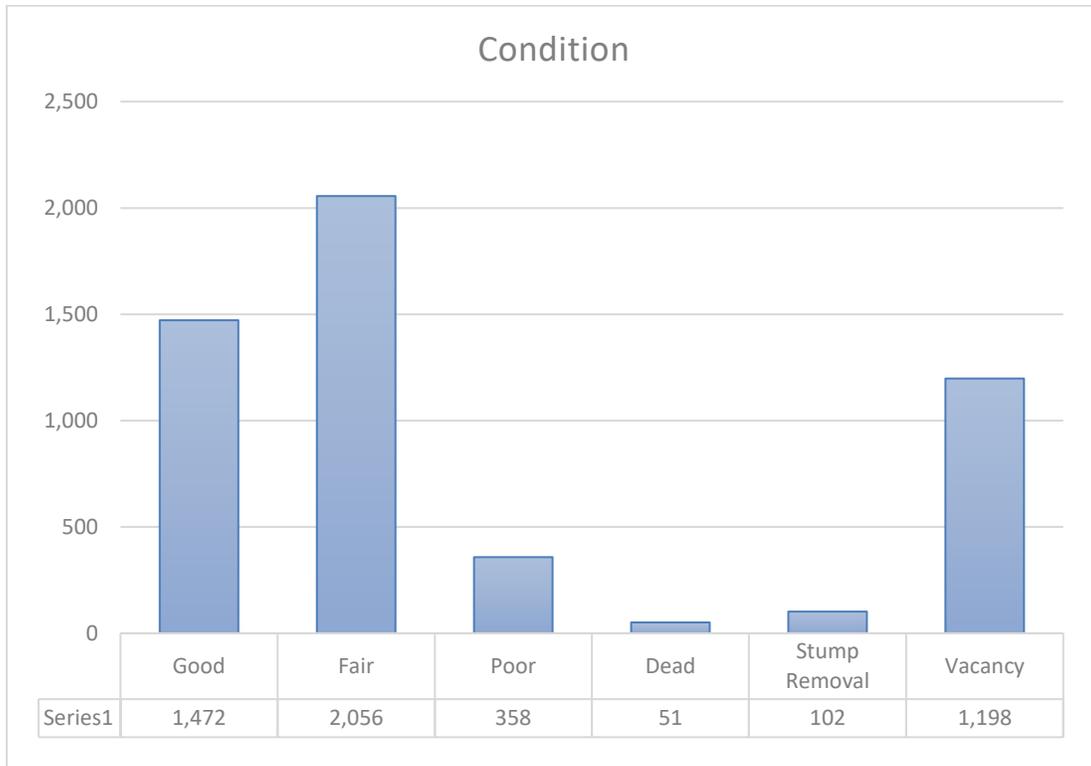
**Fair** – The tree may exhibit the following characteristics: minor structural problems and/or mechanical damage; significant damage from non-fatal or disfiguring diseases; minor crown imbalance or thin crown; minor structural imbalance; or stunted growth compared to adjacent trees.

**Poor** – The tree appears healthy, but may have structural defects. This classification also includes healthy trees that have unbalanced structures or have been topped. Trees in this category may also have severe mechanical damage, decay, severe crown dieback or poor vigor/failure to thrive.

**Critical** – The tree is in a physical state that requires immediate attention. Generally these trees are recommended for a Priority One Removal.

**Dead** – Trees in advanced states of decline are not included. This category refers only to dead trees.

Tree Condition	Tree Count	%
Good	1,472	28.1%
Fair	2,056	39.3%
Poor	358	6.8%
Dead	51	1.0%
Stump Removal	102	1.9%
Vacancy	1,198	22.9%
<b>Total</b>	<b>5,237</b>	



## Recommended Maintenance

**Priority 1 Prune** - Trees that require priority one pruning are recommended for trimming to remove hazardous deadwood, hangers, or broken branches. These trees have broken or hanging limbs, hazardous deadwood, and dead, dying, or diseased limbs or leaders greater than four inches in diameter.

