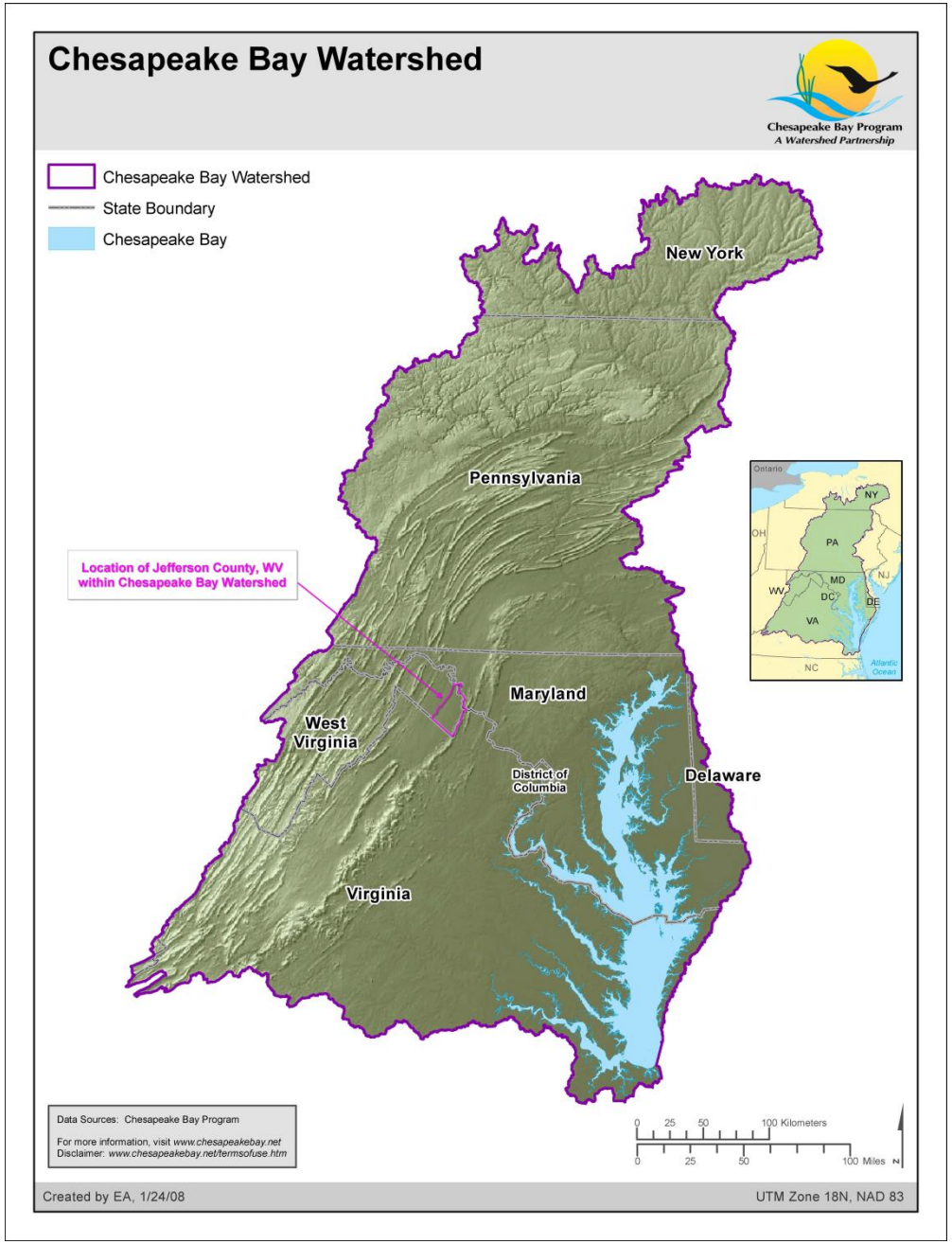
City of Charles Town, WV 2019 STREET TREE INVENTORY

By: Kelly Savannah

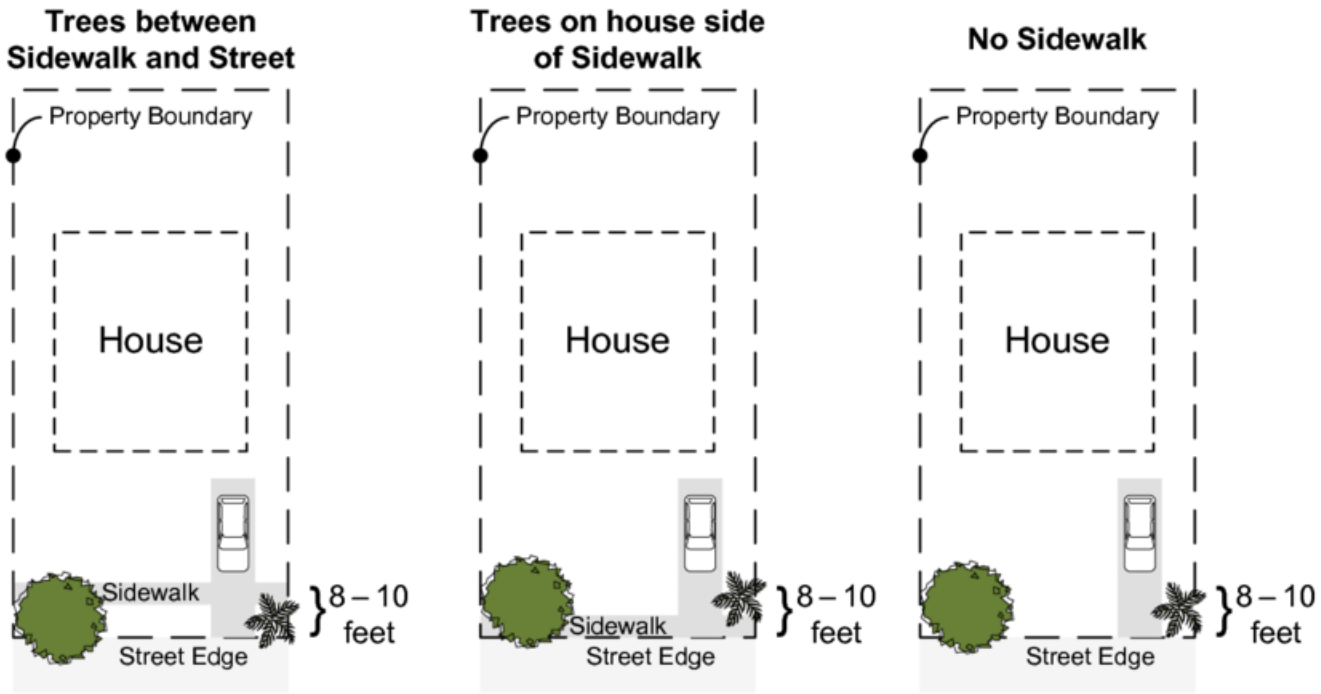
Charles Town, West Virginia

- The ***capital municipality*** located in Jefferson County.
  - Lower part of the **Blue Ridge Mountains**; bounded by the Potomac River and Maryland to the north.
  - **Evitts Run Watershed**, part of the larger Shenandoah River Watershed that leads into the Chesapeake Bay Watershed.
- Established in ***1786 by Charles Washington***, brother of George Washington.
- Known for its historical trials, underground cave and lake.



Street Trees?

- Trees that grow on a street within the right-of-way (**ROW**), urban parks, gardens and wetlands.

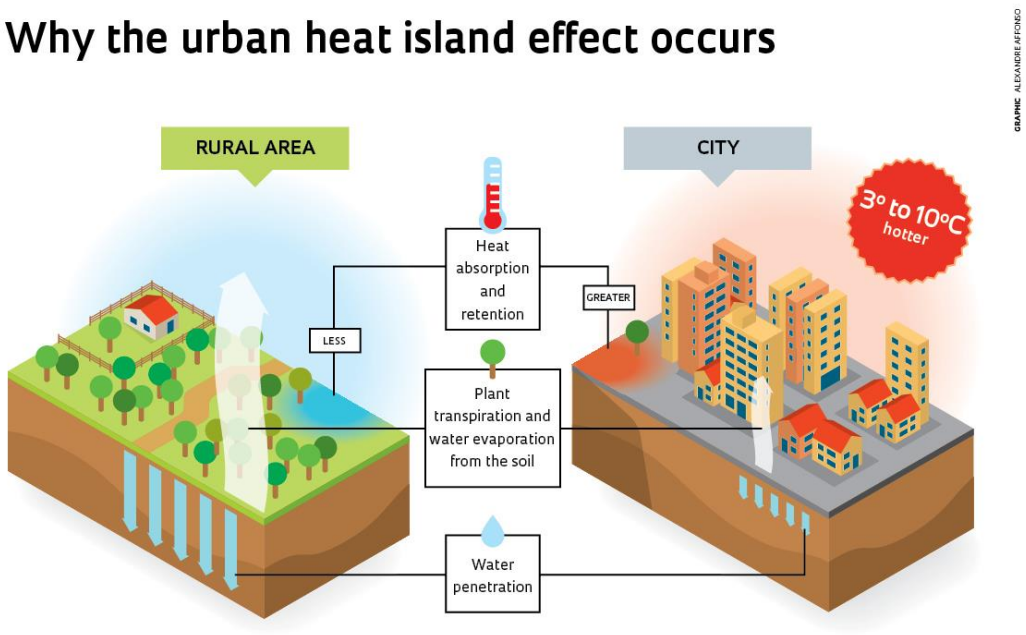


Landry, Shawn (2013).

