



# Urban Forestry Management Plan

Town of DeWitt, New York

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# Urban Forestry Management Plan Town of DeWitt, New York

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# Table of Contents

EXECUTIVE SUMMARY	4
State of the Public Street Tree Population (See Appendix A)	5
Acknowledgements	5
1.1 Urban Forestry Evolution	8
1.2 Comprehensive Goals	10
2. COMPREHENSIVE GOALS, ACTIONS STEPS AND TIMELINES	11
2.1 Comprehensive Goal 1 >> Organizational	11
2.2 Comprehensive Goal 2 >> Quality	17
2.3 Comprehensive Goal 3 >> Quantity	25
2.4 Comprehensive Goal 4 >> Education & Outreach	30
2.5 Comprehensive Goal 5 >> Protection & Enhancement	31
APPENDICES	37
Appendix A >> State of the Urban Forest	37
Appendix B. >> Tree Inventory Data Collection Specifications	51
Appendix C. >> Tree Species by Common Name and Percent and Number of the Total Population Identified in the Tree Inventory	59
Appendix D. >> Environmental and Economic Benefits by Management (Zone) Area and Type for Street Trees	62
Appendix E. >> Recommended Species Planting List for the Town of DeWitt	64

## Executive Summary

This Urban Forestry Management Plan lays the foundation for future planning efforts to increase urban tree canopy cover (UTC) as a means to enhance the environmental and economic benefits provided by urban trees to citizens of DeWitt. A secondary but critical goal of this plan is to clearly identify management responsibilities within the Town that in the past have been shared among several Town Departments. Five management goals were identified along with specific action steps and timelines to complete them.

### **Goal 1. >> Organizational**

By 2020, improve DeWitt's efficiency in managing the physical, organizational, and fiscal aspects of its urban forestry program.

### **Goal 2. >> Quality**

By 2020, complete priority maintenance identified in the tree inventory, and develop and implement planting and maintenance standards to ensure DeWitt's urban forest is healthy, diverse, and functional to provide maximum environmental, social, and economic benefit for residents, businesses, and wildlife, and to buffer against global climate change.

### **Goal 3. >> Quantity**

Increase DeWitt's street tree stocking 20% over 2015 levels by 2020 with the intent of increasing species diversity and overall canopy cover in each management area each year by targeting areas of the Town with low canopy cover and high availability of planting space.

### **Goal 4. >> Education and Outreach**

Each year, increase the percentage of Town residents who accept street tree planting and care responsibilities through heightened outreach efforts such as workshops and public announcements that focus on high priority or targeted planting areas in the Town.

### **Goal 5. >> Protection and Enhancement**

By 2020, protect and enhance DeWitt's urban forest on private and public lands and rights of ways by reviewing and updating existing ordinances, and incorporating urban forestry principals and industry standards into guiding management documents including landscape and development design guidelines and the Town's Comprehensive and Sustainability Plans.

## State of the Public Street Tree Population (See Appendix A)

An inventory of street trees was completed in 2015 with a New York State Department of Environmental Conservation Urban Forestry Grant that identified the following:

- 1,812 trees and 4,720 planting sites on the street ROW where over 110 different species were identified.
- Over 90% of street trees were rated in fair or good condition and 5% have priority maintenance needs.
- The tree population was dominated by the genus *Acer* (maple) at 40%. Norway maple (19%), sugar maple (8%), and Norway spruce (7%) were the most common species.
- Only 12% of the tree population was greater than 25 inches in diameter.
- Tree stocking (number of sites with trees divided by number of sites that could hold a tree) is less than 40%, with approximately 30 trees per mile.
- The urban street tree population alone provides over \$205,000 in economic benefit annually to the Town, or nearly \$115 per street tree.
- Annual budgets to manage the public urban tree population have been around \$100,000. Based on the inventory and current costs it would take approximately \$60,000 per year of the annual budget for the next three years to complete priority maintenance work.

## Acknowledgements

The Town of DeWitt wishes to thank the following organizations, agencies, and individuals for their contributions in developing this Urban Forest Management Plan:

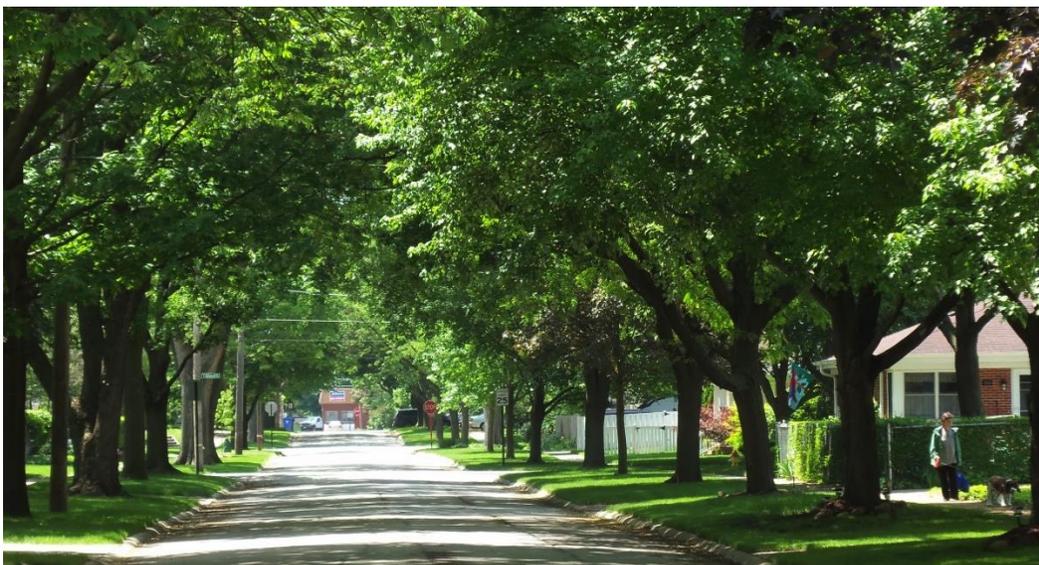
- New York State Department of Environmental Conservation (NYS DEC) for the grant opportunities that funded the data collection phase resulting in an updated street tree inventory and the creation of this management plan.
- The DeWitt Advisory Conservation Committee and the Tree Committee for their unrelenting dedication in support of conservation, preservation, and protection of the urban environment.
- Town staff including Town Supervisor-Ed Michalenko, Director of Planning and Zoning- Samuel Gordon, Highway Superintendent-Rocco Conte, and Christine Manchester-Sustainability Coordinator for continued support.
- Town Board for unanimous approval to adopt this management plan.
- Urban Forestry, LLC for collecting field data, consultation, and facilitating the recommendations found in this management plan.

## 1. Introduction

The ultimate goal of this plan is to improve urban tree canopy cover (UTC) and delineate management responsibilities within the Town. This plan establishes a framework to accomplish this by setting achievable and realistic but challenging goals that potentially will improve the UTC and also facilitate efficient and fiscally responsible decisions to enhance the urban forest.

Urban tree canopy is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. UTC provides an important stormwater management function by intercepting rainfall that would otherwise run off of paved surfaces and be transported into local waters through the storm drainage system, picking up various pollutants along the way. UTC also reduces the urban heat island effect, reduces heating and cooling energy costs, lowers air temperatures, reduces air pollution, increases property values, provides wildlife habitat, and provides aesthetic and community benefits that improve quality of life (Photographs 1 and 2).

Several factors have impacted UTC in the Town in the past including severe storm damage, land development, Dutch elm disease, white-tailed deer population increases, and invasive pests such as emerald ash borer. Tree planting efforts to offset these losses have been primarily limited to new residential and commercial development projects. Therefore, protection, maintenance and expansion of UTC are important overriding goals of this urban forest management plan. These goals will require a variety of management practices and approaches that influence UTC on both public and private lands.



Photograph 1. Trees provide many environmental benefits to the citizens of DeWitt that have quantifiable monetary value.



Photograph 2. | Street trees as seen in Dewittshire contribute to the UTC and provide numerous environmental and economic benefits that enhance the quality of life for Town residents.

## 1.1 Urban Forestry Evolution

The Town of DeWitt sits in Onondaga County, with an area of 33.9 square miles, 124 miles of roads, and approximately 26,000 residents. The Town contains the Village of East Syracuse and the hamlets of Jamesville and Collamer. Land use varies widely, ranging from large areas classified as residential, commercial, industrial and vacant, along with measurable amounts of agricultural, open space and land used for public service. Current Town land use, history of development, demographics, soils and climate are presented in Appendices Appendix A >> State of the Urban Forest).

The Dewitt Advisory Conservation Commission (DACC), established in 1972, came to recognize the need for a concerted tree planting and pruning effort and formed the Town's Tree Committee (TC) in 2006. The TC was formally adopted into Town Code as a standing committee in February 2012. Chapter 8, Article III: Tree Committee of the DeWitt Town Code provides the legislative intent, duties, and responsibilities in detail.

The efforts of the TC earned DeWitt the distinction of becoming recognized as a Tree City USA in 2011. This nationwide program of the National Arbor Day Foundation requires a community to meet the following four core urban forest management standards:

- Maintain a tree board or department
- Have a community tree ordinance
- Spend at least \$2.00 per capita on urban forestry
- Celebrate Arbor Day

In addition, the Town also received the Growth Award in 2013 from the National Arbor Day Foundation. This distinction identifies innovative programs and projects with increased commitment of resources for urban forestry, and provides an opportunity to share new ideas and successes across the country.

In the past, the TC has conducted targeted tree planting initiatives, led pruning efforts, provided education and outreach opportunities, and offered stewardship opportunities. Additionally, it provided oversight to the Student Weekend Arborist Team, a team of students overseen by Dr. Nina Bassuk from Cornell University that inventoried selected areas with street trees in the Town.

The Town received grants in 2015 from the New York State Department of Environmental Conservation to conduct a professional inventory of DeWitt's street trees and to develop an urban forest management plan. Based on the inventory results, the Planning and Zoning Department and the TC produced five Comprehensive Goals to streamline management and planning efforts. The target is to achieve goals within 10 years from date of adoption of this plan. The following section will detail the comprehensive goals, objectives, challenges, and action steps.

## 1.2 Comprehensive Goals

### **Goal 1. >> Organizational**

By 2020, improve DeWitt's efficiency in managing the physical, organizational, and fiscal aspects of its urban forestry program.

### **Goal 2. >> Quality**

By 2020, complete priority maintenance identified in the tree inventory, and develop and implement planting and maintenance standards to ensure DeWitt's urban forest is healthy, diverse, and functional to provide maximum environmental, social, and economic benefit for residents, businesses, and wildlife, and to buffer against global climate change.

### **Goal 3. >> Quantity**

Increase DeWitt's street tree stocking 20% over 2015 levels by 2020 with the intent of increasing species diversity and overall canopy cover in each management area each year by targeting areas of the Town with low canopy cover and high availability of planting space.

### **Goal 4. >> Education and Outreach**

Each year, increase the percentage of Town residents who accept street tree planting and care responsibilities through heightened outreach efforts such as workshops and public announcements that focus on high priority or targeted planting areas in the Town.

### **Goal 5. >> Protection and Enhancement**

By 2020, protect and enhance DeWitt's urban forest on private and public lands and rights of ways by reviewing and updating existing ordinances, and incorporating urban forestry principals and industry standards into guiding management documents including landscape and development design guidelines and the Town's Comprehensive and Sustainability Plans.

## 2. Comprehensive Goals, Actions Steps and Timelines

### 2.1 Comprehensive Goal 1 >> Organizational

By 2020, DeWitt improves its efficiency in managing the physical, organizational, and fiscal aspects of its urban forest program.

#### 2.1.1 Background

Planning and management decisions for street trees on the right of way are currently administered within the Planning and Zoning Department. The Highway Department does most of the arboriculture work, removing and pruning trees on both an as-needed and complaint-driven basis. The Parks and Recreation Department oversees tree management in the Town Parks.

#### 2.1.2 Administration

An important and significant step for the Town in development of its urban forestry programs is assignment of specific urban forest management responsibilities, along with development of communication amongst the Town departments involved in making management decisions. This should include delegating assignment (in some cases sharing assignments where appropriate, such as tree inspections) of specific tasks to specific departments and individual staff positions. This is best accomplished by creation of an Urban Forestry Administration and Policy Manual as described below, where these duties and assignments are specified.

A critical element in development of any administrative and staffing assignments and delegation of responsibilities will be coordination, communication, and agreement amongst the Planning and Zoning, Highway, and Parks and Recreation Departments. Based on input from the Town, urban forest planning will take place in the Planning and Zoning Department with the following administrative and management responsibilities:

- Planting initiatives
- Coordination of routine removals
- Coordination of pruning and maintenance efforts
- Budgeting oversight
- Coordination with Parks and Recreation, and the Highway Departments

The Parks and Recreation and Highway Departments should retain the ability to remove and prune trees according to Town policy. A means to coordinate this work with the Planning and Zoning Department needs to be established. Management of park trees should remain within the Parks and Recreation Department. Budgeting, coordination and management of park trees within the Town needs better definition and coordination with the Planning and Zoning Department.

### 2.1.3 Staffing

Based on discussion with the Planning and Zoning Department, additional staff assistance is likely to be needed if the current urban forest is to be improved and expanded. A particular need of the Town is for an individual experienced in urban and community forestry to handle daily management of the program and to provide assistance in expanding the program. This individual at minimum should be an International Society of Arboriculture Certified Arborist.