**Priority 1 Removal** - Trees designated for removal have defects that cannot be cost- effectively or practically treated. The majority of the trees in this category will have a large percentage of dead crown and pose an elevated level of risk for failure. Any hazards that could be seen as potential dangers to persons or property and seen as potential liabilities would be in this category. Large dead and dying trees that are high liability risks are included in this category. These trees are the first ones that should be removed.

**Priority 2 Prune** - These trees have dead, dying, diseased, or weakened branches between two and four inches in diameter and are potential safety hazards.

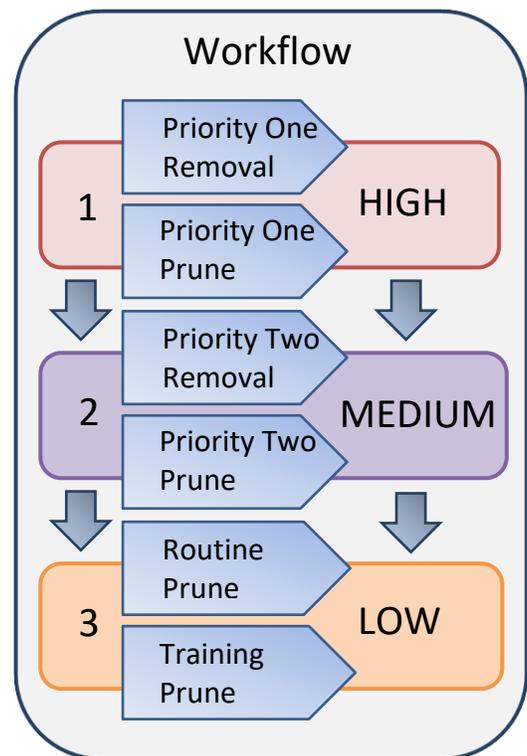
**Priority 2 Removal** - Trees that should be removed but do not pose a liability as great as the first priority will be identified here. This category would need attention as soon as "Priority One" trees are removed.

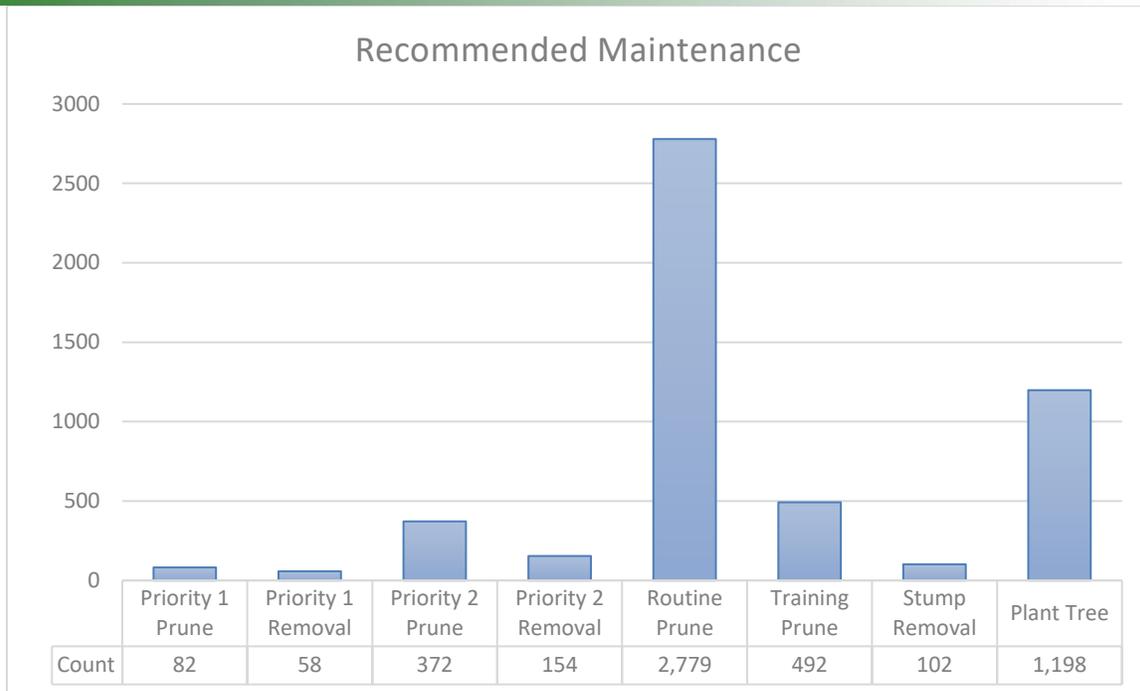
**Routine Prune** - These trees require routine horticultural pruning to correct structural problems or growth patterns, which would eventually obstruct traffic or interfere with utility wires or buildings.