- How are Street trees beneficial?
  - **Environment Factors**:
    - Improve air quality
    - Reduce the heat island effect
    - Reduce storm-water runoff
    - Sequester carbon dioxide and excess sedimentation.
  - **Economical Factors**:
    - Increase real estate value through enhancing aesthetics, shading and cooling homes.
  - **Health Factors**:
    - Improve public health through-
      - Reducing asthma
      - Reducing stress
      - Decreasing aggressive behavior and symptoms of young children with Attention Deficit-Hyperactivity Disorder (ADHD)

Purpose of Tree Inventory

- To **provide** necessary **information** about the **health** and **well-being** of the **trees in an area**.
- Without a detailed tree inventory, it can be very difficult to measure the severity of an invasive pest species such as the emerald ash borer (**EAB**) or the Asian longhorned beetle (**ALB**).
- Comprehensive inventory of street trees can provide:
  - Insight on **how to manage tree survival** with the potential **impacts that climate change** will have on urban forestry.
  - Urban environments are **physically different than rural areas**.
    - **Less vegetated surfaces** to provide shade and cool the surroundings.
    - **Several degrees warmer** than countryside's leading to an altered energy exchange
      - Urban heat island effect.
    - **Increased impervious surfaces** results in increased surface runoff from rainwater.
    - As a result, **climate change will amplify these physical features** in the urban environment.



Site Locations

- Downtown boundary of Charles Town, WV

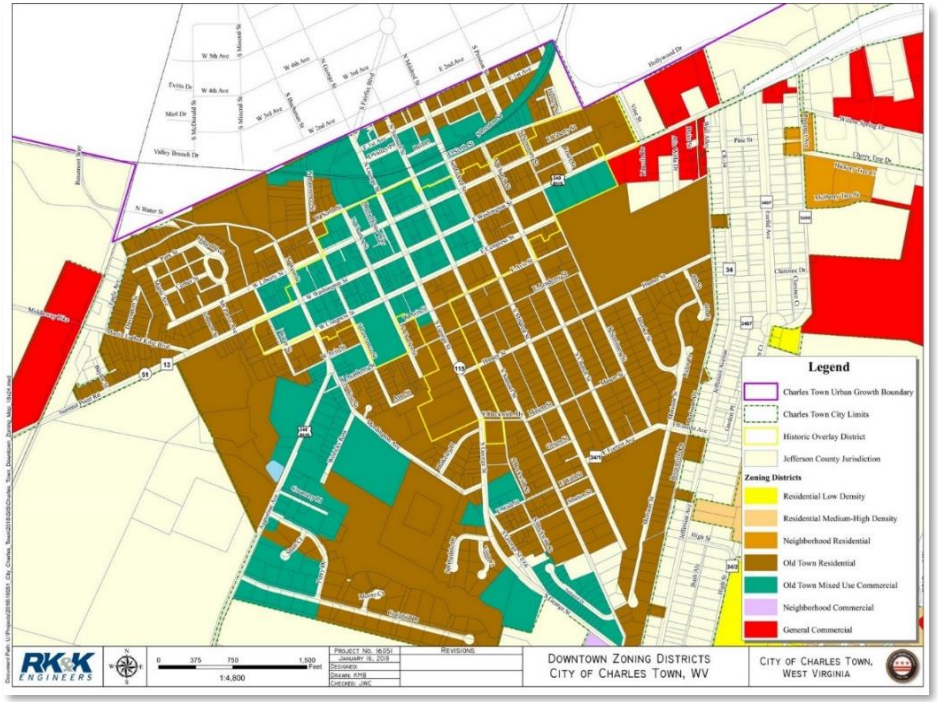


Figure 1: Downtown Zoning Map of the City of Charles Town, WV. Retrieved from https://www.charlestownwv.us/vertical/sites/%7B497B4BB1-9A1F-47D0-AF93-611C825E6674%7D/uploads/Downtown_Zoning_Map_18_x_24_-_Official(1).pdf (2018a).

- Newer residential communities within the zoning area such as Crosswinds, Greenfield and Huntfield.

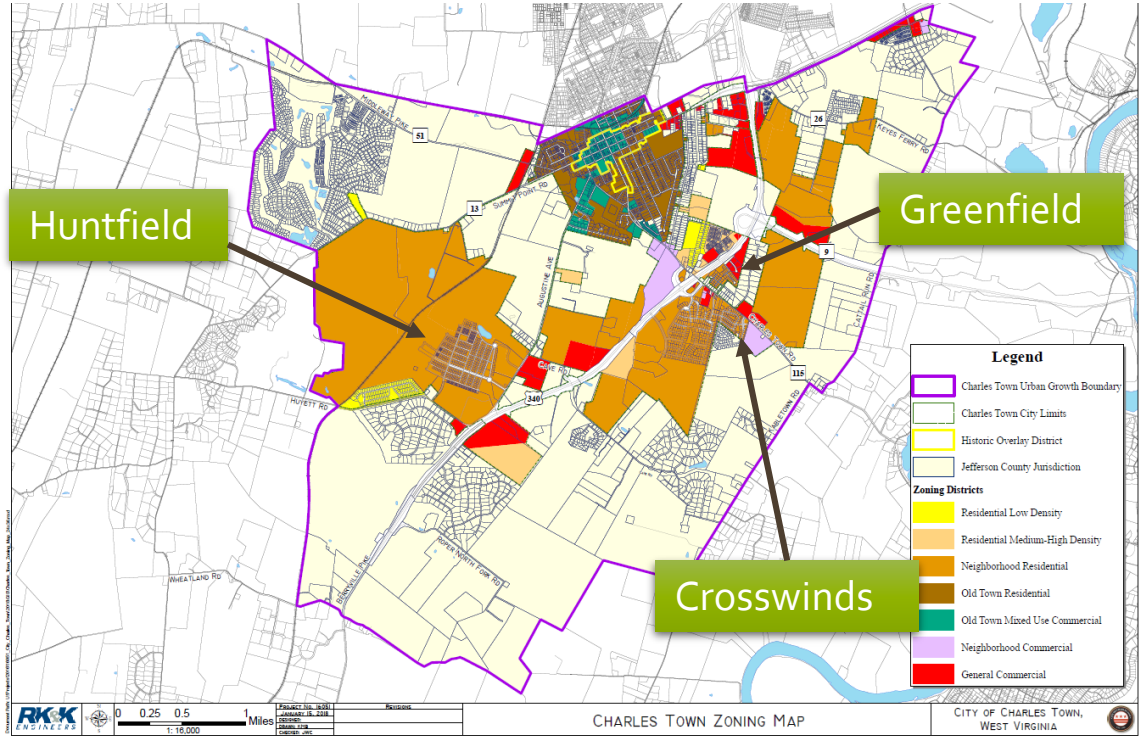


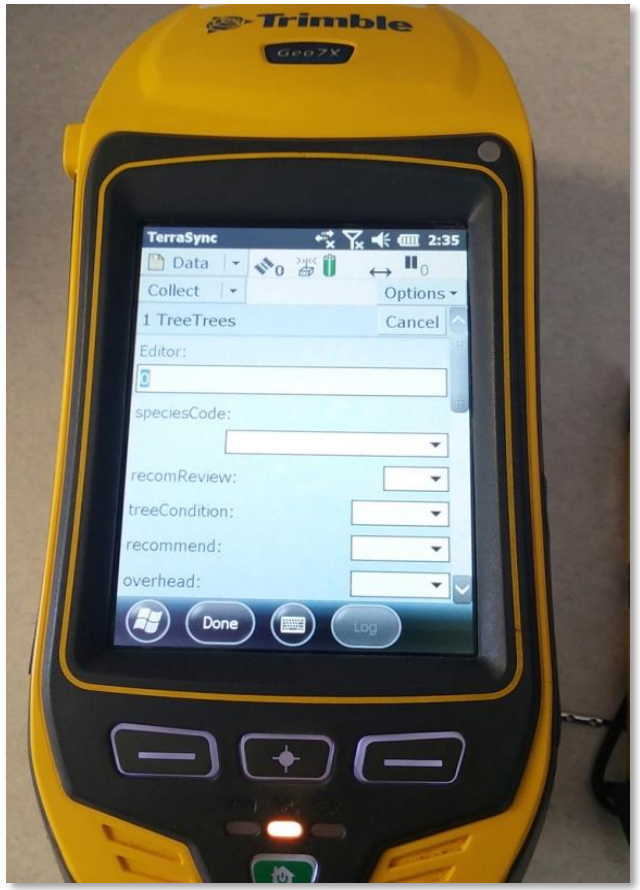
Figure 2: Zoning Map of the City of Charles Town, WV. Retrieved from https://www.charlestownwv.us/vertical/sites/%7B497B4BB1-9A1F-47D0-AF93-611C825E6674%7D/uploads/Charles_Town_Zoning_Map_24x36_-_Official.pdf (2018b).

Methods and Tools

- Highlight **unsuitable areas** on the paper map with a pink marker.
- Collect Point Data on **Trees and Open Green strip availability** for planting along streets using a Trimble Geo 7x GPS.
- Export Data from the GPS to the program **Pathfinder** and then into **ArcPro** to analyze and build a map.

<u>Other tools needed to complete survey:</u>

- **DBH Tape** (DBH: Diameter at Breast Height)
  - Diameter measurement on one side of tape will be to measure the DBH of the Tree.
  - Inches measurement on the other side of the tape will be used to measure the width of the Green strip as well as the height of the curb.
- **Tree Identification** Books and phone Tree Identification App (PlantNet)
- **Orange vest** to wear so public understands that I work with the City.



