TREE INVENTORY AND MANAGEMENT PLAN

For

VICTORIA CAFARELLI

TOWN SUPERVISOR'S OFFICE

For Service At

TOWN OF OSSINING, OSSINING, NY

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March 9, 2018

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WHY DID SAVATREE PERFORM AN INVENTORY AND MANAGEMENT PLAN FOR OSSINING?

In early 2017, the Town of Ossining contacted SavATree to provide technical assistance in the development of an application for New York Department of Environmental Conservation (DEC) Urban Forestry Grant.   Ossining was awarded the grant in October and selected SavATree to perform the work in January 2018.

The Town of Ossining executed a contract with SavATree to perform the following scope of work:

- An inventory and assessment of public trees at four specific locations within the Town of Ossining:
    o Louis Engel Park;
    o N. State Road from Chappaqua Road to Stone Creek Lane;
    o NYS Route 134 from New Castle to the Village of Ossining, and;
    o NYS Route 133 from New Castle to the Village of Ossining.
- For all tree growing within the park or street right-of-way, the following data points were collected:
    o Tree species – common and latin names;
    o Measurement of diameter at breast height (dbh, defined as tree diameter measured 4.5 feet above grade);
    o ANSI Risk Assessment Level (1 or 2);
    o International Society of Arboriculture (ISA) Qualitative Risk Rating (Low, Moderate, High, Extreme);
    o Condition (Good, Fair, Poor, Critical, Dead);
    o Specific defects observed;
    o Risk mitigation/tree management recommendations;
    o Priority level for recommendations (High, Medium, Low, None at this time);
    o Location – street address and GPS.
- In addition, the locations of empty and/or potential new planting sites were collected. For these locations, we collected the following data points:
    o Type of planting site (Lawn, Strip, Pit, Sidewalk, etc.)
    o Size of planting site, in feet (width for strips; width and length for pits, etc.)
    o Notes
    o Location – address and GPS
- i-Tree Eco analysis and report on tree canopy cover, invasive species, and ecosystem services provided by trees in the study area.
- i-Tree Eco Forecast analysis to estimate tree canopy cover and ecosystem services over a 20 year period.
- Report on social and economic conditions in the study area using ESRI Tapestry Market segmentation data.
- Deliverables to include: a written report summarizing the findings of our assessment; an Excel file with the complete inventory dataset, a web-based, searchable map of the tree inventory, and a PDF report of the outputs from the i-Tree study.
- We will present the results of the inventory and associated analysis at a public even to be held on March 20,2018.

HOW DID SAVATREE PERFORM THE ASSESSMENT?

We began field work for the tree inventory on January 22, 2018 and completed it on January 26, 2018. We used the ESRI ArcGIS Collector app on iPads to collect data on public trees within the specified areas. Data QA/QC was completed on February 8, 2018. The dataset has been provided as a separate Excel document.

We used ESRI's 2017 USA Tapestry Segmentation data layer from ArcGIS OnLine to determine geodemographic market segments.

We ran the collected tree inventory data through i-Tree Eco to obtain ecosystem services information. We ran the same data through i-Tree Eco Forecast to estimate tree canopy cover and related ecosystem services provided by inventoried trees over a 20 year horizon.

WHAT DID SAVATREE FIND?

TREE INVENTORY

The tree inventory field data collection was performed by Tree Risk Assessment Qualified Registered Consulting Arborist Matt Weibel.

The complete results of the tree inventory are provided as a separate Excel file. We inventoried 664 public trees on streets and public lands included in the assessment.

Some of the street trees are planted at or near the property line, so in most cases the Town is a tenant-in-common, or co-owner, with the adjacent property owner regarding the tree.

Below is a link to the online map of the tree inventory.

http://arcg.is/1GXKi9

 It can be searched by Tree Number by typing in the box at the top and clicking on the magnifying glass icon. Tree icons are color-coded by priority level of the recommended action where red = High; orange – Medium; Yellow = low; and Green = no recommendations at this time. Recommended planting locations are shown as purple stars.