**Training Prune** - Young, large-growing trees that are still small must be pruned to correct or eliminate weak, interfering, or objectionable branches in order to minimize future maintenance requirements. These trees, up to 20 feet in height, can be worked with a pole-pruner by a person standing on the ground.

**Stump Removal** - This category indicates a stump that should be removed.

Maintenance	Tree Count	%
Priority 1 Prune	82	1.6%
Priority 1 Removal	58	1.1%
Priority 2 Prune	372	7.1%
Priority 2 Removal	154	2.9%
Routine Prune	2,779	53.1%
Training Prune	492	9.4%
Stump Removal	102	1.9%
Plant Tree	1,198	22.9%
<b>Total</b>	<b>5,237</b>	





## Vacant Sites

Vacant planting sites were recorded in suitable areas and can be used for future tree plantings. Vacant sites were recorded based on the size of the planting location and the available rooting space. The size of the vacant site is based on the height of a potential tree at maturity. The criteria used to determine size is as follows: Small – 3-4’ of root space, Medium – 5-6’ of root space, 7’ or more of available root space.

Vacant Site Size	Tree Count	%
Vacant planting site - Large	195	16.3%
Vacant planting site - Medium	119	9.9%
Vacant planting site - Small	884	73.8%
<b>Total</b>	<b>1,198</b>	