Timeline and Maps

Timeline
May 2019-August 2019

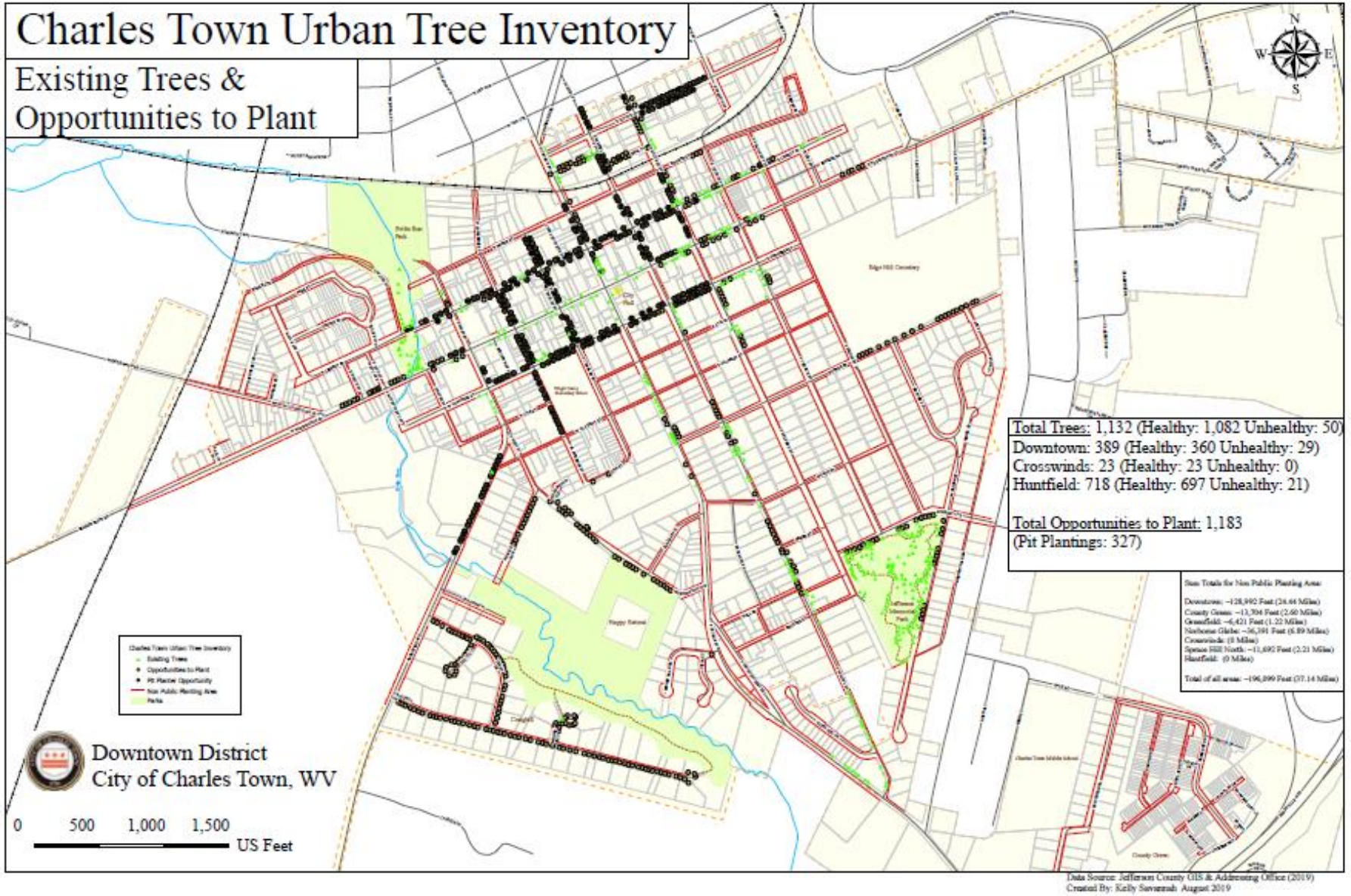
For each Location:

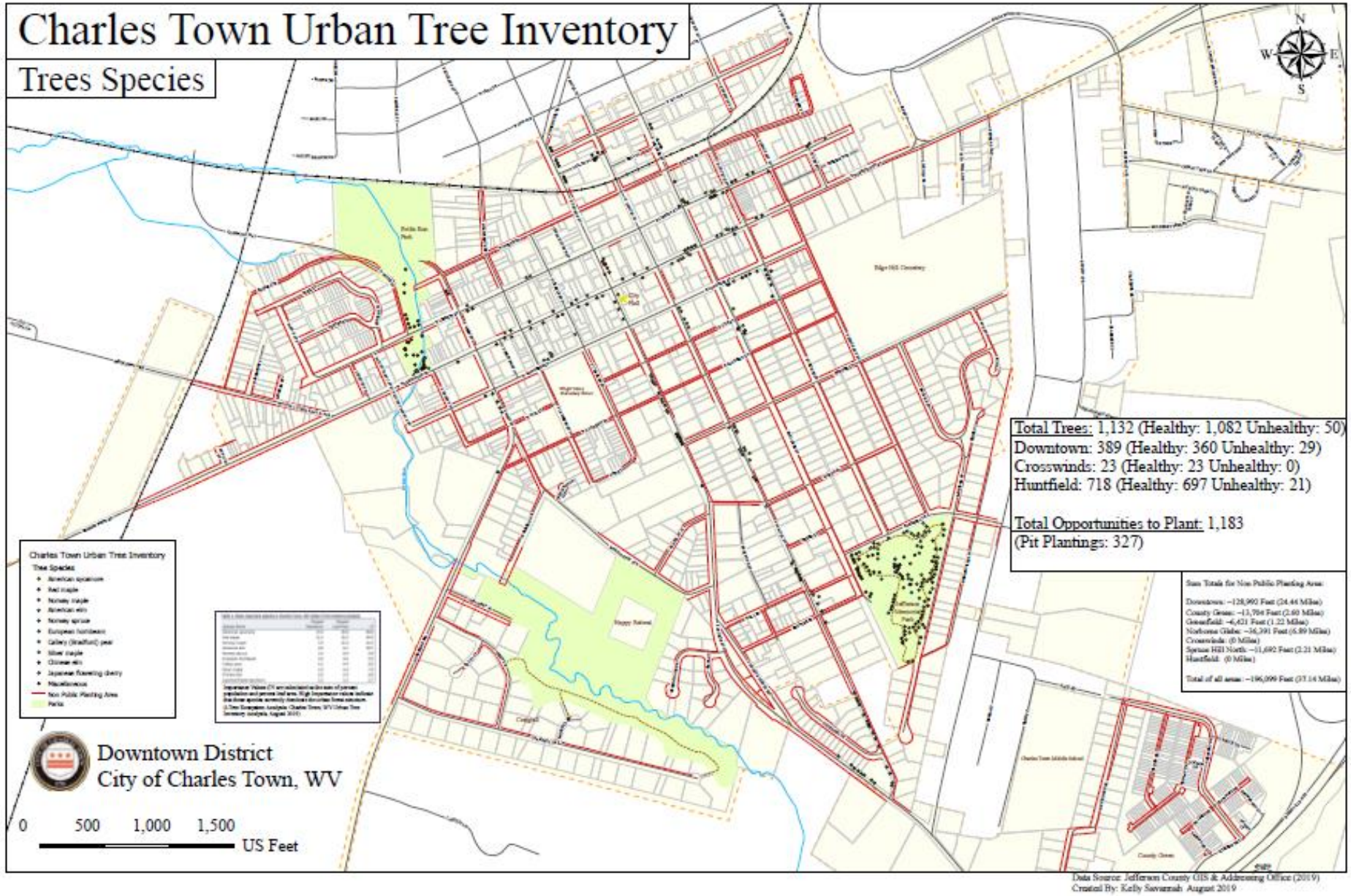
- Downtown
- Huntfield
- Crosswinds

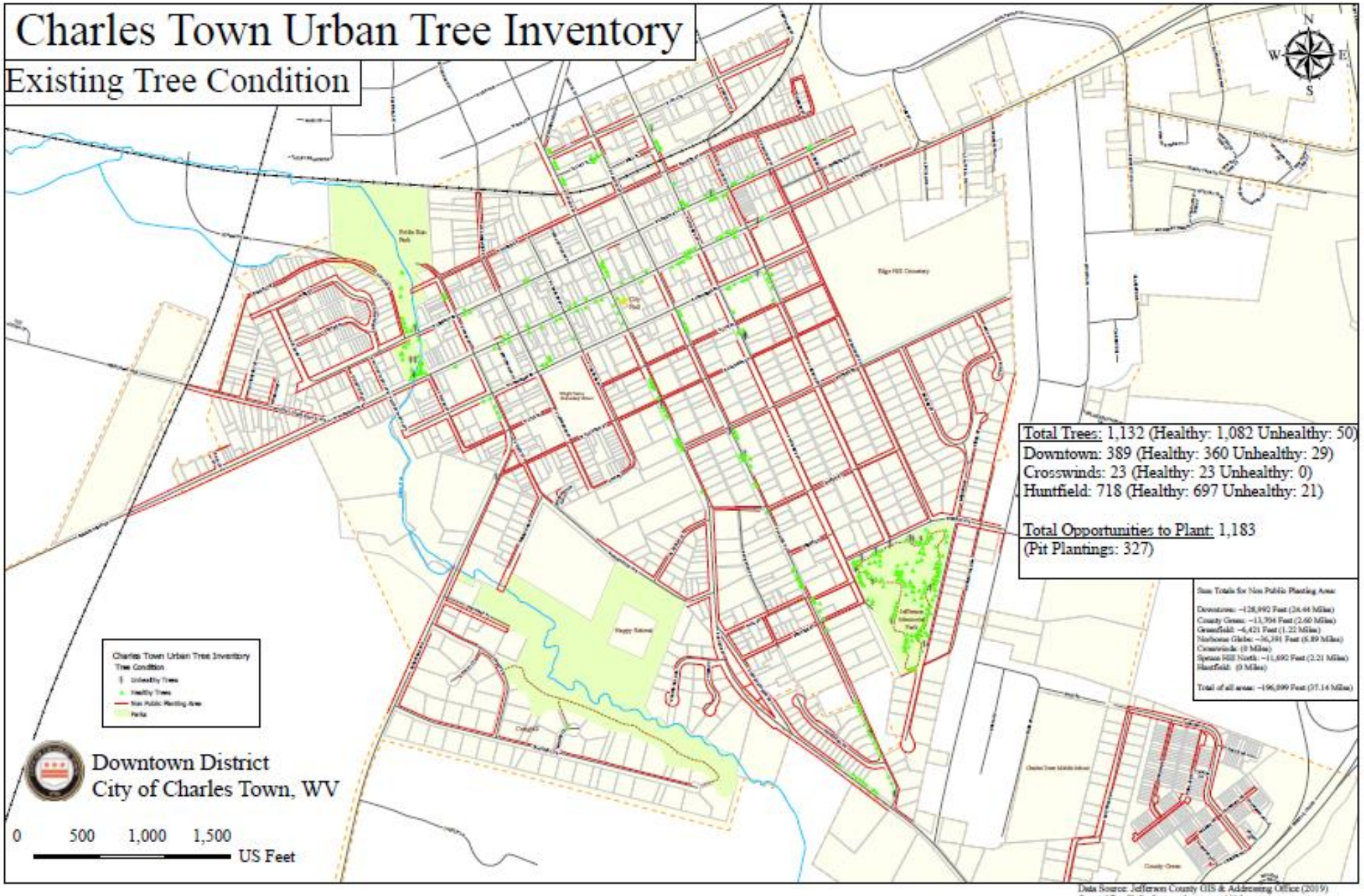
Total of **9** Maps were created:

- Existing Trees and Opportunities to Plant
- Tree Species (Top 10 and other)
- Existing Tree Condition

Downtown District Maps




Charles Town Urban Tree Inventory
Trees Species
Total Trees: 1,132 (Healthy: 1,082 Unhealthy: 50)
Downtown: 389 (Healthy: 360 Unhealthy: 29)
Crosswinds: 23 (Healthy: 23 Unhealthy: 0)
Huntfield: 718 (Healthy: 697 Unhealthy: 21)
Total Opportunities to Plant: 1,183
(Pit Plantings: 327)
Downtown District
City of Charles Town, WV
0 500 1,000 1,500
US Feet
Data Source: Jefferson County GIS & Addressing Office (2019)
Created By: Kelly Savannah August 2019


Charles Town Urban Tree Inventory
Existing Tree Condition
N
W
E
S
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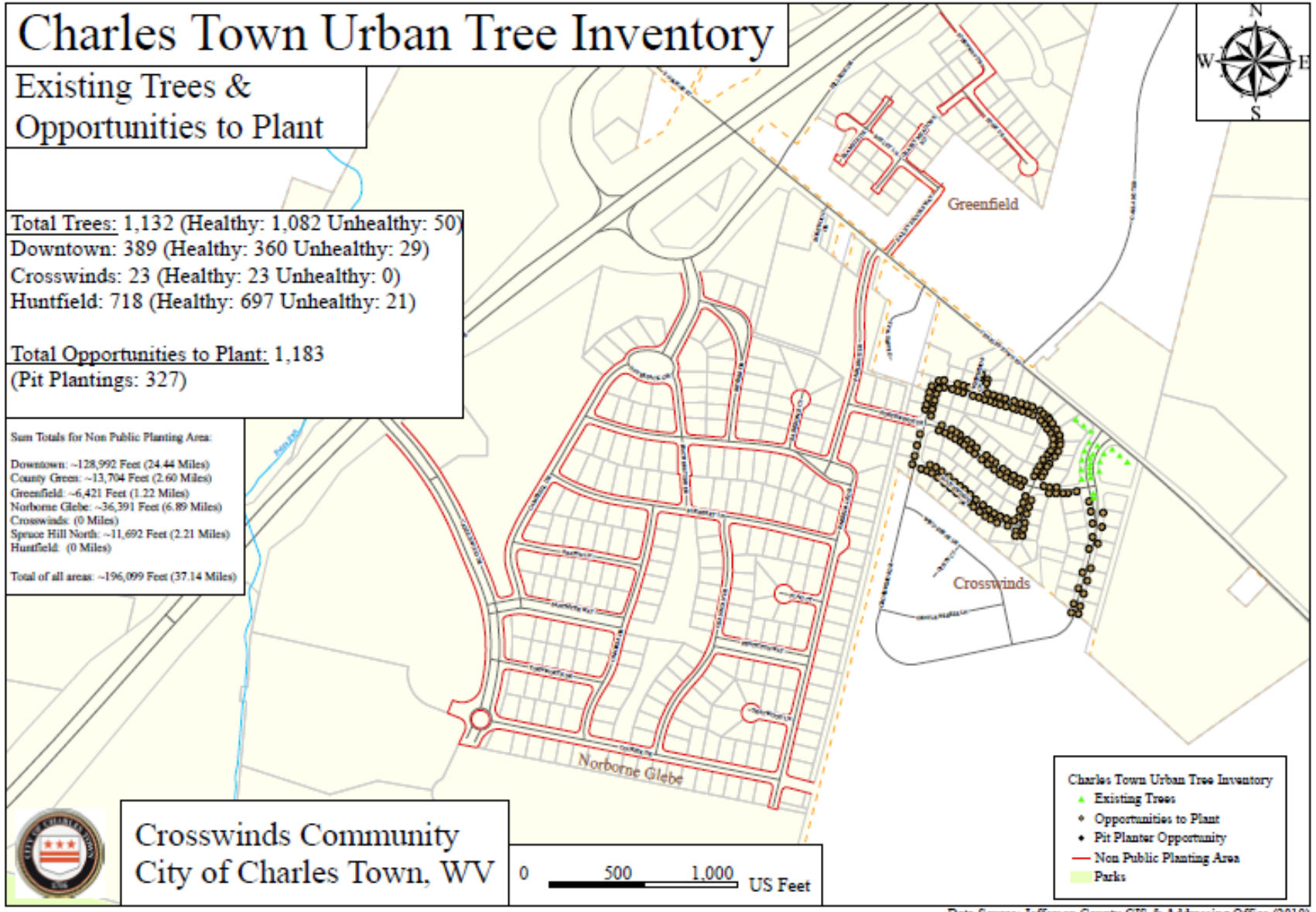
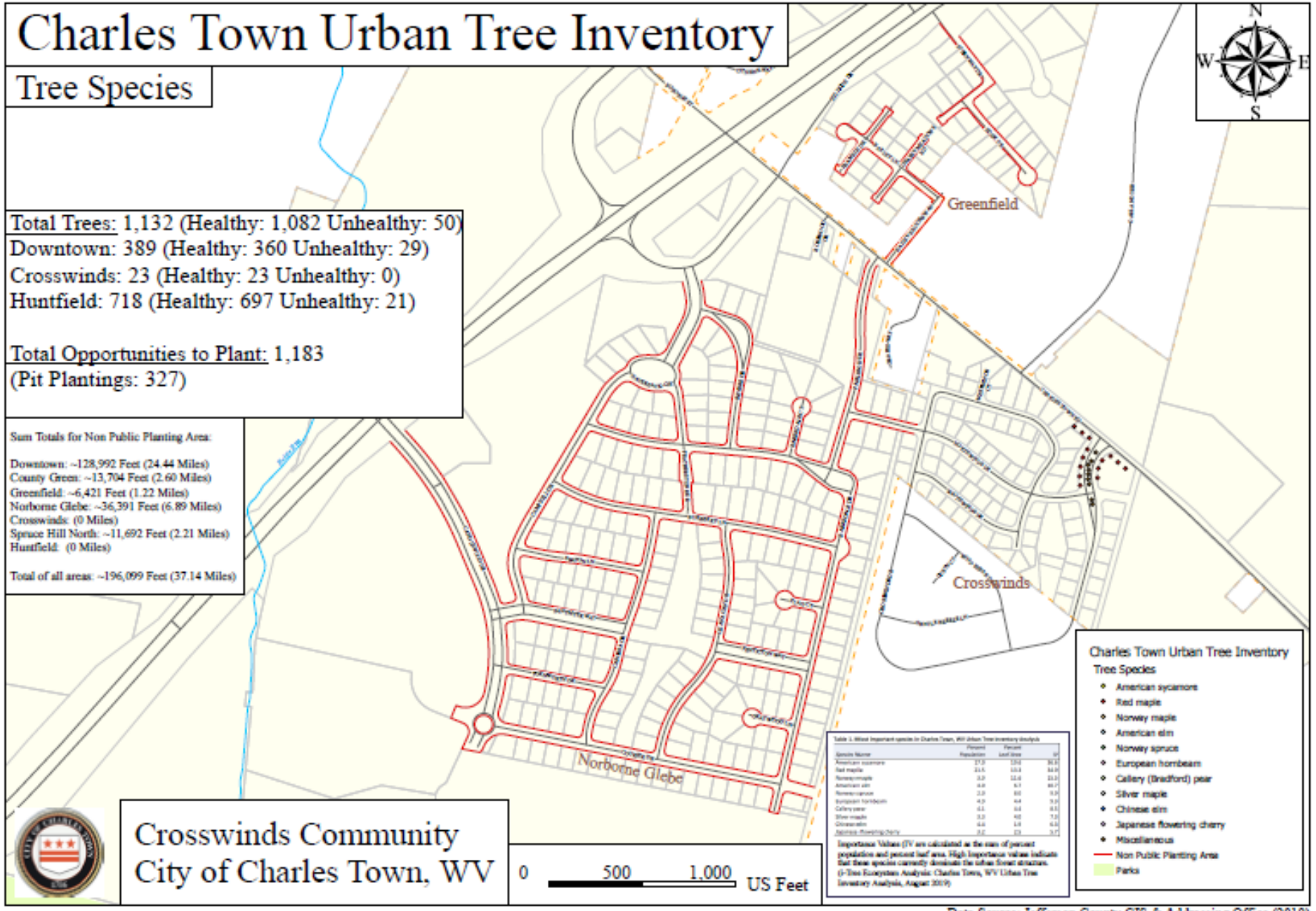
City of Charles Town, WV
0 500 1,000 1,500
US Feet