Because a primary function of this additional staff position is planning, this individual should be assigned or have work responsibilities in the Planning and Zoning Department. The Town could create a position and hire an individual with urban forest management skills, or make this a part-time position with other work responsibilities. Given the current size of the urban forest, a part-time staff person with designated urban forest management responsibilities would be likely adequate. However, many municipalities use contract urban foresters to provide such services. Common tasks for this position would be:

- Coordinating and communicating with the Highway, and Parks and Recreation Department on urban forest management and maintenance
- Conducting field inspection of service requests from the public for tree maintenance or planting
- Managing the inventory data in Tree Tracker, including updating the inventory, recording service requests, and entering work history data
- Overseeing and managing urban forest contracts for Town tree planting and maintenance, which includes developing contract and work specification, obtaining contractor bids, and inspecting completed work
- Providing tree planting service for planning, selection and assessment of planting sites, selection of nursery stock and managing contractors and planting work
- Providing educational programs and materials for the public about the urban forestry program
- Developing and inspecting tree preservation projects
- Providing guidance, planning and program development for the urban forestry program
- Developing urban forestry budgets based on planning and projected management work

### Action Steps

Administration and Staffing	Time Frame
Detail the specific responsibilities of each Department and staff in the Town involved in the management of the urban forest resource on and off the public ROW as outlined above	1-3 years
Identify the best means to staff and administer the urban forestry program in the Town and determine the number of personnel required to meet the projected demands of the program	1-3 years
Include the result of the above recommendations in the Urban Forestry Administration and Policy Manual (see below)	1-3 years

#### 2.1.4 Urban Forestry Administration and Policy

Urban Forestry LLC highly recommends that the Town develop an Urban Forestry Administration and Policy Manual that guides urban forest management in the Town. Along with the Technical and Specifications Manual (see below), this manual would identify departmental and individual administrative responsibilities, define management policies, and become the primary document that guides day-to-day urban forest management.

### Action Steps

Urban Forestry Administration and Policy	Time Frame
Develop an Urban Forestry Administration and Policy Manual to guide management of the urban forest and establish critical policy for tree management.	1-3 years
Include key urban forestry management policy such as: <ul style="list-style-type: none"> <li>▪ Intra-departmental communication responsibilities and guidelines</li> <li>▪ Tree risk assessment guidelines</li> <li>▪ Tree inventory data management</li> <li>▪ Maintenance rotations</li> <li>▪ Removal guidelines</li> <li>▪ Planting guidelines</li> <li>▪ Staff education and training</li> <li>▪ Highway Department arboricultural safety training</li> <li>▪ Tree Committee responsibilities and coordination</li> <li>▪ Annual budget guidance</li> </ul>	1-3 years

### 2.1.5 Tree Inventory Data Management

The tree inventory is a snapshot in time. The inventory that was conducted in 2015 (Appendix A) will quickly become out of date as tree condition changes and arboricultural management of trees is completed. The Town will need to identify and develop practices and procedures to manage the inventory data within the Tree Tracker software. This is an important administrative function. All Departments that are involved in managing or working on trees within the public ROW need to be aware of and comply with these practices and procedures to accurately maintain data.

#### Action Steps

Tree Inventory Data Management (Administration and Policy Manual)	Time Frame
Develop guidance for management of tree inventory software and data that includes all departments involved in managing trees on the public ROW	1-3 years
Identify the department and individuals responsible for overseeing and managing Tree Tracker and updating the data	1-3 years
Identify the methods to input service requests from the public, link the service requests to new or existing inventory data, notify responsible individuals or departments of the need for service request inspections, and update data when service requests are completed	1-3 years
Identify the methods to produce work requests, deliver work requests to appropriate departments, and enter work history when work is completed	1-3 years
Identify the departments and individuals responsible, and set procedures to input new inventory data resulting from tree planting and completed maintenance work	1-3 years

### 2.1.6 Tree Committee

Now 10 years old, the Tree Committee (TC) is currently in a state of flux as the long-standing members see their primary role as planting and pruning trees. However, planting efforts have steadily increased and are at a scale too large for a volunteer committee to manage. As the Town believes the TC is an integral part of effectively managing DeWitt's urban forest, it is necessary to refocus this group to areas needing their assistance. It is vitally important that the TC continue to seek community representatives who can help champion messages to individual communities within the Town. It is also crucial that the TC help to advocate and secure funding to keep DeWitt's urban forest healthy. Section 8.18 Duties and Responsibilities of the Town Code subsections C, D, F are as follows:

- C. The Committee shall consider, investigate, report, and recommend upon any law, policy, or guideline or any special matter concerning trees and other vegetation within the Town.
- D. Tree Stewards: The Committee shall establish and provide for training of volunteers to plant, prune, and inventory public and semipublic trees. The Town Naturalist will coordinate the volunteer program.
- F. Education: The Committee under the supervision of the Town Naturalist shall develop an educational policy to promote retaining and increasing the quality and quantity of the canopy of private trees.

In support of Section 8.18 C, D, and F, the TC should:

- Coordinate an Arbor Day program with both Jamesville DeWitt School District and East-Syracuse Minoa School District.
- Create and oversee a Tree Steward program comprised of residents and volunteers modeled after Cornell Cooperative Extension's Communi-Tree program.
- Through the newly created Tree Stewards, focus on small areas within the Town that have high planting potential (to be coordinated with the Town Naturalist/Arborist) to plant new trees as part of an educational opportunity. Additionally, the Tree Stewards should work with homeowners to prune and care for young trees.

**Action Steps**

Tree Committee	Time Frame
Identify within the Urban Forestry Policy and Administration Manual the specific responsibilities, functions, terms of service and other elements needed to operate the Committee efficiently	1-3 years
Complete the above recommended actions in support of Section 8.18 C, D, and F	1-3 years

## **2.2 Comprehensive Goal 2 >> Quality**

By 2020, complete priority maintenance identified in the tree inventory, and develop and implement planting and maintenance standards to ensure DeWitt's urban forest is healthy, diverse, and functional so that it will provide maximum environmental, social, and economic benefit for residents, businesses, and wildlife, as well as buffer against global climate change.

### **2.2.1 Background**

The tree inventory completed by the Town in 2015 identified priority maintenance work for trees on the public ROW (Appendix A). It is critical that the Town complete this work in a timely manner to ensure public safety and maintain the quality of those trees.

It is also critical that inspection and maintenance of Town trees continue as a standard part of the urban forestry program in the future. Tree risk management standards and legal requirements necessitate that the Town periodically inspect and maintain trees on public property. It is further critical that all maintenance work be completed to industry standards while complying with all industry and governmental safety standards.

### **2.2.2 Staff Training and Education**

Adequate staff training and education are crucial to establish and maintain high-quality urban forestry management practices in the Town. These requirements should be identified in the Administration and Policy Manual.

The Town should ensure adequate safety training for all Highway Department crews who work on trees, including electrical hazard training, chainsaw and bucket truck safety training and inspections, and tree worker safety training. Such training must meet all current American National Standards Institute standards in addition to State and Federal requirements.

Urban Forestry LLC highly recommends that at least one person in the Town involved in the urban forestry program be an ISA Certified Arborist. Other levels and types of certification are also desirable such as ISA Municipal Specialist, Tree Worker Certification, and Tree Risk Assessment Qualification. The requirements for each employee to hold a certain certification should depend on their work assignment and should be identified in the Administration and Policy Manual. The Administration and Policy Manual should also identify the desired level of continuing education and staff training for employees involved in the urban forestry program.

### Action Steps

Staff Training and Education	Time Frame
Within the Urban Forestry Administration and Policy Manual, identify the desired level or industry specific qualifications required for Staff positions involved in urban forest management depending on assigned work responsibilities	1-3 years
Enable at least one Staff member involved in the urban forestry program to gain ISA Certified Arborist status	1-3 years
Within the Administration and Policy Manual, establish desired levels of continuing education and Staff training in urban forestry	1-3 years
Within the Administration and Policy Manual, establish all industry required or recommended safety training for Highway Department crews involved in arboricultural work in the Town.	1-3 years

### 2.2.3 Tree Condition and Maintenance

The inventory showed that trees in the ROW are in generally good health with relatively few priority removal and pruning needs. However, there are still priority maintenance needs in the Town, and these can change on an annual basis as trees die or become defective. The Town should complete all the priority removals and pruning over the next three years as there are relatively low number of trees with priority maintenance (Table 1 and 2). These trees could be pruned and removed by DPW crews or by contractors. Tree Tracker software should be used to identify and budget for trees requiring each type of maintenance, and keep track of work that is completed; this is important because trees with priority maintenance requirements will change each year that work is completed or new work is identified.

Budget estimates for the priority maintenance work are provided in Tables 1 and 2. Some of the maintenance work has already been completed by the Town but these estimates show that budgeting approximately \$60,000 per year for the next three years will cover the priority maintenance identified in the tree inventory. Given that the Town has been roughly spending \$100,000 annually in maintaining its urban forest, the priority maintenance could be covered under current budget allotments since in the past roughly \$23,000 has been spent on planning and planting efforts with the remaining \$77,000 devoted to pruning, maintenance, removal, and disposal of debris. As noted in a previous section, this estimate does not reflect special projects such as the Carrier Park project. Current budget expenditure breakdown is presented in Figure 1.

TABLE 1.  
Priority tree removal cost estimates for completion over the next three years\*

Priority and Year of Completion	Number of Trees	Annual Cost	Total Costs
Priority 1 (Year 1)	25	\$11,250	
Stumps	25	\$ 3,750	
<b>Total Year 1</b>			<b>\$15,000</b>
Priority 2 (Year 2)	62	\$27,900	
Stumps	62	\$9,300	
<b>Total Year 2</b>			<b>\$37,200</b>
Priority 3 (Year 3)	96	\$43,200	
Stumps	96	\$14,400	
<b>Total Year 3</b>			<b>\$57,600</b>
Other Removals	45	\$20,250	
Stumps	45	\$6,750	
<b>Total Other Removals</b>			<b>\$27,000</b>
<b>Totals</b>	<b>228</b>		<b>\$136,800</b>

\*Cost estimates provided by the Town of Dewitt

TABLE 2.  
Priority pruning cost estimates for completion over the next three years\*

Priority and Year of Completion	Number of Trees	Total Costs
Priority 1 (Year 1)	3	\$900
Priority 2 (Year 2)	18	\$5,400
Priority 3 (Year 3)	97	\$29,100
<b>Total All Priority Pruning</b>	<b>118</b>	<b>\$35,400</b>

\*Cost estimates provided by the Town of Dewitt

## 2016 Cost Breakdown

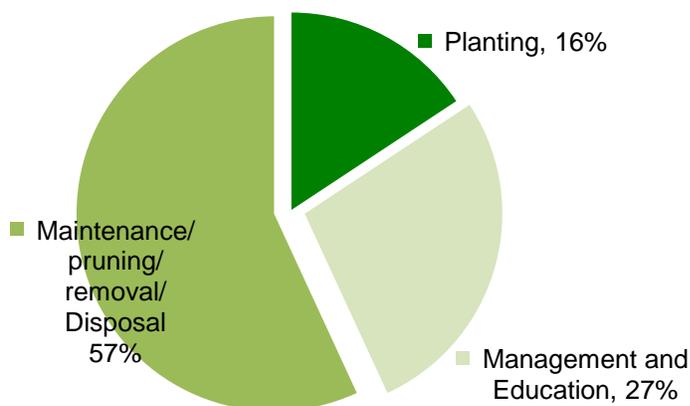


Figure 1.  
Current urban forest budget expenditures for 2016. Approximately \$100,000 was spent on planning, maintenance and education outside of special projects.

The majority of the roughly 200 trees (Tables 1 and 2) that are ranked priority three are low urgency removals or trees with clearance pruning needs. In general, clearance pruning has been absent in the Town even in areas with more traditional urban sidewalk and tree lawn structure. This was evident to the point that on some higher traffic streets, branch damage from traffic flow provides the existing clearance work. This is not surprising, since clearance pruning is usually addressed when trees are pruned on a rotational basis where every tree on a street is pruned on a five to ten year cycle. At the present time it would be reasonable for the Town to use the inventory to identify trees with clearance needs, or have Town Highway crews or contractors systematically drive streets and identify and prune trees with clearance issues. Clearance pruning could be started in DeWittshire and could be expanded to other areas based on tree density and need.

Emerald ash borer (EAB) damage is escalating in the Town, where the inventory identified 63 ash trees on the ROW. The Town protected a select group of these ashes with trunk-injected insecticides. Given the rate that EAB is moving and killing trees in other locations in western New York, the Town should be prepared to remove any ash in the ROW that was not protected with insecticides in the next two to three years. Ash trees deteriorate and become more hazardous to remove after they die, and can present a risk to citizens if they are left dead adjacent to the roadway. Therefore, the Town will have a limited time to remove the dead ash trees. Urban Forestry LLC highly recommends that the Town annually drive all roads and survey all parks and identify any dead ash and other species that require removal.

The boardwalk in Butternut Creek open space area was surveyed for priority maintenance. Urban Forestry LLC highly recommends that the boardwalk be closed to the public until the significant number of dead ash and other species are removed. The ash will continue to die, and some have been dead long enough that they may pose a threat to citizens using the site.

### Action Steps

Tree Condition and Priority Maintenance	Time Frame
Budget for and complete all priority maintenance identified in the tree inventory over the next three years	1-3 years
Provide administrative support to plan for and oversee priority maintenance	1-3 years
Develop tree pruning and maintenance specifications within the Technical and Specifications Manual for the priority maintenance work (see below).	1-3 years
Drive annually all streets in the Town to identify ash killed by EAB and for other priority maintenance	Annual
Enter all maintenance work into Tree Tracker	Annual

### 2.2.4 Tree Risk Assessment

Because of their potential to fail or break and cause damage to citizens or property, trees pose an element of risk to the Town if not properly maintained. The policies and practices the Town uses to manage this potential risk should be detailed in the Administration and Policy Manual. Urban Forestry LLC recommends at a minimum that the Town annually conduct risk assessments for trees on the public ROW and parks. This could include driving all the streets in the Town by a qualified individual and identifying high risk trees, or re-inventorying one-fifth of the Town each year to update the inventory data and identify priority maintenance. In addition, other important elements of risk management that could be identified in the Administration and Policy Manual are training requirements for risk assessors, time frames for completion of priority maintenance work, and policy to review requests from the public on removal of risk trees.

**Action Steps**

Tree Risk Assessment within the Administration and Policy Manual Training	Time Frame
Identify requirements for any individuals that conduct tree risk inspections. Use of industry established tree assessment methods such as those provided in the International Society of Arboriculture's Tree Risk Assessment Qualification program and Best Management Practices are recommended.	1-3 years
Identify procedures, policies and practices to document risk inspection practices, training programs, and maintenance work.	1-3 years

**2.2.5 Diameter Distribution**

Diameter is a general proxy for tree age, and the diameter distribution in the Town indicates that in general there are relatively few large older street trees. The vast majority of the trees inventoried were less than 19 inches in diameter and relatively few trees are greater than 24 inches in diameter (Photograph 2). The inventory was not completed on several streets in the Onondaga Country Club area where a robust population of large diameter silver maples and other species were observed. If inventoried, these trees would have been added to the percentage of larger trees in the inventory.