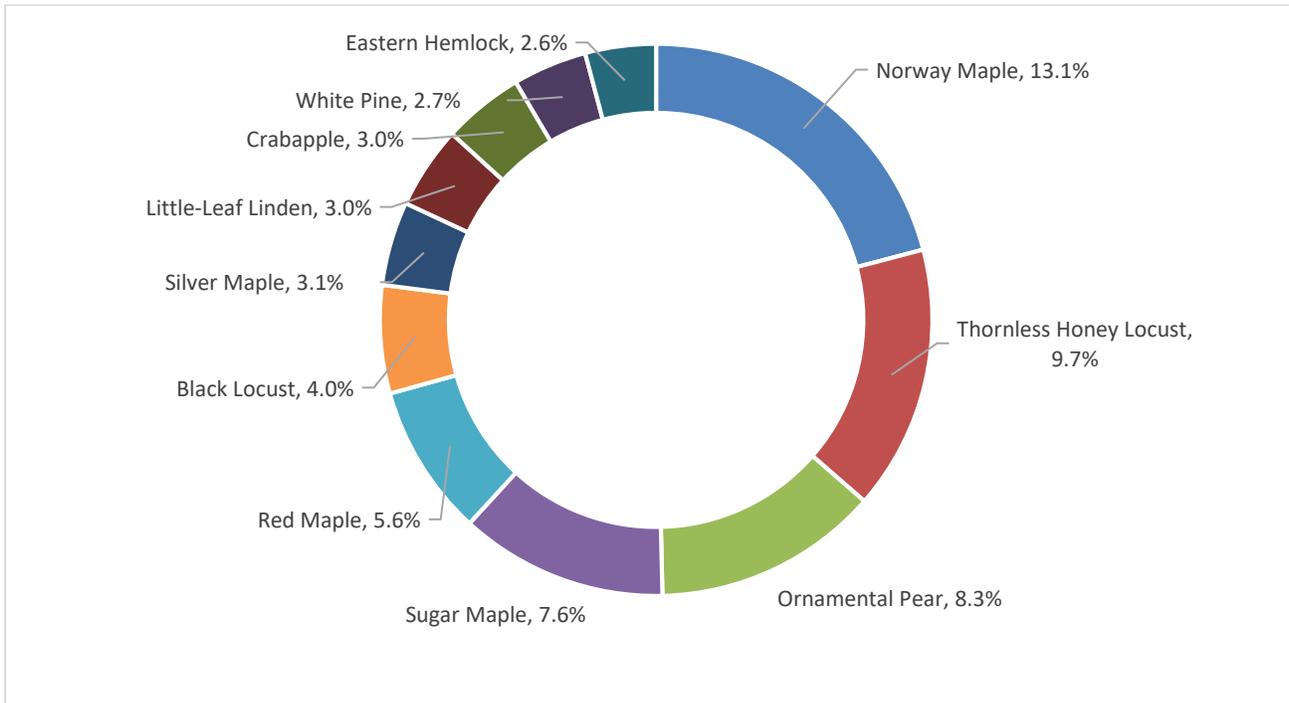
## Hardscape Damage

Hardscape damage was recorded based on the type of material used to construct the sidewalk. Damage was recorded when the vertical lift of the sidewalk was over .5’ and could cause a potential tripping hazard.

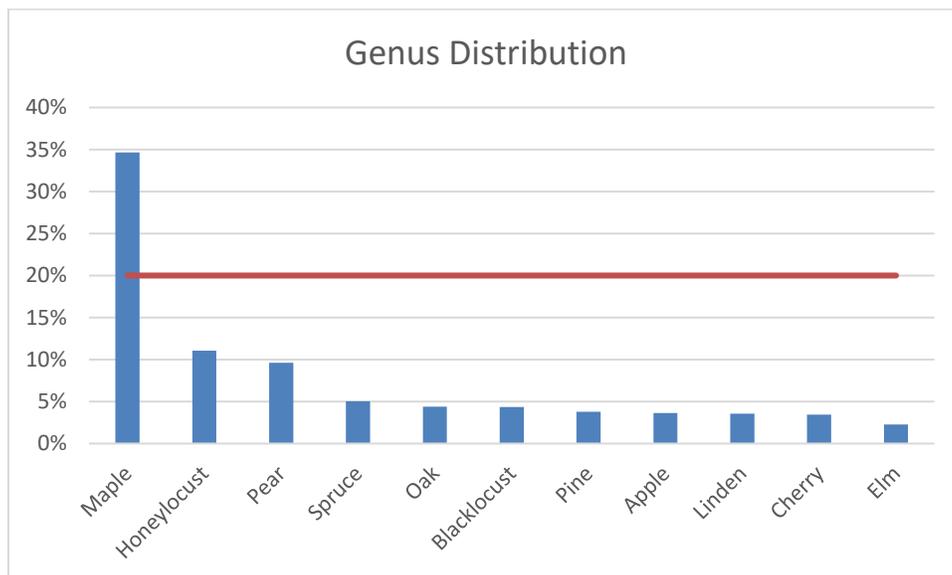
Hardscape Damage	Tree Count	%
No Damage	3,992	76.2%
Yes - Bluestone	723	13.8%
Yes - Concrete	416	7.9%
Yes - Other	106	2.0%
<b>Total</b>	<b>5,237</b>	

## Species and Distribution

Below are the top 10 species for this delivery.



The graph below shows the genus distribution for genera comprising over 2% of the entire population. They are compared the 20% rule which states that no genus should exceed 20% of the total tree population.