SUSTAINABILITY

When we look at population resilience and vulnerability, two key metrics are species diversity and size distribution.

The tree population within the study area is somewhat diverse, with 50 different species represented. However, Norway maple (*Acer platanoides*) is the most dominant species with 145 individuals making up 22% of the population. This is followed by sugar maple (*Acer saccharum*) with 82 trees (12%); red maple (*Acer rubrum*) with 56 trees (8%), and Japanese black pine with 41 trees (6%). All of the Japanese black pine trees are located at Engel Park. The large number of maple trees within the study area is a cause for concern. If a maple-specific pest enters the area, it may be catastrophic for the Town.

There were four invasive species (as defined by New York State) inventoried. They are Norway maple, callery pear, black locust, and ailanthus (tree of heaven). These accounted for 218 trees and 36% of the inventoried population.

We use size and a proxy for age when looking at the diameter distribution, realizing that this is inexact as some trees are small in stature and so may be mature and still quite small (ex: dogwood). However, this approach gives us a good "big picture" idea of how resilient or vulnerable the population is. The Town's tree distribution generally shows a "reverse-J" shape, meaning the majority of trees are younger. This is desirable as you want to have enough younger individuals growing up to assume the roles of the older ones as they decline and are removed.
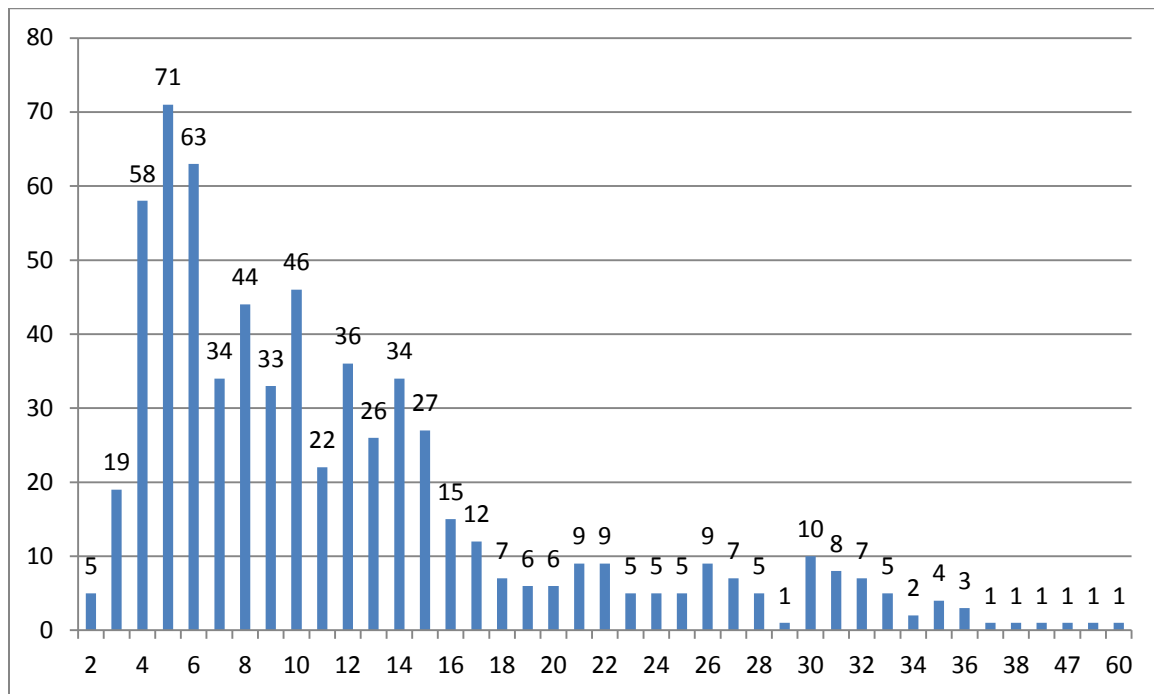

Figure 1: Diameter distribution for the trees included in the Ossining inventory

The tree population is somewhat diverse in species with an ideal age distribution. The large percentage of maples may be cause for concern in the future.