Crosswinds Community Maps





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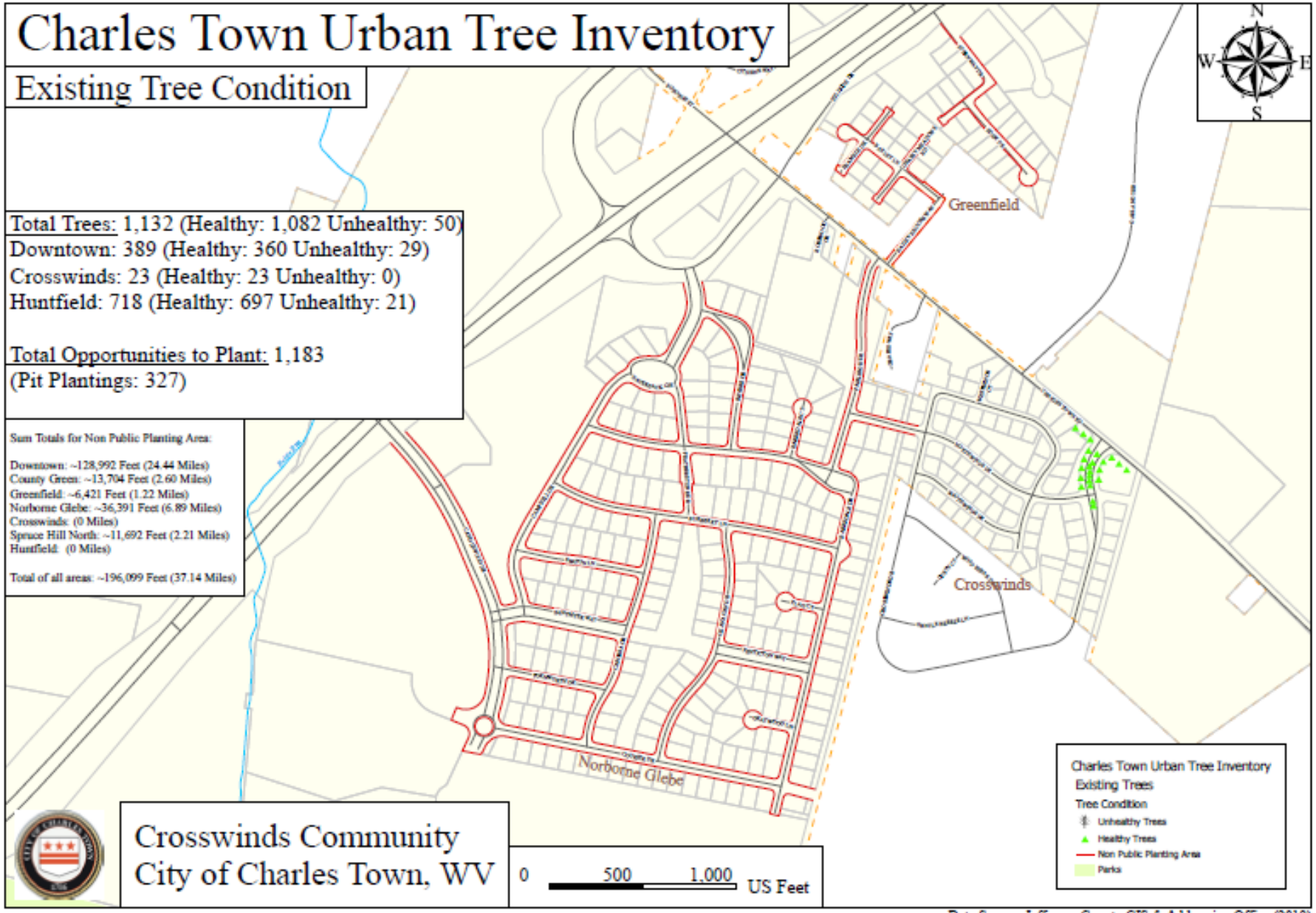
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Sum Totals for Non Public Planting Area:
Downtown: ~128,992 Feet (24.44 Miles)
County Green: ~13,704 Feet (2.60 Miles)
Greenfield: ~6,421 Feet (1.22 Miles)
Norborne Glebe: ~36,391 Feet (6.89 Miles)
Crosswinds: (0 Miles)
Spruce Hill North: ~11,692 Feet (2.21 Miles)
Huntfield: (0 Miles)
Total of all areas: ~196,099 Feet (37.14 Miles)
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Greenfield
Crosswinds
Norborne Glebe
Crosswinds Community
City of Charles Town, WV
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US Feet
Charles Town Urban Tree Inventory
Existing Trees
Tree Condition
Unhealthy Trees
Healthy Trees
Non Public Planting Area
Parks
Data Source: Jefferson County GIS & Addressing Office (2019)
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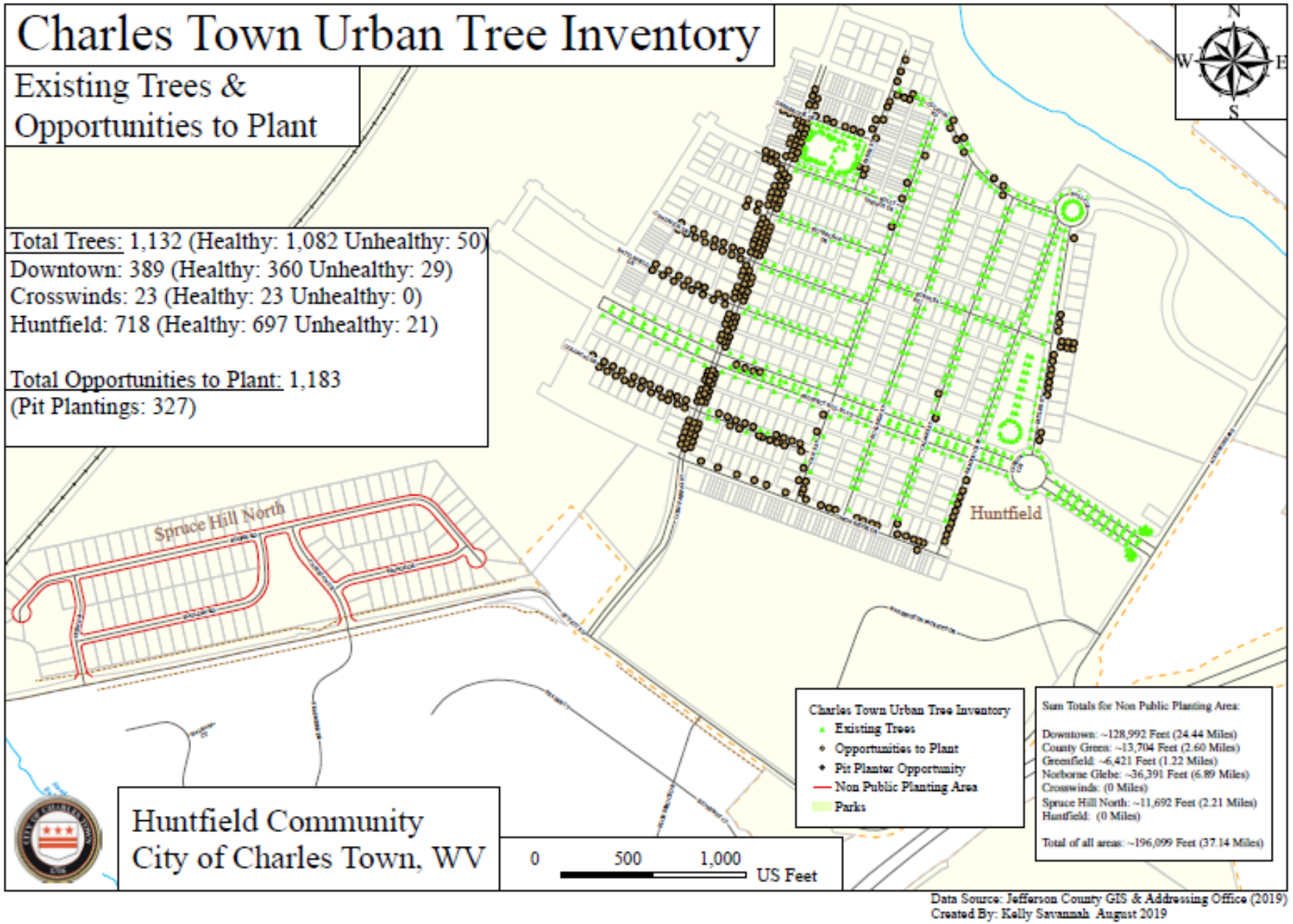
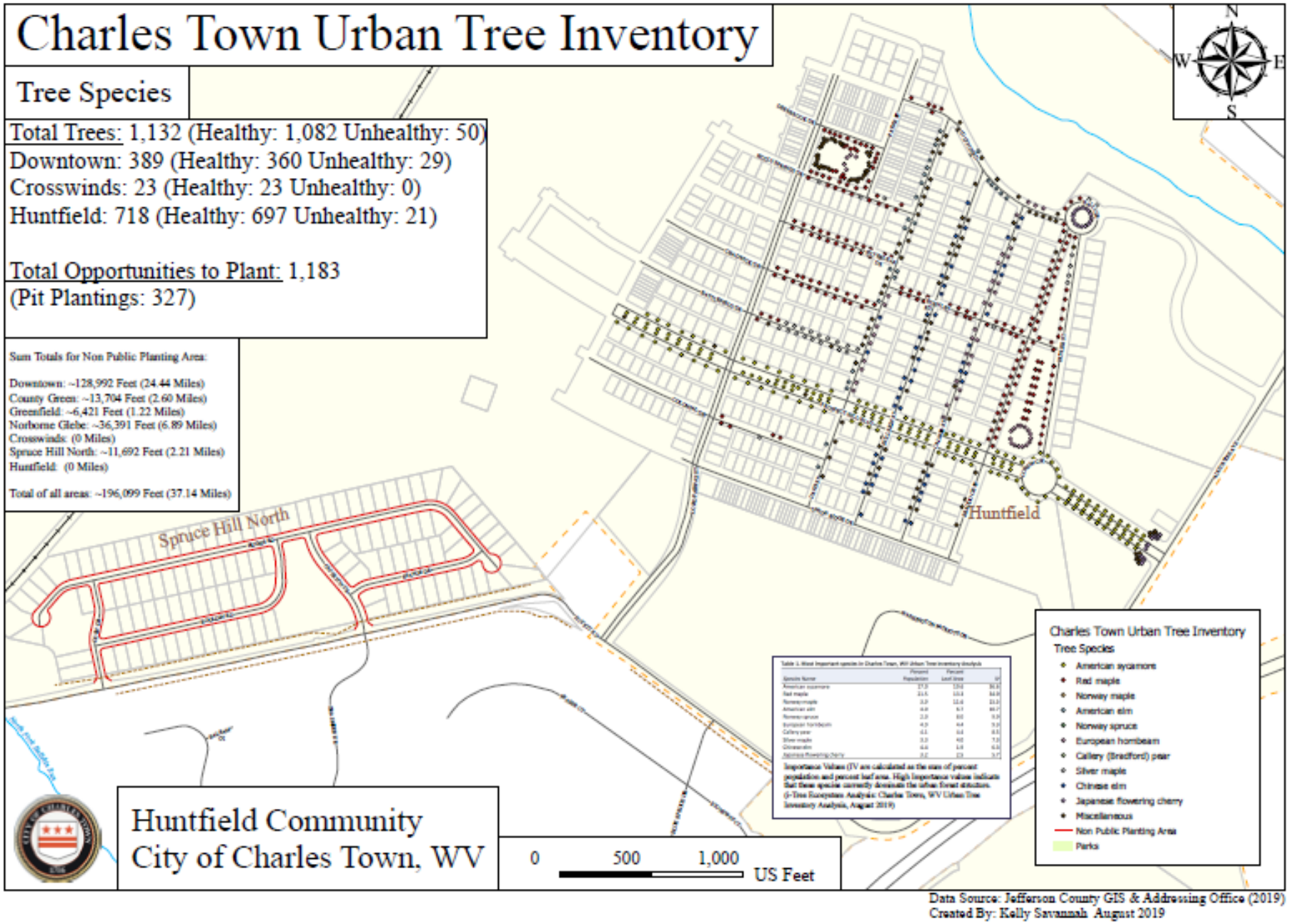
Huntfield Community Maps