The general absence of large diameter trees in the Town is probably related to some degree to past disturbances that have eliminated larger trees (such as Dutch elm disease and the wind storm of 1998) and to the absence of a sustained replanting program in past decades.



Photograph 3. This very large diameter (58 inches at 4.5 feet off the ground) bur oak street tree in the Town is one of relatively few large trees on the public ROW. An important goal is therefore to plant, maintain and protect trees along streets that are large at maturity.

**Action Steps**

Diameter Distribution	Time Frame
Develop policy in the Administration and Policy manual that prohibits removal of healthy trees and identifies the specific reasons street trees will be removed.	1-3 years
Strengthen the Town Code to increase fines for unlawful removal of street trees	1-3 years
Plant trees that are large in size at maturity on all sites with adequate growing space	Annual

### 2.2.6 Rotational or Non-Priority Maintenance

The Town has initiated tree planting programs that have resulted in over 500 new trees in the past several years. These trees will require maintenance over their lives, starting with training (structural pruning). The inventory identified 363 trees with "young" or training pruning needs. This pruning is typically done on a three-year cycle to establish branch structure and to eliminate defective branching patterns early in the life of the tree. Delaying this critical maintenance often contributes to the shortened life span of urban trees.

Rotational pruning of established trees would be a future goal of the urban forestry program in areas with traditional urban street and sidewalks, where street tree densities are adequate to justify pruning individual trees over their life, and where tree planting programs are established in the future. Rotational pruning could be started in the Dewittshire and expanded to other areas of the Town based on tree density and need. Training citizens to prune and maintain young trees has been identified as a task for the Town's Tree Committee.

#### Action Steps

Rotational Maintenance	Time Frame
Budget for and provide annual, planned, arboricultural maintenance to street trees in highly managed areas	Annual
Provide structural pruning for young trees on a three-year rotation and mature trees on a five-year rotation according to specifications in the Technical and Specifications Manual (see below)	Annual
Use the Tree Committee for outreach to train citizens on young tree pruning and maintenance	1-3 years
Develop tree pruning and maintenance specifications within the Technical and Specifications Manual	1-3 years

## 2.3 Comprehensive Goal 3 >> Quantity

Increase DeWitt's street tree stocking 20% over 2015 levels by 2020 with the intent of increasing species diversity and overall canopy cover in each management area each year by targeting areas of the Town with low canopy cover and high availability of planting space.

### 2.3.1 Background

Significant research supports the necessity for tree-lined streetscapes as a default design rather than a luxury item to meet the needs generated by the effects of global climate change, the concern about energy conservation, and the desire for livable communities. However, the tree inventory clearly showed that the Town has relatively low tree densities on the publicly managed ROW. The Town also has relatively few streets with sidewalks where trees are typically planted and managed within an urban forestry program. Only 15% of the sites that were inventoried had sidewalks. The locations with the highest density of traditional urban street trees are Dewittshire and surrounding area, neighborhoods near Lemoyne College, neighborhoods adjacent to the City of Syracuse, and along the main street in Jamesville.

Street tree density in the Town is less than 20 trees per mile (exact density is unknown since not all streets and trees were inventoried, but 20 trees per mile is likely a high estimate). In comparison, municipalities with more traditional street designs may have upward of 100 or more trees per mile. The low tree density is partially due to the substantial vacant, industrial and commercial land use areas where trees were never planted. These industrial and commercial areas in the Town generally also have low tree canopy cover on private property, and moderate to low amounts of space for planting on the ROW.

The Town also has a large number of streets with a suburban "curvilinear" street design. Some of these streets have traditional street tree populations even though they lack sidewalks (Photograph 3L). The majority of these streets were not planted with trees when they were originally developed and were not subsequently planted by the Town (Photograph 3R). As a result the ROW was often planted by citizens, as evidenced by the high number of species that are not typically used in traditional ROW street tree programs such as Norway and blue spruce, pines, and arborvitae.

However, the low street tree densities in most cases do not reflect overall canopy cover, as many of the neighborhoods with curvilinear streets have high canopy cover from trees planted in front yards, or trees from natural stands just off the ROW. In some cases the presence of these trees precludes reasonable planting of a tree on public property.



Photograph 4L. Left | Some areas in the Town lack sidewalks and a tree planting strip, but have been planted with street trees.

Photograph 4R. Right | Many areas in the Town have no sidewalks and were never planted to street trees after they were developed.

### 2.3.2 Street Tree Stocking and Density

Urban Forestry LLC drove and visually assessed the vast majority of the Town streets that were not formally inventoried and generally classified each of these areas based on existing tree canopy cover and availability of planting sites. We observed the following:

- Some areas of the Town have high canopy cover from private trees and low potential for trees on the ROW due to existing trees or lack of space
- Some areas of the Town have high canopy cover but still have moderate or high amounts of space for tree planting in the ROW
- Some areas of the Town have moderate or low canopy cover and moderate or high available space for tree planting

With the exception of a few areas such as Dewittshire and Jamesville, tree density on the ROW is low in most areas of the Town of DeWitt. The current planting program for the Town has been mostly grant-driven and used to satisfy citizen request for trees. In some cases, trees have been planted off the ROW as allowed by funding agencies.

The Town is in a position to decide whether it will continue the current tree planting approach or initiate increased tree planting. Higher levels of tree planting will require increased planning, funding, administration, and maintenance to implement successfully. Public education will also be a critical aspect of any planting program, as initiating new planting programs in areas that traditionally do not have trees can meet with resistance from the public. Public support of tree planting is critical: the public can assist with maintenance such as watering if they support the program or adversely affect the success if they damage or remove planted trees.

The first step for the Town if it decides to substantially increase tree planting is to prioritize the areas for the program. The tree inventory identified a large number of planting sites in the Town. It seems reasonable to focus on areas that have a large numbers of available planting sites with low existing overall tree cover. Given this as a guiding principle, the greatest need for planting is in the Franklin Park and Parkhill areas of the Town where such conditions exist. Other areas that could be targeted are those being developed with new residential sites and have wide-open ROWs for tree planting.

Systematic tree planting in these and other areas would mean planting higher densities of trees on individual streets to gain the most efficient use of planning efforts, funding and oversight, and to efficiently maintain planted trees. This will require substantially higher levels of funding, planning, and administration than currently exist. Planting trees without means to provide follow-up maintenance (watering, pruning, removal of stakes) is a potential large waste of taxpayer dollars.

### Action Steps

Street Tree Stocking and Density	Time Frame
Increase tree density on the ROW by 20% over current levels	5 - 10 years
Identify primary areas in the Town for these new plantings	Annual
Establish budgets for annual planting and post installation maintenance that match tree planting goal	Annual
Engage the Town's Tree Committee for support of the tree planting program	Annual
Provide administrative support and oversight for the tree planting	Annual
Develop planting specifications including those for post-installation watering and pruning within the Technical Specifications Manual (see below)	1-3 years
Conduct adequate site evaluation and species selection for each tree planted using methods identified in the Technical Specifications Manual.	Annual

### 2.3.3 Species Diversity

The inventory clearly showed that the Town should categorically avoid planting any more maples (*Acer*) species. Over 42% of the trees on the ROW are maples, with the majority being Norway and sugar maples. Further, additional planting of small stature maples such as hedge and other species used for planting under primary electrical wires should be stopped. The potential impact of Asian long-horned beetle in DeWitt is significant given that maples are a primary host of this invasive, destructive insect. Observations made during the inventory indicate that the proportion of maples species on private property in urban and suburban areas is at least as high as it is on the ROW. Development and distribution of educational materials that support the avoidance of further maple planting in the Town should be considered.

Some sources in urban forestry suggest that to avoid catastrophic losses from pests or other causes that no more than 5% of any population should be in any single species and 10% in any particular genus. The maples and spruces are the only species/genera that violate this general rule in DeWitt.

The inventory identified over 100 species on the ROW of the Town, indicating a large potential list of species that might be suitable for planting. Given the small number of oaks, lindens, buckeye, tuliptrees, sycamore and planetree, katsura, coffeetree and many other desirable species there is an ample selection of trees to choose from. The Town Code directs the management plan to identify species for planting, and a recommended planting list is present in the Site Plan Design Guidelines. A recommended species list is provided in Appendix E. The same approved planting list should be used for Town street tree planting as for the Site Plan Design Guidelines, although individual species may not be appropriate for both locations and would need to be designated as such.

We recommend developing a planting list for the Town that would reside in the Technical Specifications Manual. In all cases, species selection should be based on a thorough site evaluation that considers root growing space, soil drainage and pH, overhead and underground utilities, and general character of the street and existing plantings. Judicious selection of species and careful site evaluation is particularly important in the Town given that the soils in the northern part of the DeWitt are typically poorly drained and may limit use of some species in the ROW.

**Action Steps**

Species Diversity	Time Frame
Maintain a current street tree species planting list for the Town within the Technical and Specifications Manual for street, park and Site Plan Design locations	1-3 years
Prohibit any additional planting of maple ( <i>Acer</i> ) species	Annual
Develop and distribute educational materials identifying the need to plant species other than maples	1-3 years
Increase overall species diversity through the use of species that are adapted to local soil and climate conditions	Annual

## 2.4 Comprehensive Goal 4 >> Education & Outreach

Each year increase the percentage of Town residents who accept street tree plantings and care responsibilities through heightened outreach efforts such as workshops and public announcements that focus on high priority or targeted planting areas in the Town.

### 2.4.1 Background

Traditional urban forestry practices are evidenced in DeWittshire and a few other residential neighborhoods where over the past several decades street trees have been planted and maintained resulting in relatively high street tree densities and tree cover. The most significant challenge is to expand the tree planting effort to other areas of the Town with lower tree cover and no sidewalks, and to gain acceptance for planting on public property in these areas.

### 2.4.2 Education and Outreach

The Town has designated that a primary function of the Tree Committee is to provide assistance with education and outreach. This is an important need in the Town as successful tree programs are based on public support and participation. In fact, increasing citizen awareness and interaction can increase the financial support and commitment the Town applies to the urban forestry program.

#### Action Steps

Education and Outreach	Time Frame
Utilize the Town's Tree Committee in all aspects of the education and outreach effort	Annual
Provide public education programs and materials to support any tree planting initiatives in targeted management areas	1-3 years
Identify targeted areas in the Town for new plantings and develop public support through workshops and mailing using the Tree Committee	1-3 years

## **2.5 Comprehensive Goal 5 >> Protection & Enhancement**

By 2020, protect and enhance DeWitt's urban forest on private and public lands and rights of ways by reviewing and updating existing ordinances, and incorporating urban forestry principals and industry standards into guiding management documents including landscape and development design guidelines and the Town's Comprehensive and Sustainability Plans.

### **2.5.1 Background**

As indicated in the Introduction, Town Code Chapter 175 recognizes the contribution trees make to the environment and community, and establishes standards for tree planting, preservation and maintenance. The Code directs development of this Urban Forest Management Plan to guide and increase environmental quality in the Town.

Several other planning and guidance documents refer to or should refer to urban forest maintenance and planning including the Comprehensive Plan, the Sustainability Plan, and the Site Planning and Design Guidelines. Ideally, these documents should all identify and support urban forest management as a means to improve the quality of life in the Town. Any documents such as the Site Planning and Design Guidelines should ideally provide the same guidance for tree selection, planting and maintenance as is used in the Town for public trees.

### **2.5.2 Town Code**

As it stands, the Town Code Chapter 175 directs management policy and technical standards to be developed within this plan. The Code also identifies penalties for violating Chapter 175, and provides management guidance (for example B. Pruning and Maintenance in 175-3 General Provisions). Currently in the Town there are no specifications for urban forest maintenance practices (tree planting, pruning of different age class trees, tree protection during construction, tree inspection practices including risk assessment). In addition, training requirements and credentials have not been established for staff planning or working on trees in the Town.

Urban Forestry LLC recommends the following guidance for updating and conforming to requirements present in the Town Code for tree and urban forest management. We recommend that the technical maintenance information required by the Code to be included in this plan be developed within an Urban Forestry Technical and Specifications Manual (hereafter Technical and Specifications Manual). This approach will allow the Town to update this Technical and Specifications Manual as a living document so it reflects the most up-to-date management information without rewriting or changing the Urban Forest Management Plan; note that all American National Standards Institute (ANSI) for Tree Care Operations are updated and changed every 5

years. We also recommend that the Code be updated to reflect this change and to reflect other management changes that occur as a result of this plan.

### Action Steps

Town Code	Time Frame
Develop a Technical and Specifications Manual that addresses technical related topics and provides ANSI A300 referenced specifications for all arboricultural work for the Town	1-3 years
Update the Town Code to eliminate references to technical topics and direct authority for these topics to the Technical and Specifications Manual after it is developed	1-3 years
Update Town Code to strengthen fines and procedures for violation of Code infractions	1-3 years

### 2.5.3 Sustainability Plan and Comprehensive Plan

The Sustainability Plan and Comprehensive Plan ideally should specifically identify the benefits of urban trees in the Town and support the urban tree program with language and goals that support urban tree management. These Plans do support urban tree management in intent; for example, by identifying the importance of street tree planting in creating neighborhood character in the Comprehensive Plan as below:

*“one of the Town's strongest assets and that it is the Town's policy to "affirm existing neighborhoods by investing in elements that establish character and identity and enhance safety and convenience such as... street plantings etc., and to require developers of new neighborhoods to provide the same level of amenities”.*

In the Sustainability Plan, the urban tree management plan would be supported by such statements as:

*“The Town of DeWitt will provide leadership and pursue practical solutions to improve environmental sustainability in our community while reducing long term costs. The Town will adopt and support programs, policies and actions in pursuit thereof”.*

**Action Steps**

Comprehensive and Sustainability Plans	Time Frame
Include specific language that supports the urban forest management program in future Comprehensive and Sustainability Plans	5-10 years

**2.5.4 Site Plan Design Guidelines**

One of the best means for the urban forest management program to support the Comprehensive Plan and Sustainability Plan is in the Site Plan Design Guidelines, where current requirements have large impacts on the future environment and desirability of the Town.