CONDITION

Despite a minimal maintenance program, 87% of trees inventoried were in Fair or better condition. Three percent of the trees were standing dead at the time of the inventory. One percent was in critical condition and 9% were poor.

PRIMARY MAINTENANCE NEED

Thirty-two percent of trees had no primary maintenance need. Another twenty percent require regular monitoring. Eighteen percent are recommended for removal. Most of the rest need crown cleaning (removal of dead and defective limbs) and/or clearance pruning.

Treatment for emerald ash borer should be considered (and has been recommended for four of the 27 ash trees. The other 23 ash trees are not suitable for treatment based upon their condition and/or location.

RISK

We used tree care industry standards (ANSI A300-Part 9, Level 2) and best practices (International Society of Arboriculture) performed by a Tree Risk Assessment Qualified arborist to derive qualitative tree risk ratings as noted on the following page.

These ratings are based on the risk assessment formula:

Probability x Consequences = Risk

Risk Rating	Number of Trees	Percent of Population
Extreme	0	0%
High	7	1%
Low	632	95%
Moderate	25	4%
Grand Total	**664**	

Table 1 - Risk ratings for the Town's trees

Because most of the trees were street trees, many had potential targets (people or property that could be impacted if the tree failed) and so Significant or Severe consequences in the event of failure,

No trees received the highest risk rating of Extreme. Only seven were rated High risk. The vast majority were in the Low risk category.

PLANTING SPACES

During the inventory, we collected information on available plantings spaces within the study area. Twenty-six planting locations were identified. The complete dataset has been provided as separate document.

Within Engel Park, we avoided recommending new plantings in front of the stage area where concerts occur in the summer as they would impact site lines. In addition, there is an open area to the east of the playground. We assumed this open area was part of the design aesthetic of the park and did not recommend plantings. This area is suitable for two or three large shade trees.

Along roads, we did not recommend plantings in the unmanaged, wooded areas. There are areas of Route 134 and 133 that have steep slopes and/or narrow planting strips (less than 3 feet wide) between the road edge and sidewalk. We did not recommend any plantings in these areas.

STUDY AREA DEMOGRAPHICS

Esri's Tapestry Market Segmentation is a geodemographic system that identifies 68 distinctive markets in the US based on socioeconomic and demographic characteristics to provide an accurate, comprehensive

profile of US consumers. These are summarized into 14 LifeMode Groups. There are four LifeMode Summary Groups and six Tapestry Segments in the ten census blocks in the study area.

The eastern side of the Town is dominated by the Affluent Estates (Top Tier, Exurbanites segments) and Upscale Avenues (Urban Chic, Pleasantville) LifeMode Groups. The western side of the study area, which is both downslope and closer to the Hudson, is dominated by the Middle Ground (City Lights) and Next Wave (International Marketplace) LifeMode Groups.
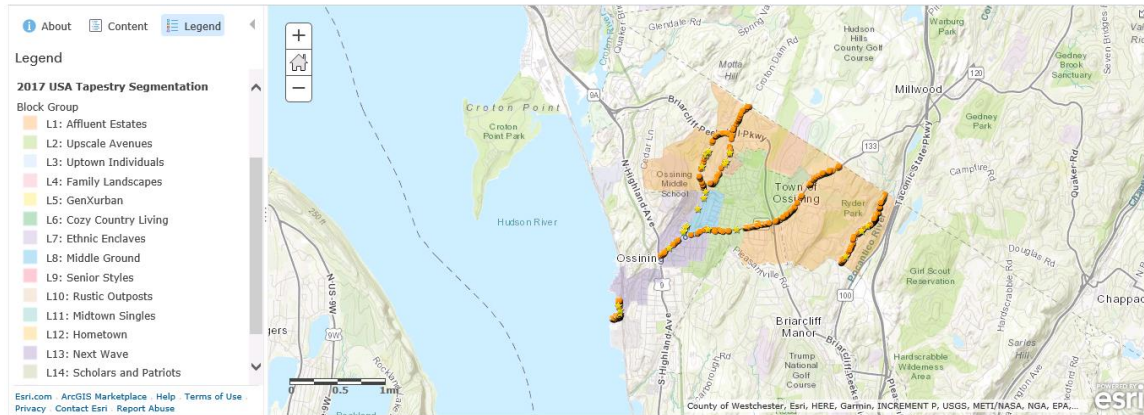

