

WORCESTER CONSERVATION COMMISSION

Cascades East

Conservation Property Baseline Assessment

July 2024



Table of Contents

Table of Contents	1
Section One: Introduction	2
<i>Property Information</i>	2
<i>Property Background and Setting</i>	2
<i>Statement of Purpose</i>	3
<i>Equipment Used for Data Collection</i>	3
<i>Acknowledgements</i>	3
Section Two: Findings	4
Forest Structure and Health	4
<i>Field Observations</i>	4
<i>Potential Impacts of Climate Change</i>	4
<i>Key Results</i>	5
UTC Results	6
<i>Canopy Cover</i>	6
<i>Canopy Health</i>	6
<i>Benefits</i>	7
Section Three: Management Recommendations	8
<i>Recommendations in Priority Order</i>	8
Appendix A: Maps	9
Appendix B: Findings By Photo and Polygon	15
 TABLES	
Table 1: Expected response of common Cascades East species to climate change	5
Table 2: Canopy cover at Cascades East	6
Table 3: Canopy health at Cascades East	6
Table 4: Canopy benefits at Cascades East	7
Table 5: Summary of field observations by photo and/or polygon ID	15
 MAPS	
Map 1: Site location map	9
Map 2: Existing resources summary map	10
Map 3: Existing trails summary map	11
Map 4: Existing tree health rank summary map	12
Map 5: Representative photo locations summary map	13
Map 6: Cascades Trail System map from Greater Worcester Land Trust	14

Section One: Introduction

Property Information

Property Name: Cascades East

Address: 201 Cataract Street

MBL: 54-006-0001A

Date of Visit: 5/18/2024

Visit conducted by: Lori Carlos and Patti Burns, PWS, CERP

Property Background and Setting

The approximately 33.6-acre Cascades East Conservation Area is a parcel at the northeastern corner of a much larger conserved tract in the City of Worcester and the adjacent Towns of Holden and Paxton called The Cascades that also includes Cascades Park, Cascades West and Boynton Park. Cascades East is owned by the City of Worcester. Along its southern and western boundaries, the parcel abuts Cascades Park. A gravel road (Cataract Street) that is blocked from vehicular use runs along the eastern property boundary. On the opposite side of the gravel road are the backyards of a few residential properties that front on Olean Street. At the northeast parcel boundary there is an abutting residential property and undeveloped land that front on Olean Street. At the northwestern boundary, the property abuts undeveloped land at Holden Reservoir in the Town of Holden (labeled on the trail map as City of Worcester Water Division property). Cascades East slopes from the west at elevations over 790 feet above mean sea level (AMSL) to east, towards Olean Street, where elevations are about 670 feet AMSL. The off-site land continues to slope to the east towards Tatnuck Brook.

The field team entered the property at the intersection of Olean and Cataract Streets and parked in a small gravel lot. At the corner of the lot there is a sign with a trail map that shows all of The Cascades parcels. To the west of the parking area, a trail (Cascades Trail) leads uphill to Cascade Park. This trail is blocked with a boulder but allows room for hikers to pass through. The gravel portion of Cataract Road also ends at the parking area. Vehicular use is limited by a cattle gate, with room for hikers to pass through. There is a larger parking area on Olean Road for access to both Cascades Park and Cascades East. At the central-western portion of property the field team encountered the area labeled on the trail map as the "Clean-up Area" and observed large areas of trash (primarily of broken glass, metal and construction debris). Along the main trail there is evidence of former trash removal areas that are now covered with either non-native pachysandra (*Pachysandra spp.*) ground elder (*Aegopodium podagraria*), or Japanese Knotweed (*Reynoutria japonica*). Much more trash and debris was observed from a narrow trail heading to the south. The western side of that trail and the trail itself, were covered with debris and broken glass. These areas would benefit from a clean up of the dumped materials and management of invasive plants.

In areas that are not former dump sites, The Cascades East is primarily forested and provides habitat for native wildlife. The main trail that runs from the parking area to the west was in use by runners and dog walkers during the field inspection. There are no on-site perennial streams, but intermittent drainage was observed flowing from west to

east across the unpaved portion of Cataract Street. This drainage settles along the west side of Cataract Street forming some isolated wetlands. From those wetlands, intermittent streams flow under and across Cataract Street to mapped wetlands and then continue to flow approximately 800 feet downhill through neighborhoods and undeveloped land to Tatnuck Brook. A mapped certified vernal pool near the border with Cascades Park was not found. Near the center of the eastern boundary there is evidence of a former homestead, with stairs of stone and portions of a foundation.