The Site Plan Design Guidelines were adopted by the Town of DeWitt Planning Board on October 27, 2005 and last revised December 13, 2012. The Site Plan Design Guidelines provide the acceptable minimum for the protection of the health, safety, convenience, and attractiveness of the Town for new developments, and for changes to existing uses, sites, or structures. The guidelines address the design and construction of projects in the Town of DeWitt other than single-family dwelling units.

Section I, Street Trees, requires the planting of street trees to improve the aesthetic quality of the Town’s neighborhoods, moderate temperatures in the summer, and play a role in traffic calming. The approved species list needs to be updated to reflect the recommendations expressed in earlier sections of this plan.

For uniformity, recommended planting specifications and species, tree preservation practices during site development and construction, and arboricultural specifications should have the same technical specification as used elsewhere in the Town and in public trees. Requirements for planting (for example numbers of trees per unit area or site), preservation, and maintenance would be specified in the Site Plan Design Guidelines.

**Action Steps**

Site Plan Design Guidelines	Time Frame
Refer to the Technical and Specifications Manual for approved species, planting specifications, tree preservation, and maintenance specifications.	1-5 years
Specify planting, preservation, and maintenance requirements in the Site Plan and Design Guidelines	1-5 years

### **2.5.5 Stormwater Plan Management Program**

In response to the 1987 Amendments to the Clean Water Act (CWA), the US Environmental Protection Agency (EPA) developed Phases I and II of the National Pollutant Discharge Elimination System (NPDES) Storm Water Program. The Town of DeWitt meets the population threshold and density criteria regulated under Phase II of the Stormwater Program (minimum population density of 1000 people per square mile and located in urban areas with a population of 50,000 or more as defined the US Census Bureau). The Town of DeWitt Stormwater Management Program Plan was developed and implemented by the CNY Stormwater Coalition (CNYSC) Stormwater Management Program (SWMP Plan complies with Part IV.A. of the New York State Department of Environmental Conservation General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems, GP-0-10-002).

Stormwater runoff from impervious and developed surfaces carries large amounts of various pollutants to the surface waters of the United States. Among these pollutants are nutrients, silt and sediment, pathogens, oil/grease, metals, and floatables (debris and litter). Of particularly high concern to water bodies surrounding DeWitt are phosphorus, sediment, and pathogens.

Phosphorous is the primary nutrient of concern locally. Sources of phosphorous include fertilizer, human and animal waste, detergents, as well as decomposing leaves, grass clippings, and other plant materials that fall or are deposited on urban land. Silt and sediment are carried by stormwater into water bodies as a result of soil erosion. Urban tree cover reduces stormwater runoff and soil erosion and can help reduce phosphorus loading into local waterways if properly managed.

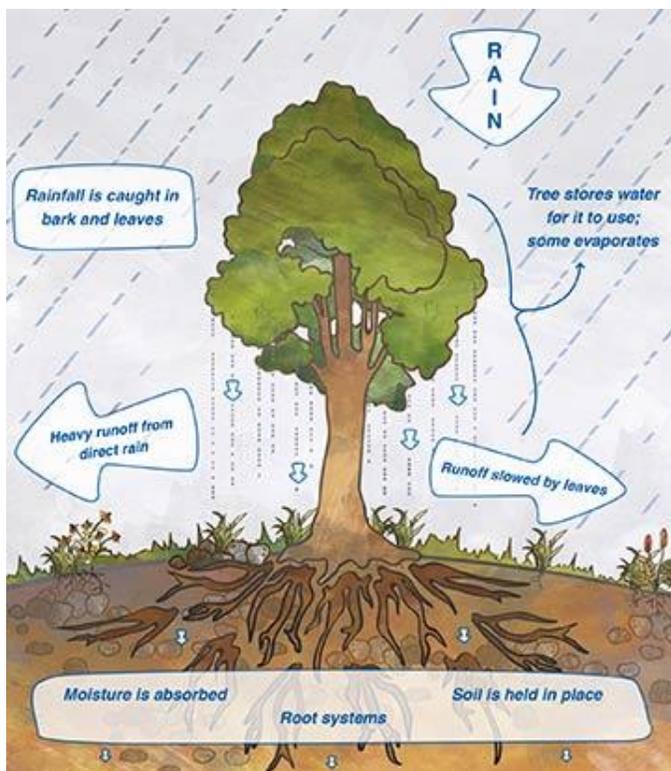


Figure 2.  
Urban trees provide multiple positive impacts on stormwater quality and quantity.

Phase II of the Federal Stormwater Final Rule identifies six (6) program elements—or Minimum Control Measures (MCM)—designed to reduce the discharge of pollutants to the maximum extent practicable. The six MCM's are: 1. Public Education and Outreach, 2. Public Involvement and Participation, 3. Illicit Discharge Detection and Elimination, 4. Construction Site Runoff Control, 5. Post-Construction Stormwater Management, 6. Pollution Prevention and Good Housekeeping of Municipal Operators.

Implementation of green infrastructure practices that includes a public outreach component and a thoughtful streetscape and parking lot design with suitable tree and other vegetative selections will help reduce stormwater pollutants and achieve MCM's. These practices are included in all or portions of Goals 1-5 in this plan in action steps that aim to improve and increase the urban tree canopy cover and its management, and in particular those goals that engage the public in the planting and maintenance of street trees.

**Action Steps**

Stormwater Plan Management Program	Time Frame
Engage citizen participation in street tree planting and maintenance through the efforts of the Town's Tree Committee as per Goal 1 Actions Steps	1-3 years
Increase street tree density as per Goal 2 Action Steps	1-3 years
Develop site planning and design documents that support reduced stormwater runoff using tree planting practices	1-3 years

## Appendices

### Appendix A >> State of the Urban Forest

#### Town History, Demographics, and Infrastructure

The Town of DeWitt, with 33.9 square miles and 124 miles of roads, sits in Onondaga County. The Town was formed in 1835, and lies adjacent to the City of Syracuse, the Villages of East Syracuse and Fayetteville, and several other municipalities. DeWitt population has grown from 10,563 in 1950 to 25,838 in 2010. The Town is often mentioned as a suburb of City of Syracuse, which belies that is larger in area than Syracuse, and hides its diverse nature as evidenced by its land use statistics (Figure 1). The Town contains large areas classified as residential, commercial, industrial and vacant land, along with measurable amounts of agricultural, open space and land used for public service.

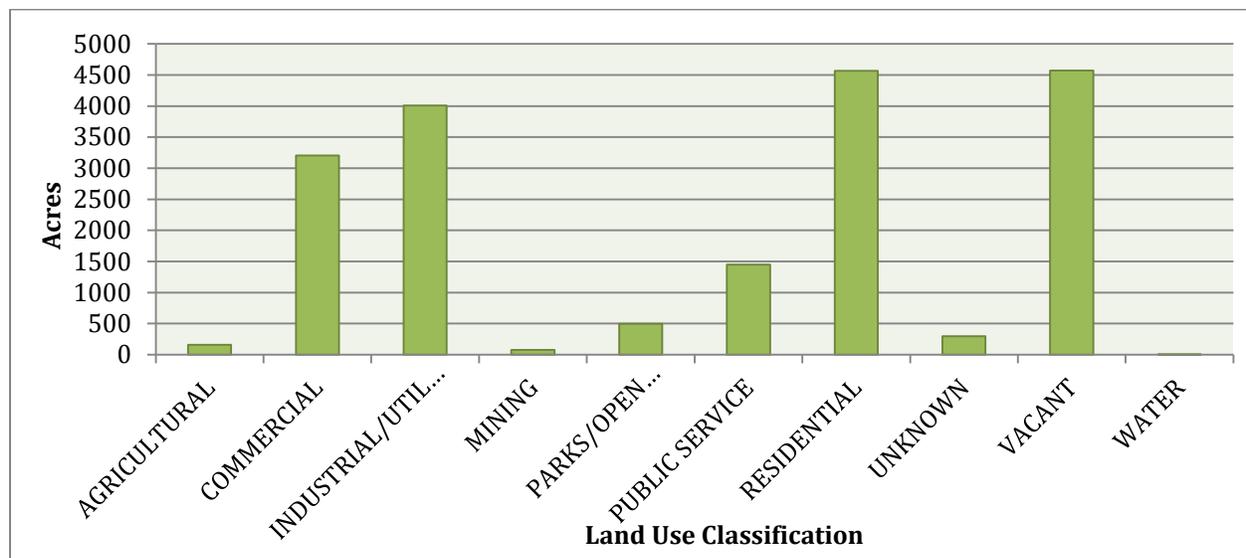


Figure 1.  
Land use in the Town of DeWitt by acres of classification. (Statistics provided Edward Hart, G.I.S. Program Manager, Syracuse–Onondaga County Planning Agency).

As described on the Town's website, DeWitt is in a prominent location being at the “crossroads” of New York State. The Town has ample industry and commerce that are supported by a regional airport, large rail yards, and the Route 90 east-west Thruway and north-south Route 81 interstate corridors. This location and the volume of interstate commerce also potentially escalate the Town's exposure to introduced tree pests such as emerald ash borer and Asian long horned beetle.

## Climate

Climate is a humid, modified continental type partially due to the Town's proximity to Lake Ontario. Annual precipitation is 38.5 inches, while average temperature low is 39 and high is 54. The Town is now in USDA hardiness zone 5b (-15 to -10 F minimum annual temperature), a change made in 2012 when the USDA updated its hardiness zone map. The Town was previously in zone 5a (-20 to -15 F), indicating warming winter temperatures.

The physical history of the Town was detailed by Reed (1960) and will only be briefly recounted here as it affects urban forest management. The Town is uniquely divided geographically, with the northern section being part of the Ontario Lake plain, and the southern section the Allegheny plateau. As such, the northern areas were part of the old Lake Iroquois that covered much of western New York. Drainage is north towards Lake Ontario via Butternut creek. Soils are of glacial origin and are generally poorly drained. This can affect tree species selection in northern sections of the Town because of the lack of drainage. This impact is evident in tree species that dominate in Franklin Park, Park Hill, and other northern sections of the Town.

The southern part of DeWitt is on the northern edge of the Allegheny mountain system and is "uneven, hilly and broken by small streams and valleys" (Reed, 1960). Elevated sections are made up of limestone bedrock and glacial drift soils that are better suited to upland tree species such as sugar maple, hickory and birch. Lower areas in the southern section are prone to fast accumulating runoff and "poor subsoil" conditions.

## Urban Forest Benefits

The Town of DeWitt, because it covers a large geographic area, has a significant amount of tree cover in a wide variety of natural and built ecosystem types, ranging from upland and lowland forests to variable canopy cover in the Town's urban forest. However, the importance of urban forest cover is that it is highly integrated with the daily functioning of the Town's citizens. As such, the environmental and health impact of the Town's urban forest resource to its citizens is truly magnified and significant. Further, urban forest canopy cover impacts the greater forest cover and environment of the Town through its direct effect on storm water runoff, air pollution avoidance and removal, and link between forested and other habitats.

Most communities and citizens inherently recognize the environmental and economic benefits of urban trees and generally cite them as reasons for their maintenance and planting. In the past twenty years evidence for the environmental and economic value of urban trees has been unequivocally established in the scientific literature, primarily through the efforts of the USDA Forest Service. Numerous publications have quantified the importance and value of urban trees. A recent study by Nowak et al (2013) found that the urban tree cover in Syracuse provided an equivalent of \$2.4 million dollars annually in ecosystem services from carbon sequestration, air pollution removal and reduction in building energy use. Similarly in Chicago the urban forest:

- Improved air quality by reducing health damaging ground-level ozone concentrations and other air pollutants. Urban trees removed 18,080 tons of air pollution annually and this air cleansing has a value to society of \$137 million.
- Removed and avoided the release of 61.9 million tons of the greenhouse gas carbon dioxide. The reduction of this greenhouse gas was valued at \$349 million.
- Reduced heating and cooling energy costs by \$44 million dollars.
- Intercepted precipitation and reduced large amounts of storm water runoff

Measurement of the environmental benefits of urban trees has allowed researchers to quantify the dollar value provided by these environmental services (Photograph 1). The value of these services is derived from costs associated with engineering or other methods used to improve the environment. Using this approach, investment in urban tree management has consistently shown to provide dollar value returns in excess of maintenance cost (McPherson et al. 2005). This approach also allowed the benefit to cost ratio of DeWitt's street trees to be determined for this management plan using the USDA's i-Tree program (i-Tree.org).



Photograph 1. Trees provide many environmental benefits to the citizens of DeWitt which have quantifiable monetary value.

In addition to the dollar value of the environmental services trees provide, urban trees also directly affect community economics as illustrated by the following examples:

- Residential real estate values are often 3-7% greater with trees in a yard and homebuyers are willing to pay a premium for denser, greener vegetation
- Trees can increase commercial property rental rates by 7%
- Reducing urban heat island effects can directly lower cooling costs and trees also reduce heating costs in winter
- Shaded pavement requires replacement less frequently
- Consumers are willing to spend 9-12% more in treed retail areas

Therefore, expenditures for maintenance of DeWitt urban forest return both environmental and economic benefits to residents that can be measured financially.

The environmental and economic benefits aside, the most important impact of street trees may be their impact on the physical and psychological health of citizens. Researchers have increasingly documented the critical importance of trees to the psychological, social, and physical health of urban dwellers (Photograph 1). They have shown that urban trees impact numerous aspects of human life, or in a sense trees provide “human health services” to residents. Where trees or access to natural settings are present, research has shown the following benefits:

- Increased desirability of streets for walking and increased time spent outside
- Greater connection with nature through wildlife presence, marking the change of season, and of softening urban hardscapes
- Improved speed of surgery and illness recovery
- Increased healing, shorter post-operative stays and reduced need for pain medications
- Lower crime rates
- Reduced violence and conflict in domestic relations
- Improved social ties in neighborhoods
- Reduced stress, anxiety and ADHD symptoms

A recent study (Donovan et al. 2013) highlighted the importance of these effects to urban dwellers’ psychological and physical health. In that study, respiratory illness and cardiac mortality rates were shown to increase significantly when trees were abruptly removed due to EAB infestation.