Figure 2 – Market segments in the study area

Market segments are generally younger, more diverse, with lower household income as we move east and higher elevations to west and lower elevations.

LifeMode Group	Tapestry Segment	Median Age	Diversity Index	Median Household Income
Affluent Estates	Top Tier (1)	53	48	$148,999
Affluent Estates	Savvy Suburbanites (1)	43	61	$133,439
Affluent Estates	Exurbanites (1)	54	52	$111,147
Upscale Avenues	Urban Chic (1)			
Upscale Avenues	Pleasantville (2)	41 - 43	65 - 75	$100,895 - $100,000
Middle Ground	City Lights (1)	37	82	$73,856
Next Wave	International Marketplace (3)	34 - 35	84 - 90	$46,483 - $62,286

Table 2 – Summary of market segment information with the number of census blocks in a tapestry segment provided in parenthesis

Descriptions of these segments are found here:
https://www.dropbox.com/sh/rnibu4hkygj3msn/AAA3cUzVu7yqF0I5e0KtjKc0a?dl=0. The diversity index summarizes racial and ethnic diversity. The index shows the likelihood that two persons, chosen at random from the same area, belong to different race or ethnic groups. The index ranges from 0 (no

diversity) to 100 (complete diversity). For example, a diversity index of 59 means there is a 59 percent probability that two people randomly chosen would belong to different race or ethnic groups.

These market segments have very different lifestyles and life stages. Urban greening research has shown that different market segments benefit from messages and messengers that are specific to them. That is, the messages and messengers that would optimally engage the households in the International Marketplace segment may not optimally engage the Top Tier market segment, and vice versa.

TREE COVER BENEFITS AND FORECAST

The iTree Eco report based on the inventory data has been provided as a separate PDF document and be accessed here: https://www.dropbox.com/sh/rnibu4hkygj3msn/AAA3cUzVu7yqF0I5e0KtjKc0a?dl=0. The trees in the study area provide approximately 8 acres of tree canopy cover to the Town. The three most common species are maples, with the most prevalent being the invasive Norway maple. The maples account for approximately 43% of the population and 62% of the leaf area. This lack of diversity is cause for concern.

The diameter distribution is favorable as the majority of trees are in the lower size classes (Figure 1). If most of the trees were in the larger size classes, the population would be considered unsustainable as there would not be enough younger trees to take the place of older trees as they decline and age out.

The 664 trees studied provide the following ecosystem services:

• Tree cover: 7.953 acres

• Pollution removal: 454.4 pounds/year ($4.01 thousand/year)

• Carbon storage: 277.7 tons ($37 thousand)

• Carbon sequestration: 4.645 tons/year ($618/year)

• Oxygen production: 12.39 tons/year

• Avoided runoff: 15430 cubic feet/year ($1.03 thousand/year)

• Structural values: $664 thousand

We used iTree Forecast to estimate the impacts on tree canopy over a 20 year period based on the following standard assumptions regarding mortality rates:

- 3% annual mortality rate for healthy trees

- 13% annual mortality rate for sick trees

- 50% annual mortality rate for dying trees.

The results are shown in Figure 3 below. Given the present inventory, a "no action" scenario will result in 4.5 acres of canopy cover in 20 years, 56% of the canopy cover presently provided by the trees.

As the majority of ecosystem services provided are related to leaf area, there will be a consequent similar reduction in ecosystem services provided by the trees.