Statement of Purpose

The purpose of this baseline report is to provide useful information for park planning and management; identify areas of conservation value, areas impacted by non-native plants, encroachments from abutting properties, public accessibility, and regulated areas such as wetlands, perennial rivers, certified vernal pools, and rare habitat. The observations and management recommendations provided in this report will aid the Worcester Conservation Commission in maintaining and improving their conservation properties, tracking changes in the properties over time, and securing funding to support necessary park management activities.

Equipment Used for Data Collection

- Dell Latitude 7220 Rugged Extreme Tablet (polygons and notes)
- Samsung Galaxy S9 SM-G960U phone (photos and notes)
- Apple iPhone Model: 12 Version: IOS 17.4.1 (photos and notes)

Acknowledgements

This project was funded in part by the USDA Forest Service through the Massachusetts Department of Conservation and Recreation Urban and Community Forestry Program. All elements of the project were completed by Davey Resource Group, Inc. with support from the Worcester Conservation Commission. Both institutions are equal opportunity employers.



Section Two: Findings

Forest Structure & Health

Field Observations

Heading onto the Cascades Trail from the Olean parking area, the forest appears to be at a mid-successional state dominated by northern red oak (*Quercus rubra*), sugar maple (*Acer saccharum*), and yellow birch (*Betula alleghaniensis*). Stand age is mixed, with a combination of semi-mature to mature overstory trees, young to semi-mature midstory, and newly established to young understory regeneration. The understory, shrub, and herbaceous layers are native and highly diverse. Bird calls heard in this area during the assessment included wood thrush (*Hylocichla mustelina*), tufted titmouse (*Baeolophus bicolor*), and cardinal (*Cardinalis cardinalis*), indicating good habitat for a range of bird and other species.

Although American beech (*Fagus grandifolia*) is not a primary component of the forest at Cascades East, where it is present it is afflicted by beech leaf disease (BLD), a new threat to beeches caused by a nematode which lives within the leaves of the trees. No cure or treatment for BLD is available at this time, and treatments are typically difficult or impossible to implement on a landscape scale even when options are available. It may be beneficial to monitor areas of denser beech growth to observe what species start to take advantage of the canopy gaps caused by dying overstory beech and determine whether intervention is necessary to prevent invasive species from gaining a foothold or to ensure that tree regeneration of species other than American beech occurs.

As the trail approaches an area which is labeled “Clean-Up Area” on trail maps, there are several stands of invasive species including ground elder (*Aegopodium podagraria*) and Japanese knotweed (*Reynoutria japonica*). There is evidence of past soil disturbance in these areas, possibly related to past efforts to remove what appears to be a large bottle and can dump and construction debris on the property. The dump area is extensive and has resulted in potential hazards for hikers as broken glass and sharp metal and wood litter the area. Soil disturbance and bringing in of outside soil can easily create a perfect habitat for invasive species to thrive, so care should be taken as clean up continues to minimize the risk of invasive species being brought in.

As the trail loops around the Cascades East property, the forest continues to be mid-successional mixed hardwood. Sugar maples, white ash (*Fraxinus americana*), northern red oak, and a variety of birches including black birch, yellow birch, and paper birch are all common in the overstory and midstory. The age structure continues to be diverse, with good cohorts in varying age classes as is desirable in an area that is designated to remain forested into the future. Evidence of past land use is present in several iconic New England stone walls which cross the property, notably along the property boundary with Cataract Street, which is closed to vehicular traffic along the eastern edge of Cascades East and acts as a walking and biking trail. Further evidence of past land use includes a stone staircase as part of a small and unmapped trail, possibly a “desire” trail that has been created by hikers curious about the stairs rather than a true trail. There is a small patch of Japanese knotweed at the top of the stairs.

Potential Impacts of Climate Change

Table 2 includes a summary of the USFS Climate Change Atlas information for tree species commonly found in Cascades East.