Given this evidence, one must conclude, based on a preponderance of research, that a significant impact and value of street and urban tree management in the Town is the subtle, daily contribution that trees make to the overall quality of everyday life of residents. This contribution, along with the measurable environmental and economic value provided by street trees, are the returns the Town receives for its investment in its urban tree resource.

### **Tree Inventory Data Collection Specifications**

Street trees and selected park tree locations were inventoried by Urban Forestry LLC in the summer of 2015. Urban Forestry LLC used the data collection specifications as required by the "Request for Proposal" issued by the Town for the inventory. Some of the attributes were modified to meet the Town's need. However, all modifications were approved by the Town prior to commencement of the inventory and are documented in Appendix B.

Definition of the tree inventory data collection attributes and specifications used in the inventory are presented here. These specifications are important because they memorializes what attributes were collected, the characteristics of those attributes, and the methods used in the field to collect the inventory data. Importantly, to keep the inventory data consistent, these specifications should be consulted when new data are entered into the tree inventory and when tree evaluations are made in the field on existing trees.

Each tree or site was located in the field using a high accuracy geographic positioning system (GPS) unit. The GPS latitude and longitude were mapped and added to the Town's geographic information systems (GIS) layer. The mapping was completed by Edward Hart, G.I.S. Program Manager, Onondaga County Planning Agency.

Identification of the data collection fields for the inventory and a brief description of their characteristic are provided below:

- Street name and address – physical property of the tree or site
- On street – street the tree was located on
- Side – odd or even side of the street
- Side of Lot – whether the tree or site was at the front, side or other location relative to the street address
- Tree number – for multiple trees or sites at a property numbered consecutively in the direction of increasing address numbers
- Management Area – four management areas were designated by the Town (Figure 1).
- Managed by – whether the tree or site was on public or private property or both

- Location – location of the tree or site in the landscape such in a tree planting strip or lawn.
- Land use – land use where the site is located
- Date inventoried and inventoried by
- Tree species – common name, and genus and species of tree
- Maintenance priority – maintenance priority ranking based on relative need of the maintenance present
- Maintenance type – pruning, planting or arboricultural maintenance specified for the tree or site
- Condition leaves–health of the tree based on assessment of leaves and other living above ground tree parts
- Condition of wood or tree structure–structural condition of the tree based on presence of decay and other defects.
- Tree diameter–trunk diameter measured at 4.5 feet off the ground
- Failure size–size of the tree part that might fail because of defects present.
- Wires–presence of electrical utility wires
- Hardscape damage–presence of damage to sidewalks from tree roots or trunk
- Rooting space–amount of rooting space based on nearest restrictions
- Observations–categorical observations about the tree or site.
- GPS coordinates–latitude and longitude of the tree or site.

After all field data were collected, it was quality controlled and then loaded into Tree Tracker tree inventory management software ([treetrackersoftware.com](http://treetrackersoftware.com)) for use by the Town in managing their street tree population. Tree Tracker allows the Town to record requests for service from the public and work histories that identify what trees have been maintained on the ROW.

The Town of DeWitt identified the street and park locations that were to be inventoried. A complete inventory of the Town was not attempted because funding was not adequate to inventory all the street miles. Urban Forestry LLC also used four person days to drive streets in the Town to locate populations of trees for inventory, identify priority maintenance, and generally classify neighborhoods as to canopy cover and potential for street tree planting based on availability of space in the ROW.

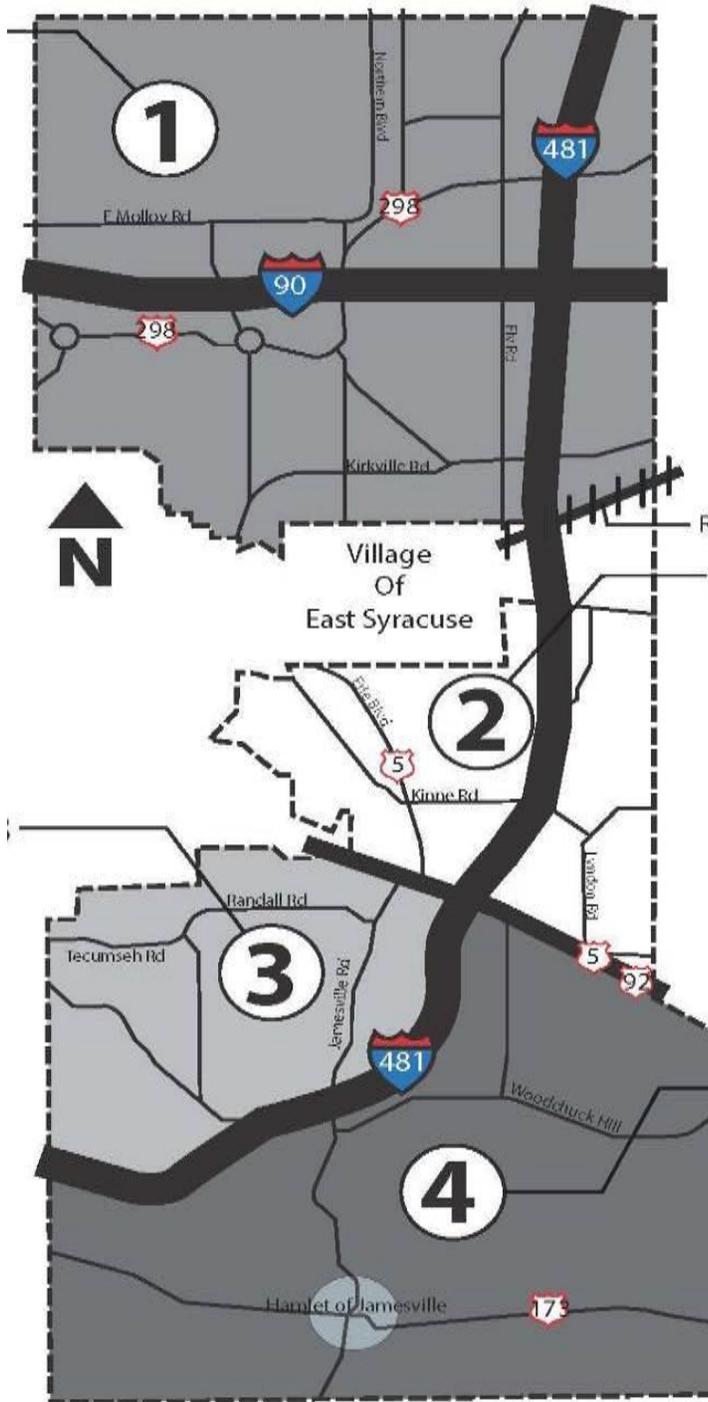


Figure 2.  
Management areas used in  
the tree inventory.

### Tree Inventory Results

The inventory categorized 4,720 total sites in the Town of DeWitt. Of these, there were 45 trees in park or open spaces that were inventoried at the request of the Town. Of the remaining 4675 sites along the streets, there were 17 stumps, 2801 potential planting sites, and 1812 sites with trees, and 45 sites with potential maintenance on private property because of their potential impact to the right of way.

### Number of Sites Inventoried

Based on the streets that were inventoried, the street tree stocking density in the Town is 39% (total sites with trees (1812) divided by total available sites (4630)). The actual density may be slightly higher because sites with multiple trees with similar maintenance requirements were inventoried as a group and the number in the group was noted in the comments field. This was primarily used for natural areas or other areas where individual tree information was not critical and therefore would not greatly affect the overall stocking density.

The majority of sites in the Town that were inventoried do not have sidewalks (all sites in Figure 3 except tree lawn). Sites with sidewalks (tree lawn) were only 15% of those that were inventoried.

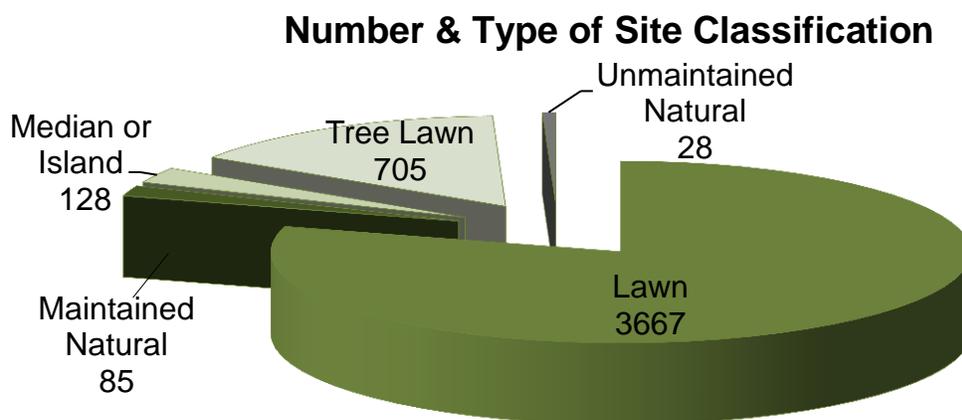


Figure 3. Sites with "tree lawn" have sidewalks and a traditional planting strip for trees.

### Species Diversity

The inventory found 110 different tree species in the ROW. Figure 4 provides species by common name that are greater than 1% percent of the total population. A listing of all species by scientific name, number of trees and percent of the total population is provided in Appendix C. Norway maple dominates the street tree population at 19% of the total, followed by sugar maple (8%), Norway spruce (7%), silver maple (6%), blue spruce (6%), red maple (6%), and crabapple (4%).

Of the sites not occupied by trees, 44% could potentially hold large tree species at maturity, 34% medium sized trees, and 21% small trees. There are substantially more planting sites in the Town than represented by the 2801 classified because a very conservative approach was used in the identification of plantings sites during the inventory.

### Tree Species by Common Name & Percentage of Total Population

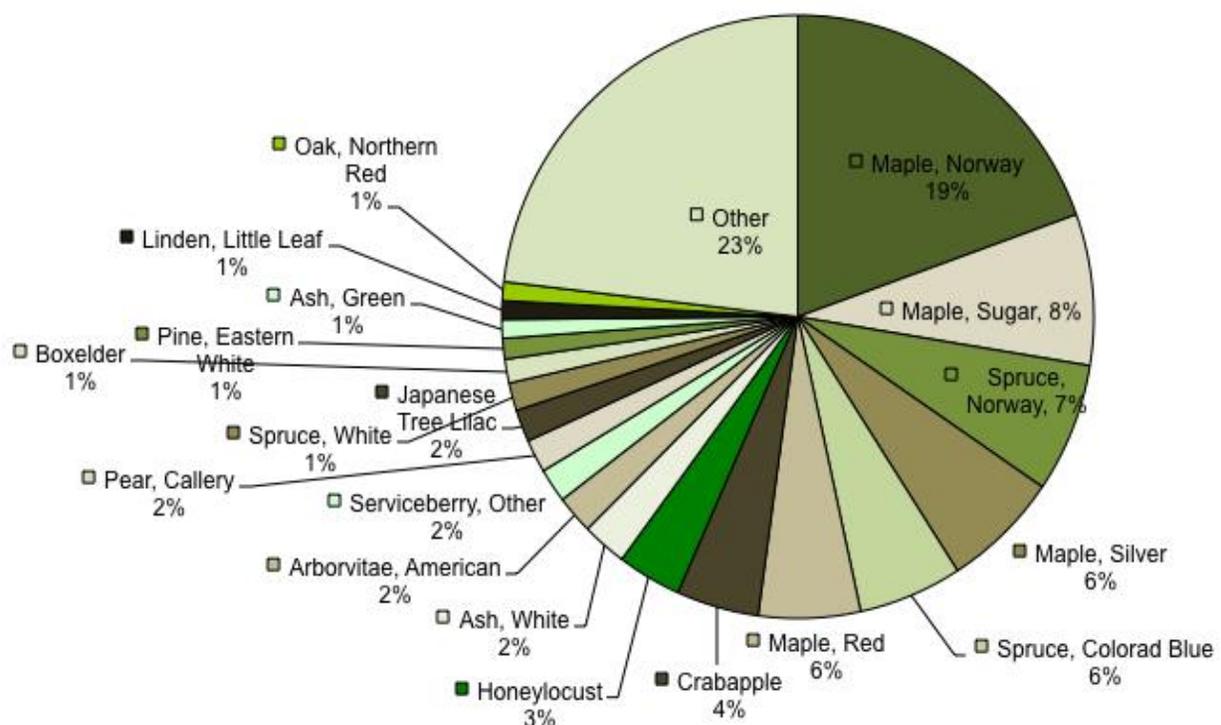


Figure 4. By tree genus, maples (*Acer*) are dominant at over 42% of the population, followed by spruce (*Picea*) at 14%, crabapple (*Malus*) at 5%, ash (*Fraxinus*), honeylocust (*Gleditsia*), cherry (*Prunus*) and pines (*Pinus*) at 3% of the total (Figure 5).