Tree Cover Over Time

Location: Ossining, Westchester, New York, United States of America
Project: Town of Ossining, Series: Certain street and park trees, Year: 2018, Forecast: Default_1
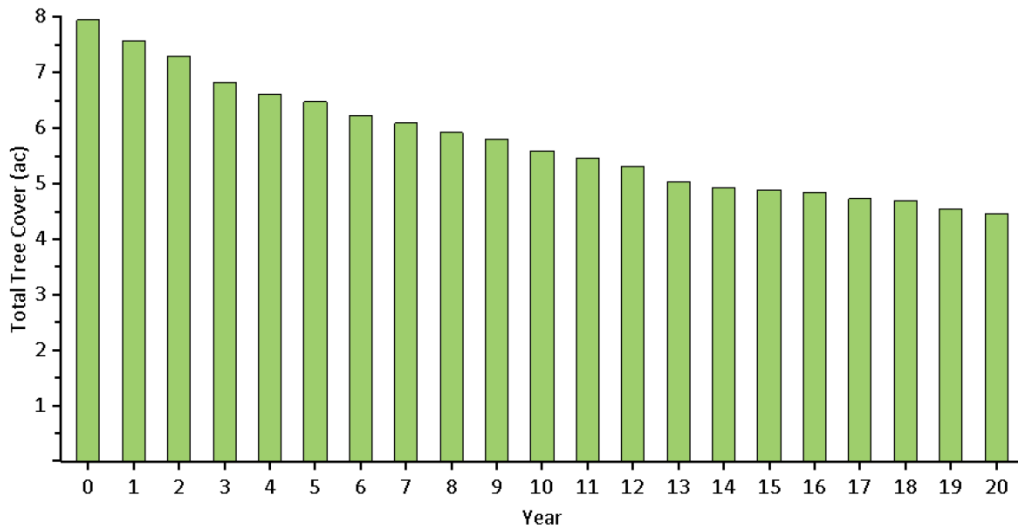Generated: 3/5/2018

i-Tree
Eco

Figure 3 – Tree cover provided by the subject trees over a 20 year period

A modest tree planting program to plant 50 trees per year in the study area (1,000 trees over 20 years) would result in an almost break-even canopy cover of 7.7 acres (Figure 4).

Tree Cover Over Time

Location: Ossining, Westchester, New York, United States of America
Project: Town of Ossining, Series: Certain street and park trees, Year: 2018, Forecast: Town of Ossining + 50 p/y
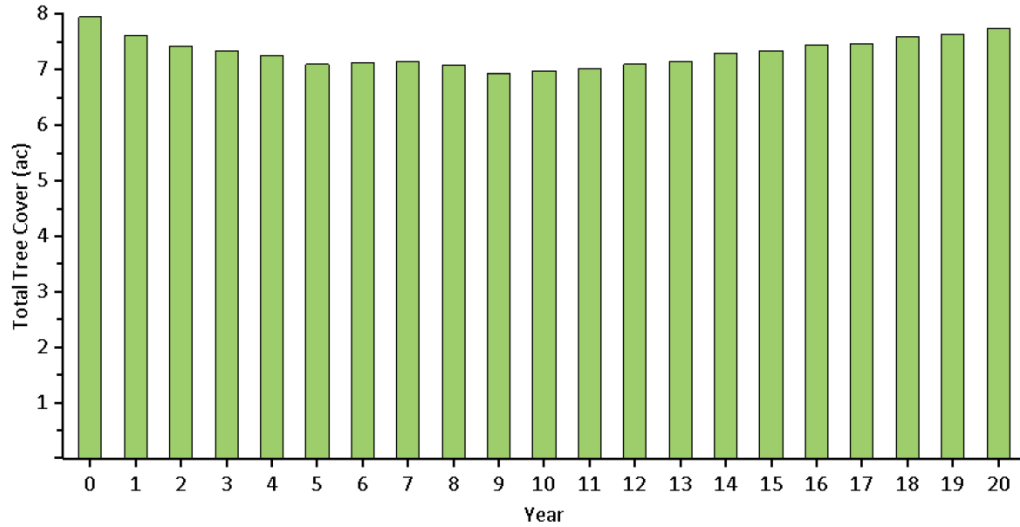Generated: 3/5/2018

Figure 4 – Canopy cover resulting from present case with a planting program to install 50 trees per year for 20 years

Increasing the annual planting to 75 trees per year would result in 11.1 acres in canopy in 20 years, an increase of over 38% over present levels (Figure 5).