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Spruce Hill North
Huntfield
Charles Town Urban Tree Inventory
Tree Species
American sycamore
Red maple
Norway maple
American elm
Norway spruce
European hornbeam
Callery (Bradford) pear
Silver maple
Chinese elm
Japanese flowering cherry
Miscellaneous
Non Public Planting Area
Parks
Huntfield Community
City of Charles Town, WV
0
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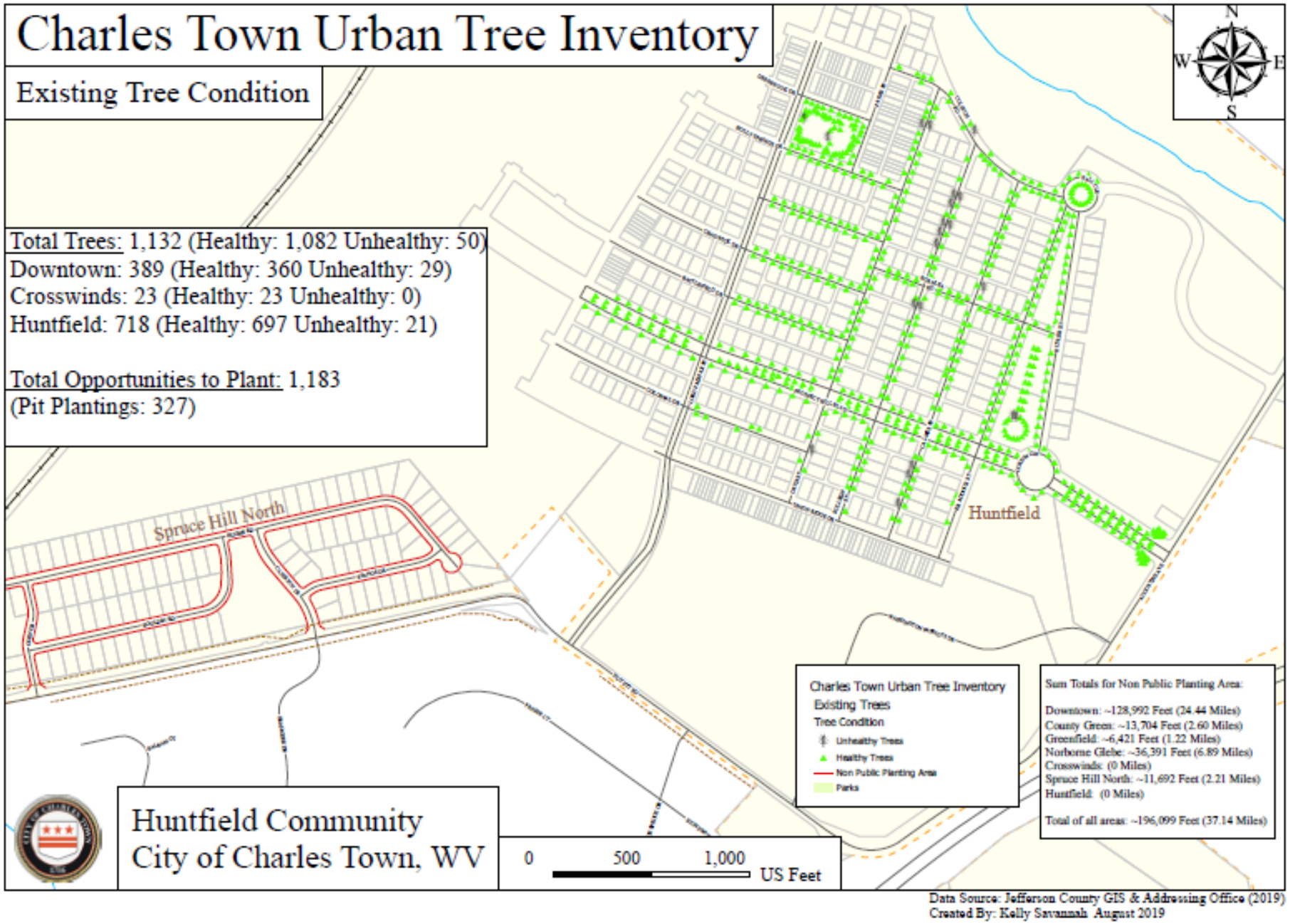
US Feet
Data Source: Jefferson County GIS & Addressing Office (2019)
Created By: Kelly Savannah August 2019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iTree Objectives & Future Plans

- Use **iTree Eco** to look at *Economical* and *Environmental* Benefits that trees provide such as:
  - **Carbon Sequestration** (Capturing and storing long-term atmospheric carbon dioxide; defer global warming).
  - **Stormwater Management** (Mitigating runoff from impervious services such as streets, lawns etc. and working to improve water quality).
  - The **British Thermal Unit (BTU)** (Traditional unit of heat- The amount of heat required to raise the temperature one pound of water by one degree Fahrenheit). https://en.wikipedia.org/wiki/British_thermal_unit
- Establish a **Tree Board**
- ***Your*BMP**-Promotes the installation of Best Management Practices (BMPs) on private land through community-based projects in the Potomac Highlands of West Virginia.

iTree Eco Results

- Number of trees: 1,127
- Tree Cover: 11.37 acres
- Most common species of trees: Red maple, American sycamore, European hornbe
- Percentage of trees less than 6" (15.2 cm) diameter: 45.9 %
- Pollution Removal: 525.4 pounds/year ($745/year)
- Carbon Storage: 457.6 tons ($78 thousand)
- Carbon Sequestration: 8.76 tons ($1.49 thousand/year)
- Oxygen Production: 23.36 tons/year
- Avoided Runoff: 20.96 thousand cubic feet/year ($1.4 thousand/year)
- Building energy savings: N/A – data not collected
- Avoided carbon emissions: N/A – data not collected
- Structural values: $3.07 million

Ton: short ton (U.S.) (2,000 lbs)
Monetary values $ are reported in US Dollars throughout the report except where noted.
Ecosystem service estimates are reported for trees.

The urban forest of Charles Town, WV Urban Tree Inventory Analysis has 1,127 trees with a tree cover of Red maple. The three most common species are Red maple (21.6 percent), American sycamore (17.0 percent), and European hornbeam (4.9 percent).