### Tree Species by Genus & Percentage of Total Population

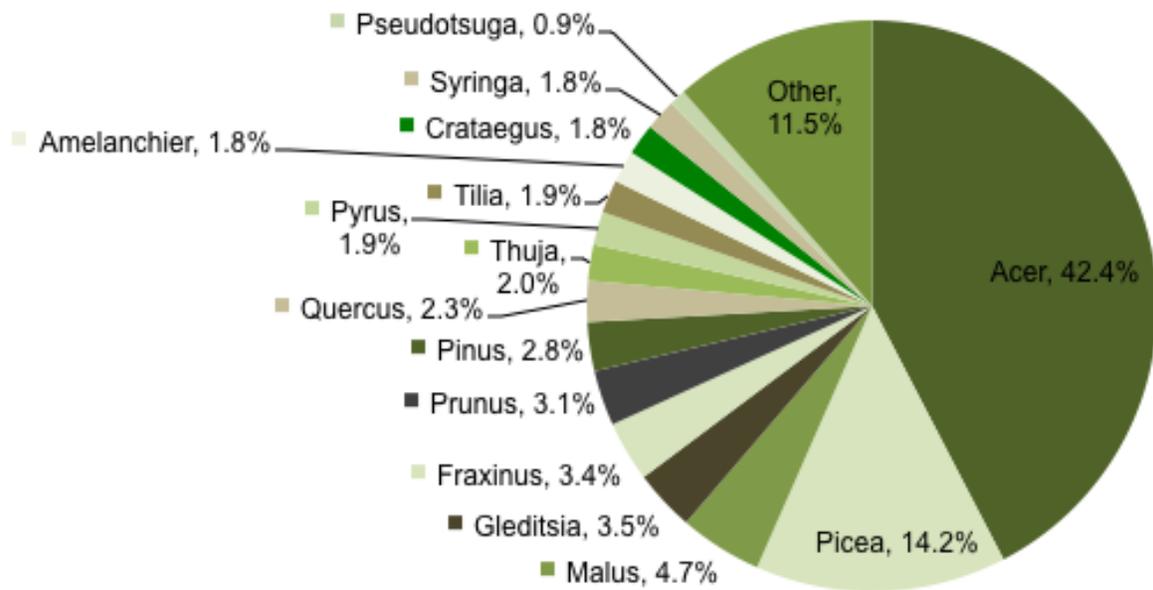


Figure 5. Tree species by genus and percentage of the total population for genera that are over 1% of the total population.

### Diameter Distribution

Diameter distribution in the Town is presented in Figure 6. The vast majority of the trees are small or moderate sized as 75% are less than 19 inches in diameter and 88% are less than 25 inches in diameter. There are relatively few trees in the largest diameter classes as 12% are greater than 25 inches in diameter and only 5% of the population is greater than 30 inches.

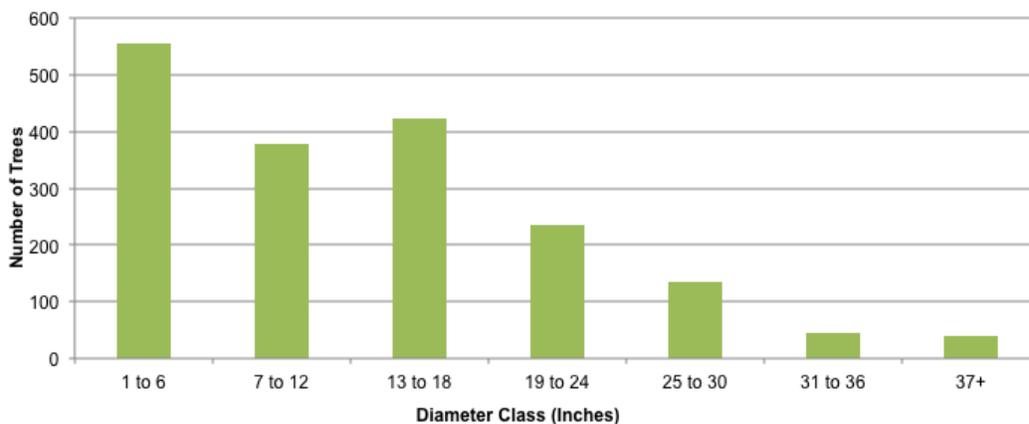


Figure 6. Diameter classification of trees on the ROW by six-inch diameter classes.

### Tree Condition or Health

Tree health in the Town was generally good (Figure 7). The vast majority (90%) of trees were rated in good or fair condition. Only 19 dead trees were identified on the streets that were inventoried. Structural condition, which was also classified was essentially the same as the condition of leaves with only slightly more trees in the fair and poor condition classes.

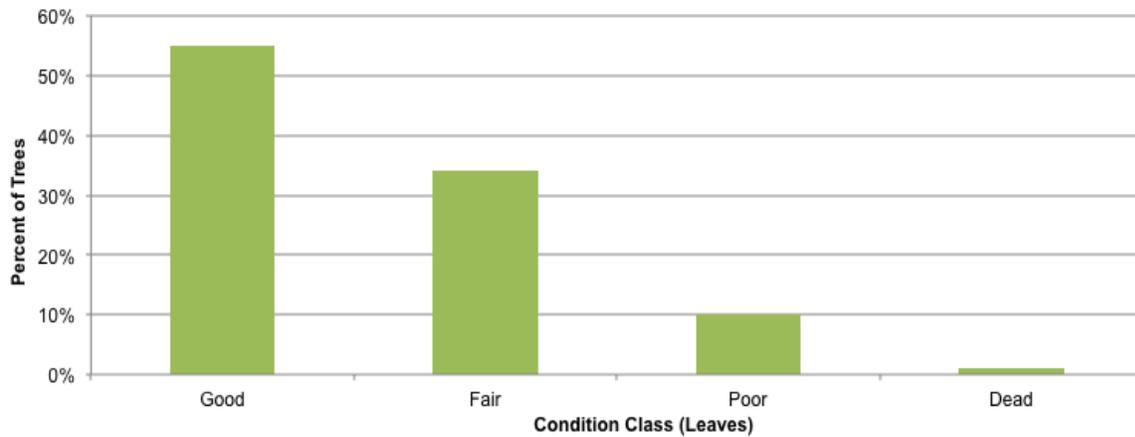


Figure 7. Tree health or condition for trees on the ROW as classified by condition of leaves.

### Tree Maintenance

The vast majority of the sites and trees that were inventoried were planting or routine pruning (Figure 8). Only 136 trees were identified for removal, 49 for pruning to reduce or clean the crown, and 88 trees for pruning to raise the crown for clearance (Table 2). There were 17 stumps that should be ground in the Town.

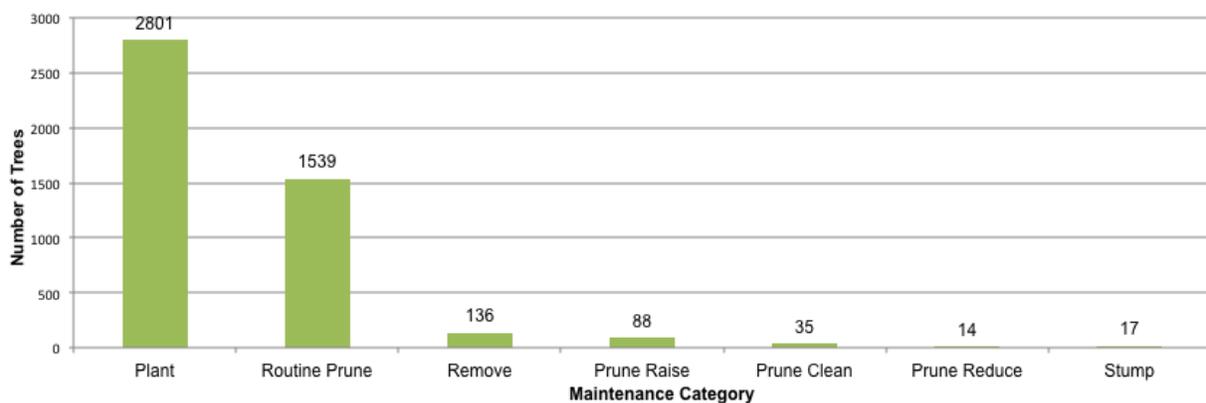


Figure 8. Maintenance needs classified in the tree inventory by number of sites or trees in each category.

Similarly, there was relatively low number of trees with priority maintenance (used only when maintenance was remove, or prune to clean, prune reduce or prune raise) (Table 2). Twenty two trees were priority one (highest), 78 were priority two, and 173 were priority three. The majority of the priority three trees were prune to raise for clearance (Table 1). Relatively few trees (363) were classified as requiring training because they were recently planted.

Table 1. Maintenance categories for trees on the street ROW and the assigned priority by maintenance type.

Maintenance Type	PRIORITY					Total
	Priority One	Priority Two	Priority Three	Routine	Young	
Prune Clean	3	16	16			35
Plant				2801		2801
Prune				1176	363	1539
Prune Raise	1	2	85			88
Prune Reduce	1	10	3			14
Remove	17	50	69			136
Stump				17		17
<b>Total</b>	<b>22</b>	<b>78</b>	<b>173</b>	<b>3994</b>	<b>363</b>	<b>4613</b>

### Parks and Open Spaces

One park (Franklin Park) and one open space (Butternut Creek boardwalk) were inventoried for priority maintenance work. The inventory of these areas showed that the Butternut creek boardwalk area contained a minimum of 11 trees for removal and Franklin Park contained 35 trees for removal. The Butternut creek boardwalk is surrounded by ash that are dead or dying from emerald ash borer and other species in poor condition or that are dead.

Franklin Park contained mainly declining Norway spruce that have reached their life expectancy and the trees recommended for removal are dead or are in poor condition. Some of the trees are large enough and close enough to roads or other areas of congregation that they were recommended for Priority Two removal.

### Environmental Benefits (i-Tree Streets)

Total annual economic benefits from the street tree population are presented in Figure 9. Total economic benefit by category and value are presented in Table 3. Total annual benefit for the street tree population is over \$200,000. Environmental and economic benefit details by benefit category and management area are presented in Appendix D.

**Total Annual Benefits, Net Benefits, and Costs for All Trees**

11/22/2015

Benefits	Total (\$) Standard Error	\$/tree Standard Error	\$/capita Standard Error
Energy	90,351 (N/A)	49.86 (N/A)	0.35 (N/A)
CO2	841 (N/A)	0.46 (N/A)	0.00 (N/A)
Air Quality	16,659 (N/A)	9.19 (N/A)	0.06 (N/A)
Stormwater	22,542 (N/A)	12.44 (N/A)	0.09 (N/A)
Aesthetic/Other	77,652 (N/A)	42.85 (N/A)	0.30 (N/A)
<b>Total Benefits</b>	<b>208,044 (N/A)</b>	<b>114.81 (N/A)</b>	<b>0.81 (N/A)</b>
<b>Costs</b>			
Planting	0	0.00	0.00
Contract Pruning	0	0.00	0.00
Pest Management	0	0.00	0.00
Irrigation	0	0.00	0.00
Removal	0	0.00	0.00
Administration	0	0.00	0.00
Inspection/Service	0	0.00	0.00
Infrastructure Repairs	0	0.00	0.00
Litter Clean-up	0	0.00	0.00
Liability/Claims	0	0.00	0.00
Other Costs	0	0.00	0.00
<b>Total Costs</b>	<b>0</b>	<b>0.00</b>	<b>0.00</b>
<b>Net Benefits</b>	<b>208,044 (N/A)</b>	<b>114.81 (N/A)</b>	<b>0.81 (N/A)</b>
<b>Benefit-cost ratio</b>	<b>0.00 (N/A)</b>		

Figure 9. Total benefits and costs and cost to benefits for the street tree population.

Table 2.

Total annual environmental benefit by amount and dollar value for publicly managed street trees. See Appendix D for breakdown by Management Area.

Benefit Type	Amount	Dollar Value
Energy Electric (MWh)	138.7	\$19,429
Energy (Gas-Therms)	50,370	\$70,922
CO2 Net Sequestered (lbs)	254766	\$841
CO2 Stored (lbs)	8,709,611	\$26,722
Air Pollutants-Total Removed (lbs)	3,192	\$16,659
Storm Water (Gallons)	2,817,724	\$22,542
Aesthetic/Other	N/A	\$77,652
<b>Total Annual</b>		<b>\$208,044*</b>

## Appendix B. >> Tree Inventory Data Collection Specifications

Street tree inventory data collection attributes and the data collection specification that was used to guide data collection in the field. "Tree Tracker Field Name" identifies how the field data is represented in the tree inventory management software used by the Town.

Tree Tracker Field Name	Allowed Input Values	Data Collection Specification
<b>Address Fields</b>		
Address	1-999999	Property Address: The house or property address as marked on the house or building. Properties with no address marking were assigned a logical number based on surrounding property addresses.
Street	Master Street List as provided by the Town of DeWitt	Street name for the property location as identified in the Town of DeWitt Master Street list.
Assigned?	Yes/No	Yes indicates that a street address number was absent on the property and the number in the database was assigned in the field.
<b>Location Fields</b>		
<i>On Street</i>	Town of DeWitt Master Street List	Street name where the tree or site is physically located as identified in the Town of DeWitt Master Street list. This field identifies trees or sites that were located on side streets that were different than the property address
<i>Side</i>	Odd	Odd is used for the side of the street with odd addresses.
	Even	Even was used for the side of the street with even addresses.
<i>Side of Lot</i>	F	When the tree was located at the front of the "On Street" property
	P	Park trees
	R	When the tree is located at the rear of the "On Street" property. All trees with a rear of street designation will have a different "On Street" than the "Street" where the tree is addressed
	S	When the tree was located on the side street intersecting the "On Street" of property address. All trees with a side of street designation have a different "On Street" than the "Street" where the

		tree is addressed.
	M	Median designation for trees that were growing in a median in the middle of the street. The nearest address on the odd or even side of the street was used for the address where medians are present.
<i>Tree #</i>	1-999999	This field numbers each tree when multiple trees or sites were present at an address. Tree and sites were numbered in the direction of increasing street address numbers.
<i>Area</i>	Area 1	Management Area 1 as designated by the Town and identified on the map in Figure 2.
	Area 2	Management Area 2 as designated by the Town and identified on the map in Figure 2
	Area 3	Management Area 3 as designated by the Town and identified on the map in Figure 2
	Area 4	Management Area 4 as designated by the Town and identified on the map in Figure 2
	N/A	No management area designation
<i>Managed By</i>	City	The site or tree trunk at ground level is on Town Right of Way (ROW). No specific ROW data by street segment was provided by the Town. ROW width was determined in the field using field markers such as water hydrants, utility poles, gas line access markers that indicate the tree was on the Town ROW
	Private	Tree or Site is off the Town ROW. Off ROW trees were inventoried only if they presented a clear and immediate threat to safe passage on a public street.
	Both	Both was used for trees whose trunk appeared to be on both ROW and private property.
	Unknown	Unknown was used when the ROW could not be determined in the field based on available information, or the tree or site appeared to require additional checking by the Town to determine ownership.
<i>Location</i>	Median or Island	Tree or Site was in a Median or Island
	Other Maintained	Tree or Site was in maintained natural