Tree Cover Over Time

Location: Ossining, Westchester, New York, United States of America
Project: Town of Ossining, Series: Certain street and park trees, Year: 2018, Forecast: Town of Ossining + 75 p/y
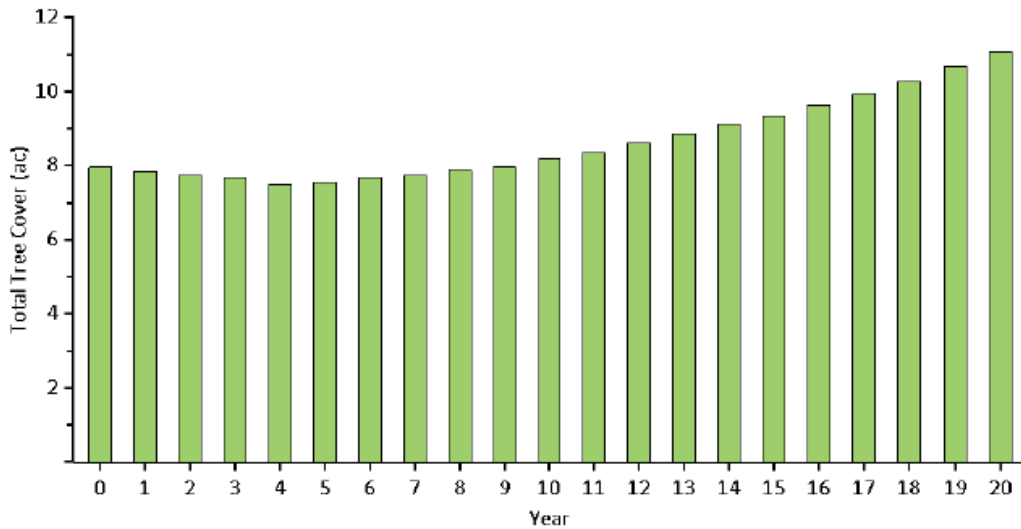Generated: 3/5/2018

Figure 5 – Canopy cover resulting from present case with a planting program to install 75 trees per year for 20 years

WHAT DOES SAVATREE RECOMMEND BASED ON WHAT WE OBSERVED?

Based on analysis of these data, we recommend the following:

- Use the tool to allocate resources to address the highest priority recommendations first and moving through the priorities to the limit of your contracting window (6 months, one year, two years.
    - o If the Town decides against treating the four recommended ash trees for emerald ash borer, the trees should be removed.
- Look at a variety of messages and messengers to engage different members of the community in urban greening, and to plan to ensure that green amenities are distributed equitably throughout the Town.
- Pursue resources to plant 50 – 75 trees annually for sustainable tree canopy cover. This will allow you to maintain or enhance canopy cover and the benefits that it provides.
    - o Avoid planting ash trees due to the presence of emerald ash borer.
    - o Looks for species other than maple trees for future plantings.
    - o Trees planted at Engel Park should be tolerant of salt due to the brackish water and flooding. These include golden rain tree, black gum, scholar tree, eastern larch, white oak, red oak, pin oak, and black oak.
- Pursue resources to expand the inventory and risk assessment to other parts of the Town. This will allow the Town to more efficiently manage their tree assessments, gain a better understanding of the environmental benefits provided by their trees, and identify additional planting spaces in order to maintain and expand the current tree canopy.