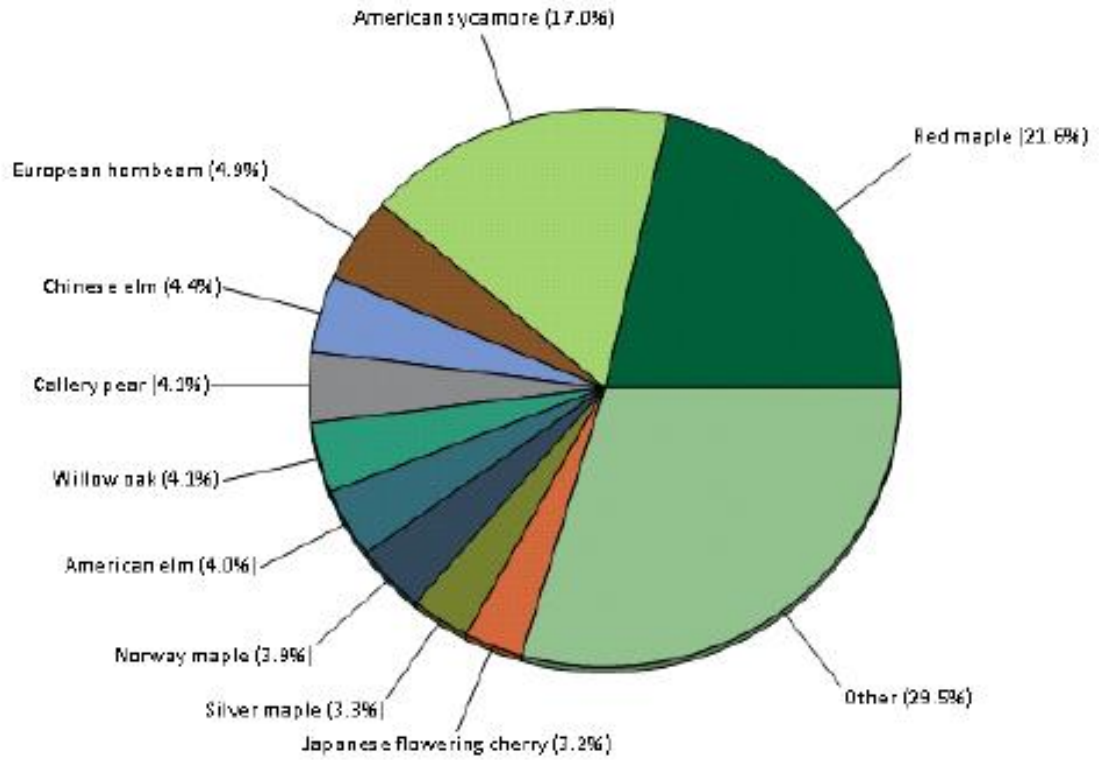

Figure 1. Tree species composition in Charles Town, WV Urban Tree Inventory Analysis

iTree Eco Results Continued: Diameter Breast Height (DBH) Class

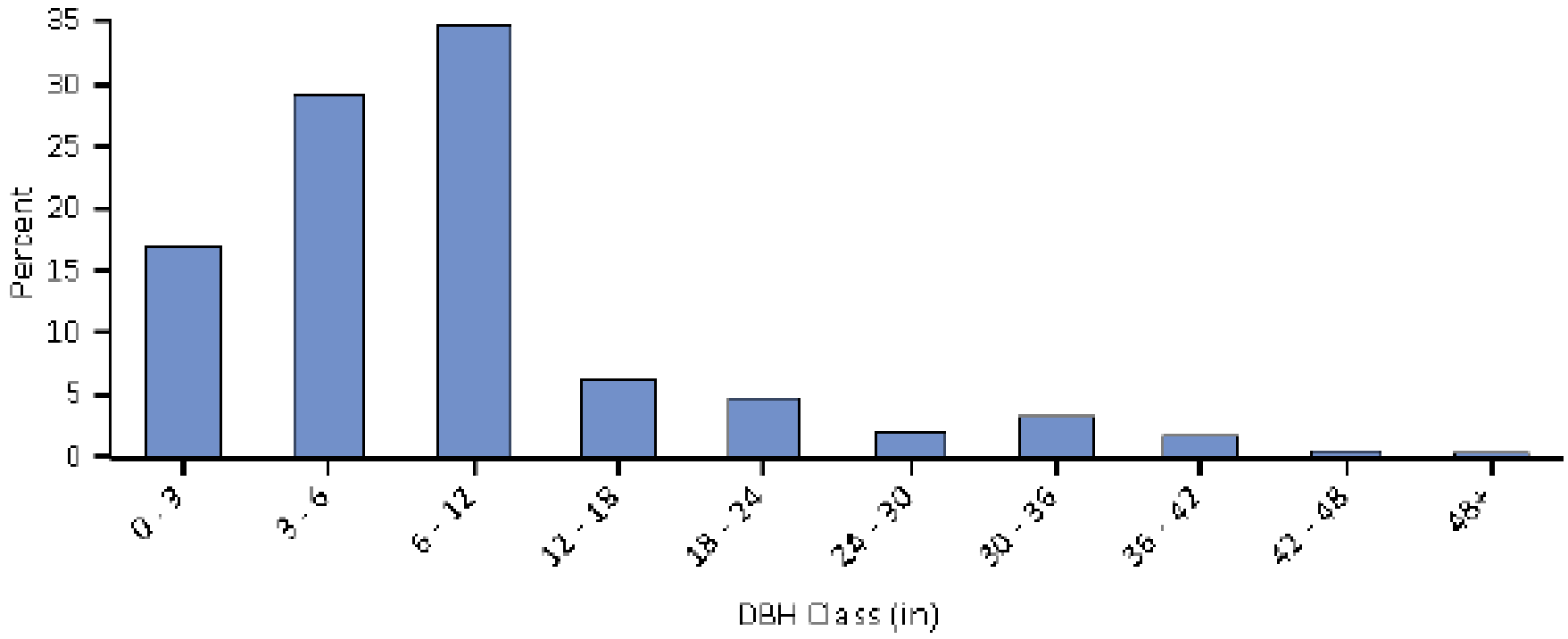

Figure 3. Percent of tree population by diameter class (DBH - stem diameter at 4.5 feet)

iTree Eco Results Continued: Top 10 Species

Table 1. Most important species in Charles Town, WV Urban Tree Inventory Analysis

Species Name	*Percent Population*	*Percent Leaf Area*	*IV*
American sycamore	17.0	19.6	36.6
Red maple	21.6	13.3	34.9
Norway maple	3.9	11.6	15.5
American elm	4.0	6.7	10.7
Norway spruce	2.0	8.0	9.9
European hornbeam	4.9	4.4	9.3
Callery pear	4.1	4.4	8.5
Silver maple	3.3	4.0	7.3
Chinese elm	4.4	1.9	6.3
Japanese flowering cherry	3.2	2.5	5.7

iTree Eco Results Continued: Carbon Sequestration

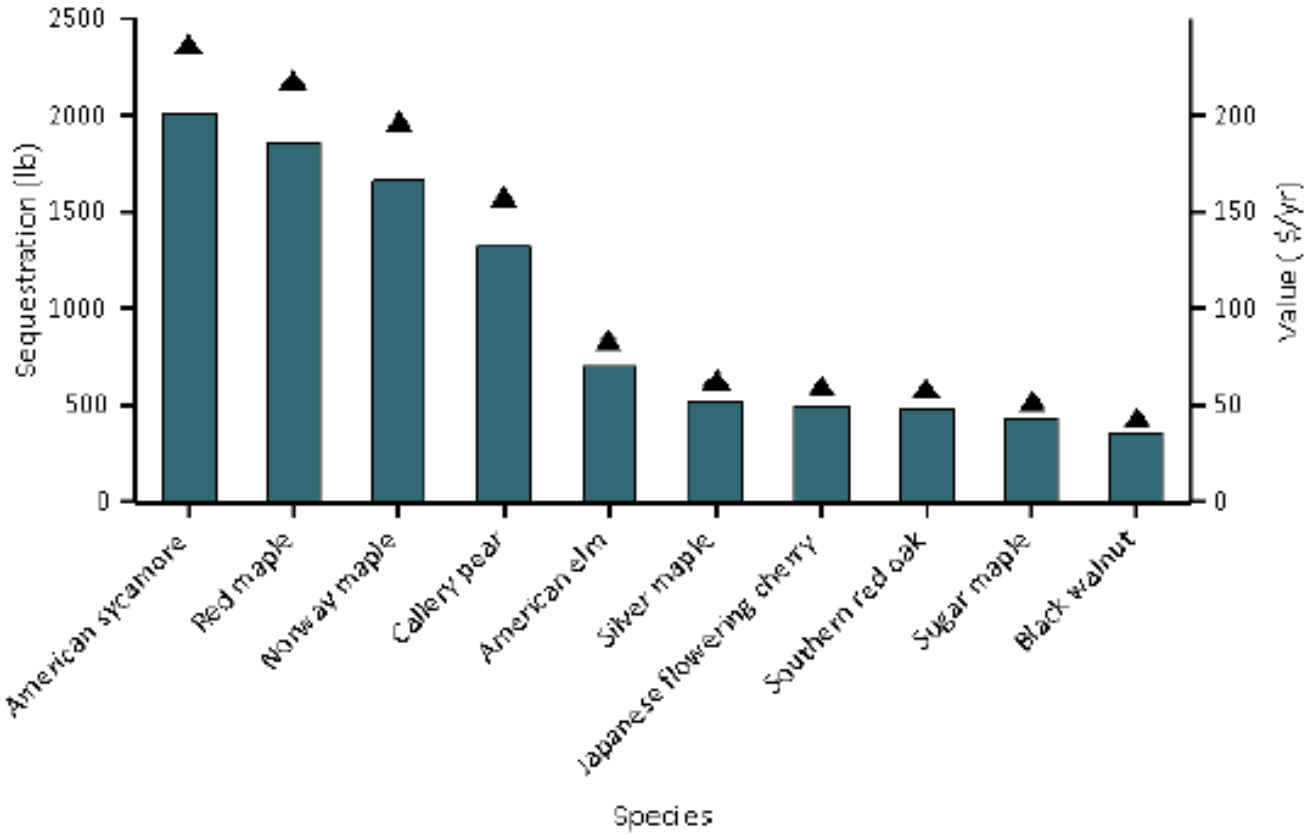

Figure 8. Estimated annual gross carbon sequestration (points) and value (bars) for urban tree species with the greatest sequestration, City Of Charles Town Urban Tree Inventory