		area
	Other Un-maintained	Tree or Site was in an un-maintained natural area
	Treelawn	Tree or Site was in a tree lawn with a sidewalk or curb
	Well or Pit	Tree or Site was in a tree well or tree pit
	Yard	Tree or Site was in a residential area with no walks or tree lawn
<i>Land Use</i>	Industrial	Tree or Site was in an industrial area
	Commercial	Tree or Site is was in a commercial (non-shopping) area
	Park/Open Space	Tree or Site was in a park or open space
	Residential	Tree or Site was in a residential area
	Other	Tree or Site was in an undefined area
	School	Tree or Site was in a school area
	Shopping	Tree or Site was in a commercial shopping area
<b>Inventory Information</b>		
<i>Date</i>	Date in Month/Day/year format	Date site was inventoried
<i>By</i>	AGP; CJL or Town Staff Initials	Initials of inventory personnel, either AGP for Andrew G. Pleninger or CJL for Christopher J. Luley.
<b>Tree Attributes</b>		
<i>Species</i>	Common name, and genus and species designation for the Tree	The tree species occupying the site. All trees were identified to genus and species and a common name was provided. The exception was for trees where a species designation is difficult or not possible in the field, such as crabapple, or hawthorn. These trees are identified to genus. Planting sites were identified according to the appropriate size tree for the site in one of three categories as identified below in Maintenance Type.
<i>Maintenance Priority</i>	Priority one	Maintenance priorities were assigned to indicate the level of priority or need. Priority one was the highest priority maintenance. Priority was assigned based on site occupancy, and tree part size, and and/or severity of defect. This maintenance priority was used with "Clean", "Reduce", "Remove" or "Raise" maintenance types (see below). Maintenance priority does not indicate a risk rating or ranking but indicates relative need of maintenance

		for planning purposes.
	Priority two	Maintenance priorities were assigned to indicate the level of priority or need. Priority two was the next highest priority maintenance. Priority was assigned based on site occupancy, and tree part size, and and/or severity of defect. This maintenance priority was used with "Clean", "Reduce", "Remove" or "Raise" maintenance types (see below). Maintenance priority does not indicate a risk rating or ranking but indicates relative need of maintenance for planning purposes.
	Priority three	Maintenance priorities were assigned to indicate the level of priority or need. Priority three was the lowest priority maintenance. Priority was assigned based on site occupancy, and tree part size, and and/or severity of defect. This maintenance priority was used with "Clean", "Reduce", "Remove" or "Raise" maintenance types (see below). Maintenance priority does not indicate a risk rating or ranking but indicates relative need of maintenance for planning purposes.
	N/A	No maintenance priority associated with planting sites or stumps
	Routine	Routine tree maintenance need with no priority maintenance observable on the tree
	Young	Young tree training maintenance need for trees that can be pruned from the ground with hand tools.
<i>Maintenance Type</i>	Clean	Presence of observable on branches greater than 4 inches in diameter where a Clean type prune is recommended to remove such defects All Clean maintenance type will have a "Maintenance priority" associated with them.
	Plant	Plant was used for open sites were there was adequate space to hold a tree. Planting sites size were designated in the species field as follows: <u>Planting Site Large</u> - sites where no overhead electrical primary utilities were present and at least 10 feet or

		<p>more of tree lawn were available. Spacing between large planting sites was 40 feet when multiple planting sites were present at a location.</p> <p><u>Planting Site Medium</u> for sites where no overhead primary electrical were present and between 6 and 10 feet of tree lawn were available. Spacing between medium planting sites was 30 feet when multiple planting sites were present in a location.</p> <p><u>Planting Site Small</u> for sites with limited space where primary overhead electrical utilities were present and between 3 and 5 feet of tree lawn existed. Spacing between small planting sites was 20 feet when multiple planting sites were present in a location.</p>
	Prune	Used for normal maintenance pruning where the priority maintenance categories of "Clean", "Raise", "Reduce" or "Remove" were not specified for a tree.
	Raise	Raise was used when raising of lower branches is needed for clearance over streets or sidewalks. Raising was specified when "Clean" or "Reduce" maintenance requirement were not present and when raising is need to achieve clearance of 13 feet 8 inches over streets or 8 feet over sidewalks. Trees with "Raise" maintenance type were assigned a "Maintenance Priority"
	Remove	Remove indicates a tree removal was recommended and was designated when defects were present such that pruning cannot would not remediate the defect or where pruning will require removal of more than 1/3 of the live crown area to remove the defect. Tree removal was designated when trees were declining in biological health such that continued decline and removal was expected in the near future. All remove maintenance type were assigned a maintenance priority.
	Reduce	Reduce was a pruning prune type that was used for trees that have defects

		where reduction pruning was determined to be useful as a means to reduce wind or other load on defects present in the tree. All reduce maintenance types were assigned a maintenance priority.
	Stump	Stumps are present. Stump will be designated in the Tree Species and the diameter will represent the diameter across the face of the stump.
	Thin	Thin will not be used in the inventory
	Train	Pruning of young or recently planted trees that can be pruned from the ground with hand tools
<i>Condition Wood</i>	Dead	No live tissues remaining on the tree
	Fair	Fair structural health where observable defects were present but the defects appeared relatively stable at the time of the inspection.
	Good	Good structural health where no obvious defects were present or defects were present that appeared to be stable at the time of inspection.
	N/A	Not Applicable- used for planting sites or stumps
	Poor	Poor structural health where single or multiple observable defects were present that appeared relatively unstable at the time of inspection
<i>Condition Leaves</i>	Dead	No live tissues remaining on the tree
	Fair	Fair functional or biological health where decline was beginning as evidenced by reduced growth rate, small branch dieback, and/or reduced foliar size, color, or density
	Good	Good functional or biological health where growth rate was normal for the species, branch dieback was generally absent, and foliar color, size and density were normal for the species.
	N/A	Not Applicable- used for planting sites or stumps
	Poor	Poor functional or biological health where obvious decline were present as evidenced by significantly reduced growth rate, significant small and/or large branch dieback, and/or significantly reduced foliar size, color or density.
<i>Diameter</i>	1-999	Diameter-breast-high (DBH) measured

		at 4.5 feet off the ground with a Biltmore stick or diameter tape. Multi-stemmed trees were measured below the separation of the trunks where the measurement reasonably estimates tree size. Adjustments to diameter measurement on multi-stemmed trees measured below 4.5 feet was made in some cases based on field judgment.
<i>Failure Size</i>		
	04-12	Diameter inch of part most likely to fail, only rated on trees with Priority one, two or three maintenance priority and Clean, Raise, Reduce or Remove maintenance types.
	13-24	Diameter inch of part most likely to fail, only rated on trees with Priority one, two or three maintenance priority and Clean, Raise, Reduce or Remove maintenance types.
	25-36	Diameter inch of part most likely to fail, only rated on trees with Priority one, two or three maintenance priority and Clean, Raise, Reduce or Remove maintenance types.
	37+	Diameter inch of part most likely to fail, only rated on trees with Priority one, two or three maintenance priority and Clean, Raise, Reduce or Remove maintenance types.
	N/A	Not applicable, and used on trees with Routine, Young or Plant maintenance type
<b>Site Attributes</b>		
<i>Wires</i>	Yes	Single or three phase primary overhead electrical wires are present
	No	No primary overhead electrical wires present
<i>Hardscape Damage</i>	Yes	Damaged curb or sidewalk where the lifting is more than one inch from the existing surface and where the damage is due to a tree present on the site.
	No	No damage
<i>Root Space</i>	1-99	Narrowest restriction in feet or 99 for no restrictions.
<i>Observations</i>	Remove Hardware	Staking or guying material needs

((Multiple Select)  (Add or subtract as needed)		removal
	Mulched Improperly	Tree was improperly mulched
	Planted Improperly	Tree was improperly planted
	Pruned Improperly	Tree was improperly pruned
	Pest Problem	Disease or insects present
	Mechanical Damage	Tree damaged by equipment
	Cavity/Decay	Cavity or decay present
	Root Problem	Root damage, girdling, or decay
	Grate/Guard	Inspect grate/guard annually for girdling
	Poor Location	Not a good site for a tree
	Re-inspect	Re-inspect annually
	Underground Utilities	Underground utilities present
	Memorial Tree	Tree planted in memory or dedication
Notes	Text Field	Open field for any notes
X-Coordinate	Number w/ decimal	Latitude / NAD_1983StatePlane_NY-CF
Y-Coordinate	Number w/ decimal	Longitude / NAD_1983StatePlane_NY-CF
Site ID	Number 1-25000	Unique Tree/Site serial number added at the end of the tree inventory

### Appendix C. >> Tree Species by Common Name and Percent and Number of the Total Population Identified in the Tree Inventory

Common Name	Number	Percent
Maple, Norway	351	19.4
Maple, Sugar	146	8.1
Spruce, Norway	125	6.9
Maple, Silver	115	6.3
Spruce, Colorado Blue	102	5.6
Maple, Red	100	5.5
Crabapple	81	4.5
Honeylocust	63	3.5
Ash, White	44	2.4
Arborvitae, American	37	2.0
Serviceberry, Other	33	1.8
Pear, Callery	32	1.8
Japanese Tree Lilac	31	1.7
Spruce, White	27	1.5
Boxelder	23	1.3
Pine, Eastern White	20	1.1
Ash, Green	18	1.0
Linden, Little Leaf	18	1.0
Oak, Northern Red	18	1.0
Douglas Fir	17	0.9
Hawthorn, Other	17	0.9
Pine, Austrian	17	0.9
Linden, American	16	0.9
Cherry, Other	15	0.8
Cottonwood, Eastern	14	0.8
Redbud, Eastern	13	0.7
Maple, Hedge	12	0.7
Pine, Scotch	12	0.7
Tulip Tree	12	0.7
Eastern Redcedar	11	0.6
Cherry, Black	10	0.6
Hawthorn, Cockspur	10	0.6
Oak, Swamp White	10	0.6
Walnut, Black	10	0.6
Birch, River	8	0.4
Black Locust	8	0.4
Cherry, Kwanzan	8	0.4
Oak, Bur	8	0.4
Amur Maackia	7	0.4
Buckthorn, Other	7	0.4
Dogwood, Flowering	6	0.3
Elm, Siberian	6	0.3
Hornbeam, European	6	0.3
Cherry, Canada Red Flowering	5	0.3

Common Name	Number	Percent
Eastern Hop Hornbeam	5	0.3
Eur. Smoke Tree	5	0.3
Fir, Balsam	5	0.3
Kentucky Coffeetree	5	0.3
Maple, Amur	5	0.3
Maple, Japanese	5	0.3
Plum, Purple Leaf -Thundercloud	5	0.3
Apple, Common	4	0.2
Catalpa, Northern	4	0.2
Cherry, Yoshino	4	0.2
Ginkgo	4	0.2
Hackberry	4	0.2
Hardy Rubber Tree	4	0.2
Hawthorn, Washington	4	0.2
Hemlock, Eastern	4	0.2
Hickory, Pignut	4	0.2
Larch, European	4	0.2
Maple, Armstrong	4	0.2
Oak, Pin	4	0.2
Rose-of-sharon	4	0.2
Beech, European	3	0.2
Birch, European White	3	0.2
Cherry, Sargent-Accolade	3	0.2
Dogwood, Cornelian Cherry	3	0.2
Elm, American	3	0.2
Elm, Other	3	0.2
Hickory, Bitternut	3	0.2
Katsura Tree	3	0.2
London Planetree	3	0.2
Maple, Other	3	0.2
Mulberry, White	3	0.2
Picea, Other	3	0.2
Sycamore, American	3	0.2
Cherry, Sour	2	0.1
Chokecherry, Shubert	2	0.1
Goldenrain Tree	2	0.1
Maple, Paperbark	2	0.1
Alder, European	1	0.1
Blackgum	1	0.1
Buckeye, Ohio	1	0.1
Butternut	1	0.1
Cherry, Higan-pendla	1	0.1
Cherry, Sweet Mazzard	1	0.1
Chestnut, Chinese	1	0.1
Cucumber Tree	1	0.1
Dawn Redwood	1	0.1
Hawthorn, Winter King	1	0.1

Common Name	Number	Percent
Hickory, Shagbark	1	0.1
Hornbeam, Upright European	1	0.1
Horsechestnut	1	0.1
Japanese Tree Lilac-Ivory Silk	1	0.1
Magnolia, Other	1	0.1
Maple, Miyabe	1	0.1
Maple, Sugar-Columnare	1	0.1
Mountain Ash, European	1	0.1
Oak, Other	1	0.1
Oak, Shingle	1	0.1
Olive, Russian	1	0.1
Peach	1	0.1
Pear, Callery-Chanticleer	1	0.1
Pear, Common	1	0.1
Pine, Other	1	0.1
Pussy Willow	1	0.1
Spruce, Black	1	0.1
Sweetgum	1	0.1
Willow, Weeping	1	0.1
<b>Total</b>	<b>1812</b>	<b>100</b>

### Appendix D. >> Environmental and Economic Benefits by Management (Zone) Area and Type for Street Trees

#### Annual Aesthetic/Other Benefits of All Trees by Zone

11/23/2015

Zone	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Zone 2	15,394	(N/A)	18.6	19.8	45.68
Zone 3	30,556	(N/A)	38.9	39.3	43.34
Zone 4	19,767	(N/A)	25.7	25.5	42.51
Zone 1	11,935	(N/A)	16.8	15.4	39.13
Citywide total	77,652	(N/A)	100.0	100.0	42.85

#### Annual Air Quality Benefits of All Trees by Zone

11/23/2015

Zone	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total Standard (\$)	Standard Error	% of Total Trees	Avg. \$/tree
	O <sub>3</sub>	NO <sub>2</sub>	PM <sub>10</sub>	SO <sub>2</sub>		NO <sub>2</sub>	PM <sub>10</sub>	VOC	SO <sub>2</sub>								
Zone 2	227.1	100.7	121.2	44.3	2,666	304.8	19.7	11.6	158.5	2,141	-173.6	-401	814.2	4,406	(N/A)	18.6	13.07
Zone 3	259.4	112.8	131.3	45.5	2,958	397.0	25.7	15.3	202.3	2,775	-112.2	-259	1,077.0	5,474	(N/A)	38.9	7.76
Zone 4	208.7	91.5	108.0	38.2	2,408	305.5	19.8	11.7	156.8	2,140	-116.0	-268	824.2	4,280	(N/A)	25.7	9.20
Zone 1	124.9	54.8	64.5	22.8	1,440	175.6	11.4	6.7	91.1	1,233	-74.6	-172	477.1	2,500	(N/A)	16.8	8.20
Citywide total	820.0	359.7	425.0	150.9	9,472	1,182.9	76.6	45.4	608.6	8,289	-476.5	-1,101	3,192.5	16,659	(N/A)	100.0	9.19