## Benefits of a Healthy Urban Forest

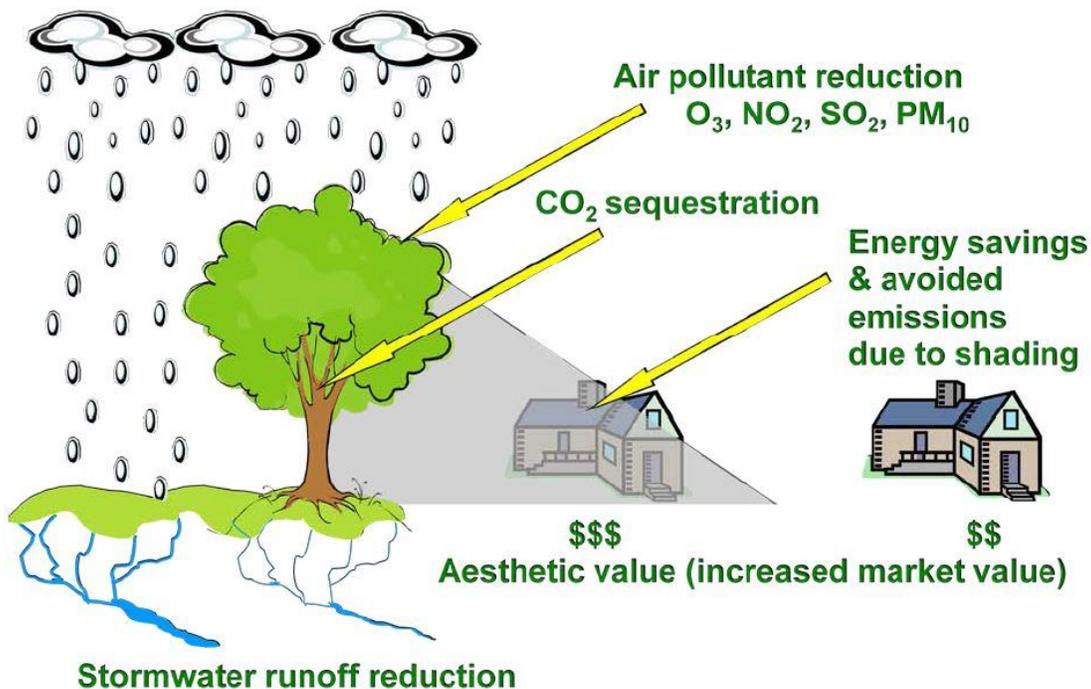
Trees provide a host of environmental, social, and economic benefits in urban areas. When properly maintained, trees can reduce pollution, improve mental health, and lower energy costs. It is important to understand the benefits trees provide as they can offset the cost associated with tree maintenance. A properly implemented tree maintenance program will maximize tree benefits in the urban setting, allowing trees to provide benefits that meet or exceed the time and money invested in maintenance activities.

The i-Tree Streets application was used to quantify the benefits provided by Kingston’s trees. This application uses growth and benefit models designed around predominant urban trees to calculate the specific benefits that trees provide in dollar amounts. The benefits calculated by i-Tree Streets include energy conservation, air quality improvements, carbon dioxide (CO<sub>2</sub>) reduction, stormwater control, and aesthetic/other. It creates annual benefit reports that demonstrate the value urban trees provide to the surrounding community.

The trees in Kingston provide a total of **\$541,095 in annual benefits**.

The total replacement cost for all the trees is **\$16,781,087**.

### Ecosystem services provided by urban trees



## Energy Conservation

Public trees contribute to energy conservation by providing shade that reduces cooling costs in the summer and diverting wind to reduce heating costs in the winter. The savings in electricity and natural gas are converted into monetary values to illustrate the annual energy savings that trees provide. Kingston's trees account for a savings of \$232,595 in energy consumption each year.

## Air Quality

Trees improve air quality by removing a number of pollutants from the atmosphere, including ozone, nitrogen dioxide, and particulate matter. The estimated value of pollutants removed by the inventoried tree population each year is \$42,790.