iTree Eco Results Continued: Carbon Storage

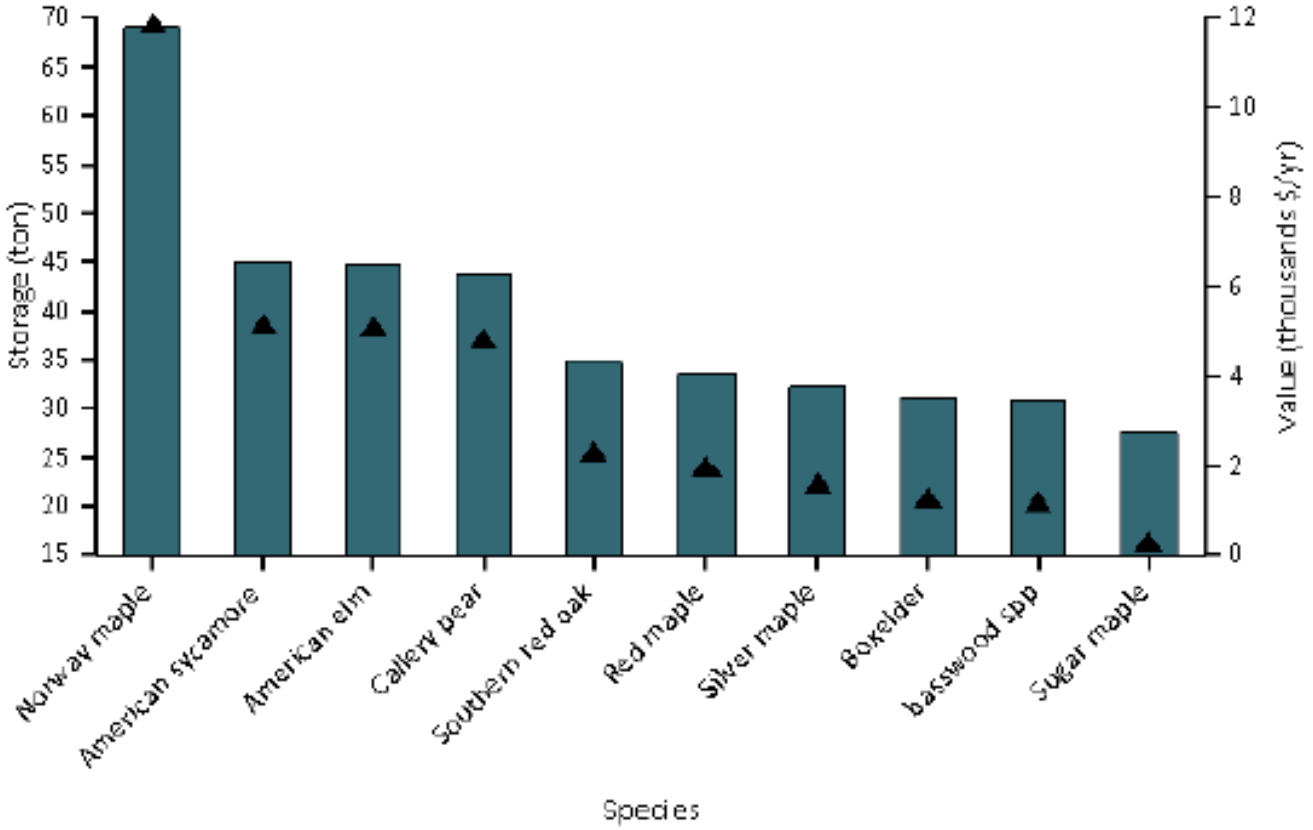

Figure 9. Estimated carbon storage (points) and values (bars) for urban tree species with the greatest storage, City Of Charles Town Urban Tree Inventory

iTree Eco Results Continued: Avoided Runoff

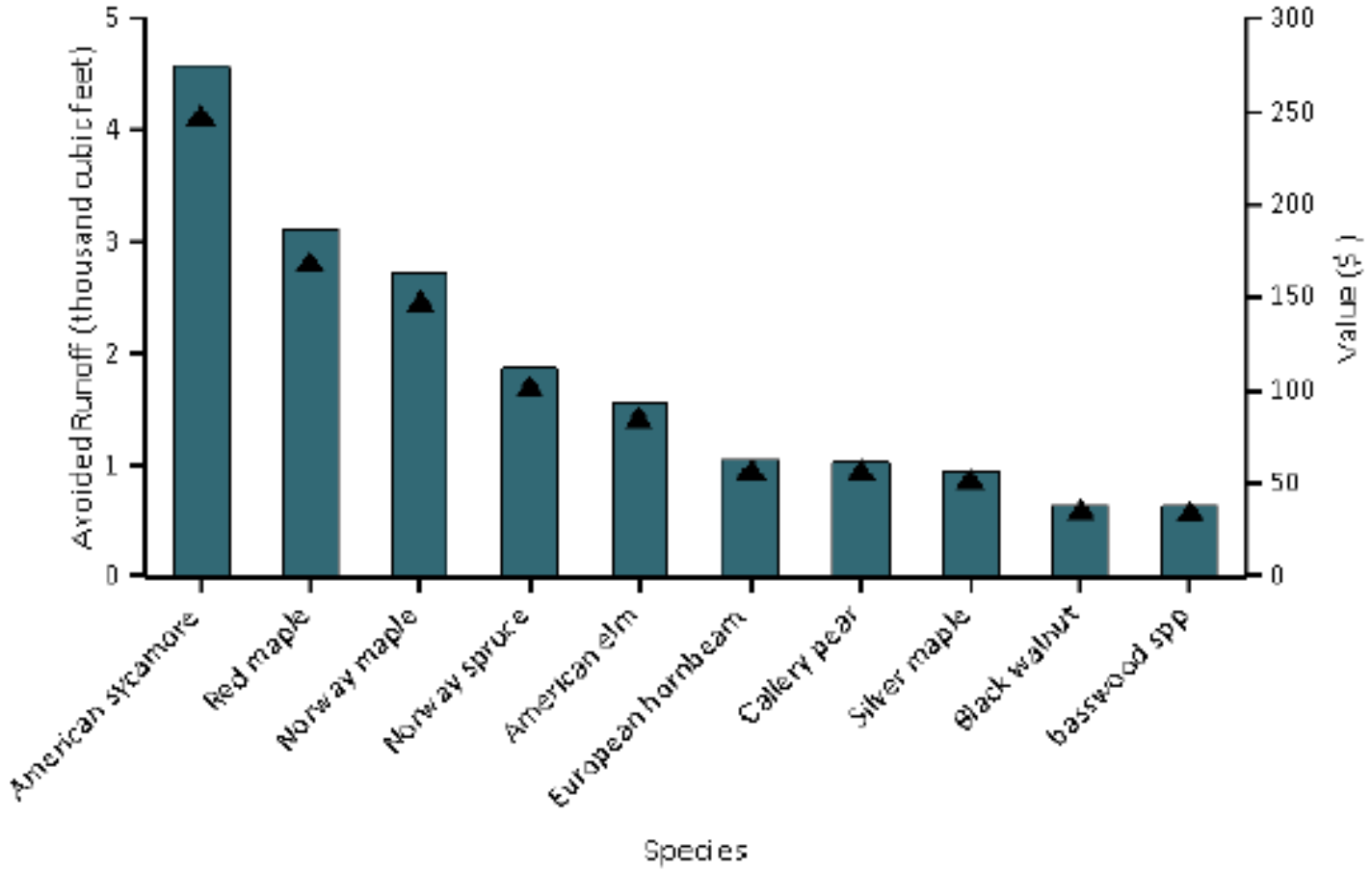

Figure 10. Avoided runoff (points) and value (bars) for species with greatest overall impact on runoff, Charles Town, WV Urban Tree Inventory Analysis

iTree Eco Results Continued: Trees & Building Energy Use

- Eco requires information about the distance and direction of a tree in relationship to buildings in order to estimate energy effects.
- Most tree inventories do not have this type of information available and it would require more time and resources to collect these measurements in the future.
- City of Charles Town, WV was not aware of these requirements prior to the 2019Tree Inventory.

Trainings and Projects completed with other Interns

- Trained at the Martinsburg Stormwater Facility with Emily Janzow and Jared Tomlin on how to use the GPS Trimble unit for data collection, processing data into Pathfinder along with ArcPro.
- Tree Identification training and planting of trees with Herb Peddicord and his intern Ciera Clawson in many locations. (Division of Forestry)
- Helped the Martinsburg Interns: Becca Russell ,Czar Parrish and Maleehah Akhtar with data collection for the City of Martinsburg's Tree Inventory Project.
- Helped Matthew Day, Intern for the Department of Environmental Protection (DEP), with a Stream Assessment.
- Helped Frank Rodgers, the Director of Education and Outreach, Cacapon Institute and Gabe Abreu, Intern for the Cacapon Institute with a Culvert Assessment.

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