#### Stored CO2 Benefits of All Trees by Zone

11/23/2015

Zone	Total Stored CO2 (lbs)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Zone 2	2,295,483	7,575	(N/A)	18.6	28.3	22.48
Zone 3	2,295,007	7,574	(N/A)	38.9	28.3	10.74
Zone 4	1,995,697	6,586	(N/A)	25.7	24.6	14.16
Zone 1	1,511,424	4,988	(N/A)	16.8	18.7	16.35
Citywide total	8,097,611	26,722	(N/A)	100.0	100.0	14.75

#### Annual CO Benefits of All Trees by Zone

11/23/2015

Zone	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total Standard (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Zone 2	82,154	271	-17,337	-4,866	-16	0	0	59,951	198	(N/A)	18.6	23.5	0.59
Zone 3	126,514	417	-23,202	-6,184	-20	0	0	97,127	321	(N/A)	38.9	38.1	0.45
Zone 4	83,987	277	-19,145	-5,016	-17	0	0	59,826	197	(N/A)	25.7	23.5	0.42
Zone 1	50,403	166	-9,730	-2,811	-9	0	0	37,862	125	(N/A)	16.8	14.9	0.41
Citywide total	343,057	1,132	-69,414	-18,877	-62	0	0	254,766	841	(N/A)	100.0	100.0	0.46

### Annual Energy Benefits of All Trees By Zone

11/23/2015

Zone	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Zone 2	36.1	5,060	12,794.8	18,015	23,075	(N/A)	18.6	25.5	68.47
Zone 3	46.1	6,456	17,119.3	24,104	30,560	(N/A)	38.9	33.8	43.35
Zone 4	35.7	5,005	13,053.1	18,379	23,384	(N/A)	25.7	25.9	50.29
Zone 1	20.8	2,907	7,403.5	10,424	13,331	(N/A)	16.8	14.8	43.71
Total	138.7	19,429	50,370.7	70,922	90,351	(N/A)	100.0	100.0	49.86

### Annual Stormwater Benefits of All Trees by Zone

11/23/2015

Zone	Total rainfall interception (Gal)	Total Standard (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
Zone 2	778,350	6,227	(N/A)	18.6	27.6	18.48
Zone 3	860,957	6,888	(N/A)	38.9	30.6	9.77
Zone 4	730,868	5,847	(N/A)	25.7	25.9	12.57
Zone 1	447,549	3,580	(N/A)	16.8	15.9	11.74
Citywide total	2,817,724	22,542	(N/A)	100.0	100.0	12.44

## **Appendix E. >> Recommended Species Planting List for the Town of DeWitt**

Note: The full recommended planting list with species restrictions and site recommendations is maintained currently by the Town Naturalist. This list represents species generally recommended for planting only.

<b>Genus species</b>	<b>Cultivar</b>	<b>Common Name</b>
Abies concolor		White Fir
Abies fraseri		Fraser Fir
Abies procera		Noble Fir
<b>No planting of Acer (Maple)</b>	<b><u>Allowed</u></b>	<b>in the Town</b>
<b>Acer buergerianum</b>		<b>Trident Maple</b>
<b>Acer campestre</b>		<b>Hedge Maple</b>
<b>Acer ginnala</b>	<b>'Flame'</b>	<b>Amur Maple</b>
<b>Acer griseum</b>		<b>Paperbark Maple</b>
<b>Acer nigrum</b>		<b>Black Maple</b>
<b>Acer palmatum</b>		<b>Japanese Maple</b>
<b>Acer psuedoplatanus</b>		<b>Sycamore Maple</b>
<b>Acer rubrum</b>	<b>'Red Sunset'</b>	<b>Red Sunset Red Maple</b>
<b>Acer rubrum</b>	<b>'October Glory'</b>	<b>October Glory Red Maple</b>
<b>Acer rubrum</b>	<b>'Karpatic'</b>	<b>Karpatic Red Maple</b>
<b>Acer rubrum</b>	<b>'Bowhall'</b>	<b>Bowhall Red Maple</b>
<b>Acer rubrum</b>	<b>'Autumn Flame'</b>	<b>Autumn Flame Red Maple</b>
<b>Acer saccharum</b>	<b>'Majesty'</b>	<b>Majesty Sugar Maple</b>
<b>Acer saccharum</b>	<b>'Legacy'</b>	<b>Legacy Sugar Maple</b>
<b>Acer saccharum</b>	<b>'Green Mountain'</b>	<b>Green Mountain Sugar Maple</b>
<b>Acer saccharum</b>	<b>'Caddo'</b>	<b>Caddo Sugar Maple</b>
<b>Acer tataricum</b>	<b>'Rubrum'</b>	<b>Rubrum Tatarian Maple</b>
<b>Acer tataricum</b>		<b>Tatarian Maple</b>
<b>Acer truncatum</b>	<b>'Pacific Sunset'</b>	<b>Pacific Sunset Purpleblow Maple</b>
<b>Acer truncatum</b>	<b>'Norwegian Sunse'</b>	<b>Norwegian Sunset Purpleblow Maple</b>
<b>Acer x</b>	<b>'Morgan'</b>	<b>Morgan Maple</b>
<b>Acer x</b>	<b>'Freemann'</b>	<b>Freeman Maple</b>
<b>Acer x</b>	<b>'Celebration'</b>	<b>Celebration Maple</b>
<b>Acer x</b>	<b>'Autumn Blaze'</b>	<b>Autumn Blaze Maple</b>
Aesculus hippocastanum	'Baumannii'	Baumann Horsechestnut
Aesculus x carnea		Red Horsechestnut
Amelanchier species		Serviceberry
Amelanchier canadensis		Serviceberry
Amelanchier laevis		Allegheny serviceberry
Amelanchier arborea		Downy serviceberry
Maacia amurensis		maackia
Betula lenta		Sweet Birch
Betula nigra	'Heritage'	Heritage River Birch
Betula papyrifera		Paper Birch
Carpinus betulus	'Fastigata'	Upright European Hornbeam
Carpinus caroliniana		American Hornbeam
Castanea mollissima		Chinese Chestnut

<b><i>Genus species</i></b>	<b><i>Cultivar</i></b>	<b><i>Common Name</i></b>
Catalpa speciosa		Catalpa
Celtis laevigata	'All Season'	All Season Sugar Hackberry
Celtis occidentalis	'Praire Pride'	Praire Pride Hackberry
Cercidiphyllum japonicum		Katsura tree
Cercis canadensis		Eastern Redbud
Cladrastis kentukea		American Yellowwood
Cornus florida		Flowering Dogwood
Cornus kousa		Kousa Dogwood
Cornus mas		Corneliancherry Dogwood
Cornus mas	Golden Glory	Corneliancherry Dogwood
Cornus racemosa	'Tree Form'	Gray Dogwood
Corylus colyna		Turkish Filbert
Crataegus x lavalleyi	'Winter King'	Winter King Hawthorn
Crataegus crusgalli	'inermis'	Thornless Cockspur Hawthorn
Crataegus phaenopyrum		Washington Hawthorn
Diospyros virginiana		Common Persimmon
Eucommia ulmoides		Hardy Rubber Tree
Fagus grandifolia		American Beech
Fagus sylvatica	Purpurea	Purple Leaf European Beech
Fagus sylvatica	Pendula'	Weeping European Beech
Fagus sylvatica		European Beech
Ginkgo biloba	'Princeton Sentry'	Princeton Sentry Ginkgo
Ginkgo biloba	Male only	Ginkgo
Gleditsia triacanthos, inermis	Skyline	Skyline Honeylocust
Gleditsia triacanthos, inermis	Shademaster"	Shademaster Honeylocust
Gymnocladus dioica		Kentucky Coffeetree
Halesia tetraptera		Carolina Silverbell
Ilex opaca		American holly
Juniperus virginiana		Eastern Red Cedar
Koelreuteria paniculata		Panicled Goldenraintree
Larix decidua		Common Larch
Liquidambar styraciflua		American Sweetgum
Liriodendron tulipifera		Tuliptree
Maackia amurensis		Amur Maackia
Magnolia stellata	'Centennial'	Centennial Star Magnolia
Magnolia x sougangiana		Saucer Magnolia
Malus species	'Strawberry Parfait'	Strawberry Parfait Crabapple
Malus species	'Spring Snow'	Spring Snow Crabapple
Malus species	'Snowdrift'	Snowdrift Crabapple
Malus species	'Robinson'	Robinson Crabapple
Malus species	'Harvest Gold'	Harvest Gold Crabapple
Malus species	'Dubloons'	Dubloons Crabapple
Malus species	'Baskatong'	Baskatong Crabapple
Metasequoia glyptostrobodies		Dawn Redwood

<b><i>Genus species</i></b>	<b><i>Cultivar</i></b>	<b><i>Common Name</i></b>
<i>Nyssa sylvatica</i>		Blackgum
<i>Ostrya virginiana</i>		American Hophornbeam
<i>Phellodendron amurense</i>	Male'	Amur Corktree
<i>Picea abies</i>		Norway Spruce
<i>Picea glauca</i>		White Spruce
<i>Picea pungens</i>		Colorado Blue Spruce
<i>Pinus nigra</i>		Austrian Pine
<i>Pinus resinosa</i>		Red Pine
<i>Pinus rigida</i>		Pitch Pine
<i>Pinus strobus</i>		Eastern White Pine
<i>Pinus sylvestris</i>		Scotch Pine
<i>Platanus occidentalis</i>		American Planetree
<i>Platanus x acerifolia</i>	'Liberty'	Liberty London Planetree
<i>Platanus x acerifolia</i>	'Columbia'	Columbia London Planetree
<i>Platanus x acerifolia</i>	'Bloodgood'	Bloodgood London Planetree
<i>Prunus sargentii</i>		Sargent Cherry
<i>Prunus serrulata</i>	'Kwanzan'	Kwanzan Cherry
<i>Prunus species</i>	'Accolade'	Accolade Cherry
<i>Prunus subhirtella</i>	Rosey cloud'	Rosey Cloud Higan Cherry
<i>Prunus subhirtella</i>	Pendula'	Weeping Higan Cherry
<i>Prunus subhirtella</i>	'Autumnalis'	Autumnalis Higan Cherry
<i>Pseudotsuga menziesii</i>		Douglas Fir
<i>Pyrus calleryana</i>	'Cleveland Select'	Cleveland Select Callery Pear
<i>Pyrus calleryana</i>	'Chanticleer'	Chanticleer Callery Pear
<i>Pyrus calleryana</i>	'Capital'	Capital Callery Pear
<i>Pyrus calleryana</i>	'Autumn Blaze'	Autumn Blaze Callery Pear
<i>Pyrus calleryana</i>	'Aristocrat'	Aristocrat Callery Pear
<i>Quercus acutissima</i>		Sawtooth Oak
<i>Quercus bicolor</i>		Swamp White Oak
<i>Quercus coccinea</i>		Scarlet Oak
<i>Quercus imbricaria</i>		Shingle Oak
<i>Quercus macropcarpa</i>		Bur Oak
<i>Quercus muehlenbergi</i>		Chinkapin Oak
<i>Quercus palustris</i>		Pin Oak
<i>Quercus phellos</i>		Willow Oak
<i>Quercus prinus</i>		Chestnut Oak
<i>Quercus robur</i>	'Fastigiata'	Upright English Oak
<i>Quercus robur</i>		English Oak
<i>Quercus robur</i>	Regal Prince	English Oak
<i>Quercus robur</i>	Skymaster	English Oak
<i>Quercus rubra</i>		Red Oak
<i>Quercus shumardii</i>		Shumard Oak
<i>Sassafras albidum</i>		Sassafrass
<i>Sorbus aucuparia</i>		European Mountainash

<b><u>Genus species</u></b>	<b><u>Cultivar</u></b>	<b><u>Common Name</u></b>
Sorbus hybrida		Oak Leaf Mountainash
Stypholobium japonica	'Regent'	Regent Japanese Pagodatree
Syringa reticulata	'Summer Snow'	Summer Snow Japanese Tree Lilac
Syringa reticulata	'Ivory Silk'	Ivory Silk Japanese Tree Lilac
Taxodium distichum		Common Baldcypress
Thuja occidentalis		Eastern Arborvitae
Tilia americana	'Redmond'	Redmond American Linden
Tilia cordata	'Greenspire'	Greenspire Littleleaf Linden
Tilia cordata	'Glenleven'	Glenleven Littleleaf Linden
Tilia tomentosa		Silver Linden
Tilia x eucxhloria		European Linden
Tsuga canadensis		Eastern Hemlock
Ulmus americana	'Princeton'	Princeton American Elm
Ulmus parvifolia	'Sapporo Autumn G	Sapporo Autumn Gold Chinese Elm
Ulmus parvifolia	'Kings Choice'	Kings Choice Chinese Elm
Ulmus parvifolia	'Dynasty'	Dynasty Chinese Elm
Ulmus parvifolia	'Across Central Park	Across Central Park Chinese Elm
Ulmus species	'Urban'	Urban Elm
Ulmus species	'Pioneer'	Pioneer Elm
Ulmus species	'Liberty'	Liberty Elm
Ulmus species	'Homestead'	Holmstead Elm
Zelkova serrata	'Village Green'	Village Green Japanese Zelkova
Zelkova serrata	'Halka'	Halka Japanese Zelkova
Zelkova serrata	'Green Vase'	Green Vase Japanese Zelkova
Zelkova serrata	'Columnari'	Upright Japanese Zelkova
Zelkova serrata	'Wireless'	Wireless Japanese Zelkova
Zelkova serrata	'City Sprite'	City Sprite Japanese Zelkova