## Carbon Dioxide Sequestration

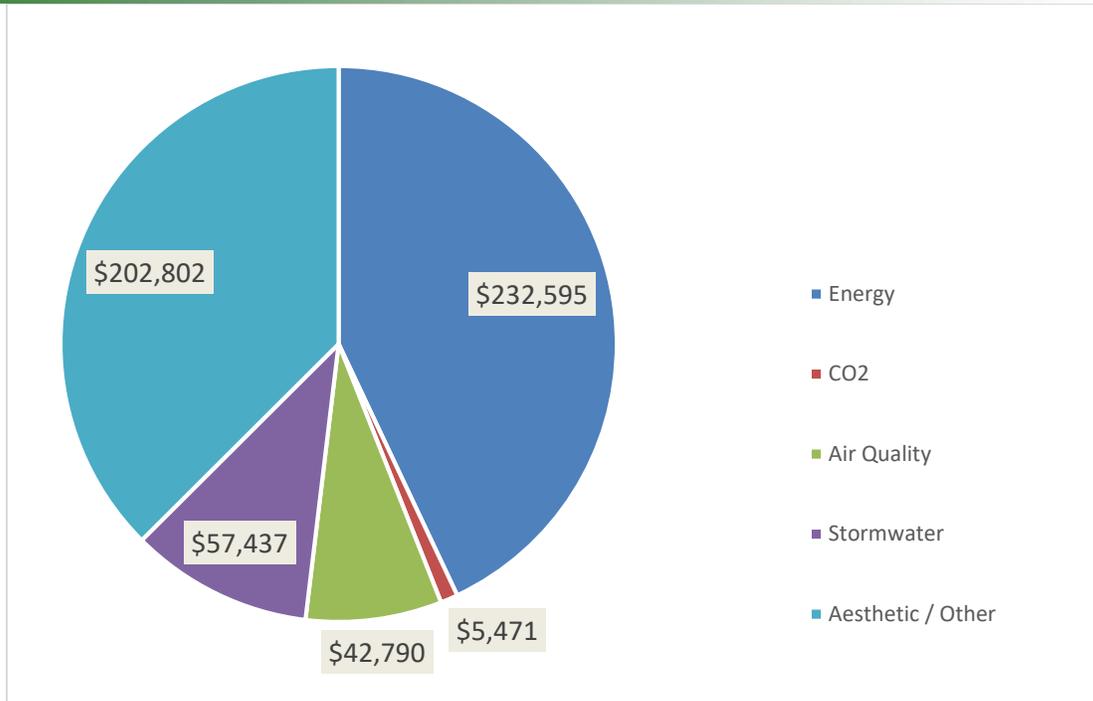
It is well known that trees absorb carbon dioxide and release oxygen into the atmosphere as a product of photosynthesis. Carbon absorbed during this process is ultimately stored in the wood of trees. The amount of carbon sequestered by the inventoried tree population is valued at \$5,471 annually.

## Stormwater Control

Trees reduce the costs associated with diverting stormwater by intercepting rainfall before it hits the ground and enters the storm runoff system. This greatly reduces the strain placed on public stormwater runoff systems and can represent a significant monetary savings by reducing the amount of infrastructure needed to divert stormwater throughout the city. The estimated savings for the City in the management of stormwater runoff is \$57,437 annually.

## Aesthetic/Other

Trees provide many social and economic benefits that are classified as aesthetic/other in the i-Tree Streets application. The major economic benefit in this category is increased property values. Trees contribute to higher property values when compared to similar properties that do not have trees. The major social benefits provided by trees are lower crime rates, improved mental health, greater time spent in businesses with tree lined streets, and higher productivity in the workplace when a view of nature is available. The inventoried trees contribute \$202,802 annually in aesthetic/other benefits.



### Total Replacement Value

In addition to Environmental Benefits, the City can consider the Total Replacement Value for its urban forest. Total Replacement Value is the amount of money it would take to completely replace the existing urban forest with trees of the same size. While this is a scenario that will likely never happen, it gives the City a specific dollar value of its trees in their current state. Replacement value differs from Environmental Benefits in that it shows how much the trees are worth instead of the dollar values that they provide in benefits. For example, a mature sugar maple could provide \$2,100 in environmental benefits by reducing stormwater runoff, improving air quality, etc. but the total cost of replacing an 18” DBH sugar maple would be \$24,270. According to i-Tree Streets, the total replacement cost for the Kingston’s trees is \$16,781,087. The table below shows the breakdown of Replacement Value by Diameter Class.

DBH (inches)	Replacement Value
00"-03"	\$35,269
04"-06"	\$219,515
07"-12"	\$1,308,658
13"-18"	\$2,902,307
19"-24"	\$4,365,457
25"-30"	\$3,717,139
31"-36"	\$2,371,533
37"-42"	\$1,161,107
43+	\$700,102
<b>Total</b>	<b>\$16,781,087</b>

Below is a Species Frequency report.

Botanical Name	Common Name	Tree Count	%
Abies balsamea	Balsam Fir	1	0.0%
Abies concolor	White Fir	6	0.1%
Acer buergeranum	Trident Maple	4	0.1%
Acer ginnala	Amur Maple	9	0.2%
Acer griseum	Paperbark Maple	6	0.1%
Acer negundo	Box Elder	18	0.3%
Acer negundo 'Flamingo'	Variegated Box Elder	1	0.0%
Acer palmatum	Japanese Maple	41	0.8%
Acer plantanoides	Norway Maple	515	9.8%
Acer platanoides 'Crimson King'	Crimson King Maple	1	0.0%
Acer rubrum	Red Maple	219	4.2%
Acer saccharinum	Silver Maple	121	2.3%
Acer saccharum	Sugar Maple	300	5.7%
Acer tataricum	Tatarian Maple	1	0.0%
Acer x freemanii	Freeman Maple	4	0.1%
Aesculus hippocastanum	Common Horsechestnut	10	0.2%
Aesculus x carnea	Red Horsechestnut	1	0.0%
Ailanthus altissima	Tree of Heaven	30	0.6%
Albizia julibrissin	Mimosa, Silk Tree	2	0.0%
Amelanchier canadensis	Canadian Serviceberry	26	0.5%
Betula lenta	Sweet Birch	1	0.0%
Betula nigra	River Birch	10	0.2%
Betula papyrifera	Paper Birch	3	0.1%
Betula pendula	European White Birch	1	0.0%
Betula populifolia	Gray Birch	8	0.2%
Carpinus betulus	European Hornbeam	1	0.0%
Carpinus betulus 'Fastigiata'	Upright European Hornbeam	1	0.0%
Carya cordiformis	Bitternut Hickory	15	0.3%
Carya ovata	Shagbark Hickory	5	0.1%
Carya tomentosa	Mockernut Hickory	1	0.0%
Castanea mollissima	Chinese Chestnut	1	0.0%
Catalpa speciosa	Western Catalpa	34	0.6%
Celtis occidentalis	Common Hackberry	16	0.3%
Cercidiphyllum japonicum	Katsura Tree	2	0.0%
Cercis canadensis	Eastern Redbud	10	0.2%
Cornus florida	Eastern Dogwood	35	0.7%
Cornus kousa	Kousa Dogwood	3	0.1%
Crataegus crus-galli	Cockspur Thorn	10	0.2%

<i>Crataegus crus-galli inermis</i>	Thornless Hawthorn	12	0.2%
<i>Diospyros virginiana</i>	American Persimmon	1	0.0%
<i>Fagus sylvatica</i>	European Beech	1	0.0%
<i>Fagus sylvatica 'Fastigiata'</i>	Upright European Beech	3	0.1%
<i>Fraxinus americana</i>	White Ash	12	0.2%
<i>Fraxinus pennsylvanica</i>	Green Ash	31	0.6%
<i>Ginkgo biloba</i>	Maidenhair Tree	59	1.1%
<i>Gleditsia triacanthos forma inermis</i>	Thornless Honey Locust	396	7.6%
<i>Juglans cinerea</i>	Butternut	1	0.0%
<i>Juglans nigra</i>	Black Walnut	20	0.4%
<i>Juglans regia</i>	English Walnut	1	0.0%
<i>Juniperus virginiana</i>	Eastern Red Cedar	58	1.1%
<i>Koelreuteria paniculata</i>	Goldenrain Tree	1	0.0%
<i>Liquidambar styraciflua</i>	American Sweet Gum	2	0.0%
<i>Liquidambar styraciflua 'Rotundiloba'</i>	Round-Leafed Sweet Gum	1	0.0%
<i>Liriodendron tulipifera</i>	Tulip Tree	8	0.2%
<i>Maackia amurensis</i>	Manchurian Maackia	4	0.1%
<i>Magnolia stellata</i>	Star Magnolia	3	0.1%
<i>Magnolia x soulangiana</i>	Saucer Magnolia	8	0.2%
<i>Malus domestica</i>	Edible Apple Species	13	0.2%
<i>Malus floribunda</i>	Crabapple	117	2.2%
<i>Metasequoia glyptostroboides</i>	Dawn Redwood	1	0.0%
<i>Morus alba</i>	White Mulberry	53	1.0%
<i>Ostrya virginiana</i>	American Hophornbeam	2	0.0%
<i>Picea abies</i>	Norway Spruce	99	1.9%
<i>Picea glauca</i>	White Spruce	22	0.4%
<i>Picea glauca albertiana</i>	Alberta Spruce	2	0.0%
<i>Picea pungens</i>	Colorado Spruce	57	1.1%
<i>Pinus mugo mugo</i>	Mugho Pine	1	0.0%
<i>Pinus nigra</i>	Austrian Black Pine	27	0.5%
<i>Pinus strobus</i>	White Pine	107	2.0%
<i>Pinus sylvestris</i>	Scotch Pine	1	0.0%
<i>Platanus occidentalis</i>	American Sycamore	101	1.9%
<i>Populus deltoides</i>	Cottonwood	33	0.6%
<i>Populus tremuloides</i>	Quaking Aspen	1	0.0%
<i>Prunus avium</i>	Sweet Cherry	1	0.0%
<i>Prunus cerasifera</i>	Purple-Leaf Plum	20	0.4%
<i>Prunus domestica</i>	Plum	2	0.0%
<i>Prunus persica</i>	Peach	8	0.2%
<i>Prunus serotina</i>	Eastern Black Cherry	32	0.6%
<i>Prunus serrulata</i>	Japanese Flowering Cherry	38	0.7%

Prunus serrulata 'Kwanzan'	'Kwanzan' Flowering Cherry	1	0.0%
Prunus species	Stone Fruit species	5	0.1%
Prunus subhirtella 'Pendula'	Weeping Flowering Cherry	9	0.2%
Prunus yeodensis	Yoshino Cherry	7	0.1%
Pyrus calleryana	Ornamental Pear	326	6.2%
Pyrus communis	Edible Pear	18	0.3%
Quercus alba	White Oak	10	0.2%
Quercus bicolor	Swamp White Oak	4	0.1%
Quercus coccinea	Scarlet Oak	3	0.1%
Quercus imbricaria	Shingle Oak	4	0.1%
Quercus macrocarpa	Bur Oak	3	0.1%
Quercus palustris	Pin Oak	98	1.9%
Quercus phellos	Willow Oak	2	0.0%
Quercus robur 'Fastigiata'	Upright English Oak	2	0.0%
Quercus rubra	Red Oak	27	0.5%
Quercus velutina	Black Oak	4	0.1%
Rhamnus cathartica	Common Buckthorn	6	0.1%
Robinia pseudoacacia	Black Locust	156	3.0%
Salix babylonica	Weeping Willow	4	0.1%
Salix discolor	Pussy Willow	1	0.0%
Salix integra	Dappled Willow	1	0.0%
Salix matsudana 'Tortuosa'	Corkscrew Willow	1	0.0%
Salix nigra	Black Willow	4	0.1%
Sassafras albidum	Sassafras	1	0.0%
Sorbus americana	American Mountain Ash	2	0.0%
Stump	Stump	102	1.9%
Styphnolobium japonicum	Japanese Pagoda Tree	2	0.0%
Syringa reticulata	Japanese Tree Lilac	21	0.4%
Syringa vulgaris	Common Lilac	4	0.1%
Taxodium distichum	Bald Cypress	12	0.2%
Taxus spp.	Yew Species	6	0.1%
Thuja occidentalis	American Arborvitae	51	1.0%
Tilia americana	American Linden	8	0.2%
Tilia cordata	Little-Leaf Linden	119	2.3%
Tsuga canadensis	Eastern Hemlock	102	1.9%
Ulmus americana	American Elm	13	0.2%
Ulmus parvifolia	Chinese Elm	6	0.1%
Ulmus pumila	Siberian Elm	47	0.9%
Ulmus rubra	Slippery Elm	3	0.1%
Ulmus x species	Hybrid Elm	12	0.2%
Vacant planting site - Large	Vacant planting site - Large	196	3.7%

Vacant planting site - Medium	Vacant planting site - Medium	119	2.3%
Vacant planting site - Small	Vacant planting site - Small	885	16.9%

## Recommended Maintenance Maps



Academy Green Park  
Kingston, NY 2018



Block Park  
Kingston, NY 2018



Cornell Park  
Kingston, NY 2018



Forsyth Park  
Kingston, NY 2018



Hasbrouck Park  
Kingston, NY 2018



Hutton Park  
Kingston, NY 2018



Kingston Point Park  
Kingston, NY 2018



Loughran Park  
Kingston, NY 2018



TR Gallo Park  
Kingston, NY 2018