Table 1: Expected response of common Cascades East species to climate change.

Species		Model Reliability	Abundance	Habitat Area Change		Capability to Cope with Climate Change	
Common	Scientific			RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
Sugar maple	Acer saccharum	High	Common	Large increase	Large increase	Very Good	Very Good
Yellow birch	Betula alleghaniensis	High	Common	Small increase	Small increase	Good	Good
Black birch	Betula lenta	High	Common	No change	Small decrease	Poor	Poor
Paper birch	Betula papyrifera	High	Rare	Large decrease	Large decrease	Very Poor	Very Poor
American beech	Fagus grandifolia	High	Common	Large increase	Large increase	Very Good	Very Good
White ash	Fraxinus americana	Medium	Common	Small increase	No change	Fair	Poor
Red oak	Quercus rubra	Medium	Abundant	No change	Small decrease	Very Good	Good

The most common species at Cascades East - sugar maple, yellow birch, and red oak - are predicted to do well under both a low and a high emissions climate change scenario. However, other species such as paper birch, black birch, and white ash, are predicted to struggle as climate change continues. Although American beech is predicted to tolerate climate change very well, it is under threat from beech leaf disease and is unlikely to persist on the landscape. This property may require monitoring in the future to determine whether climate change is causing dieback of canopy trees and failure of regeneration to replace them, and to intervene if necessary to help shift the forest species profile toward species which are better suited to survive under climate change.

Key Results

- The forest at Cascades East is mid-successional and mixed-age with high diversity in the understory and primarily native species, providing high-quality habitat for native flora and fauna.
- The large bottle and can dump on the property is a potential hazard to hikers due to the presence of broken glass and sharp, rusted metal.
- Invasive species appear to primarily be taking advantage of disturbed soils in the area around the former dump area. Care should be taken as the area is cleaned up to ensure that invasive species are not allowed to establish.
- Although Cascades East is only slightly larger than 30 acres, it is part of a much larger complex of natural and conserved properties that provides excellent wildlife habitat and recreational opportunities.

- Trails in the area are well mapped, marked, and maintained, although the parking area on Olean Street could use some maintenance to remove potholes and combat erosion.
- No encroachment appears to be taking place at this property, likely due to it being surrounded by other natural parcels rather than by residential or commercial properties.
- Most of the dominant canopy species such as red oak, sugar maple, and yellow birch are predicted to do well under climate change. However, other species such as paper birch and black birch are predicted to struggle. Still others, such as American beech and white ash, are under threat from invasive pests and are unlikely to be able to persist on the landscape long-term, regardless of climate change.
- Future forest monitoring should focus on identifying new insect and disease threats to the forest - catching these issues early allows more time to determine how best to combat them. It should also focus on determining how current pest and disease threats and climate change may be impacting.
- The forest is the main feature of East Cascades, but the area is the headwater source of intermittent streams that flow to Tatnuck Brook and play a key role in regional hydrology.

UTC Results

Canopy Cover

Table 2. Canopy cover at Cascades East.

	Number of Parcels	Total Property Acres	Acres of Canopy Cover	% Canopy Cover
Cascades East	1	31.08	31.06	99.92

Canopy Health

Table 3. Canopy Health at Cascades East.

Very Good		Good		Fair		Poor		Dead/Dying		Not Classified	
Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
1.54	4.96	11.59	37.32	13.08	42.10	4.54	14.61	0.25	0.82	0.04	0.13

Overall, canopy health at Cascades East is fair or better (84.38%) with a fairly small portion of poor or worse canopy health (15.56%). Areas of poor canopy health seem to be associated with areas with either high proportions of American beech which are being affected by beech leaf disease or the clean-up bottle and can dump area where canopy is thinner and may be stressed due to poor soils, invasive species pressure, and/or soil contaminants from the old dump.

Benefits

Table 4. Canopy Benefits at Cascades East.

Air Pollution Removal (Annual)		Carbon Sequestration (Annual)		Avoided Stormwater Runoff (Annual)		Carbon Storage (Lifetime)	
Pounds	\$	Tons	\$	Gallons	\$	Tons	\$
2,233.96	\$505.56	35.18	\$6,000.41	41,846.50	\$373.93	1,064.45	\$181,542.74

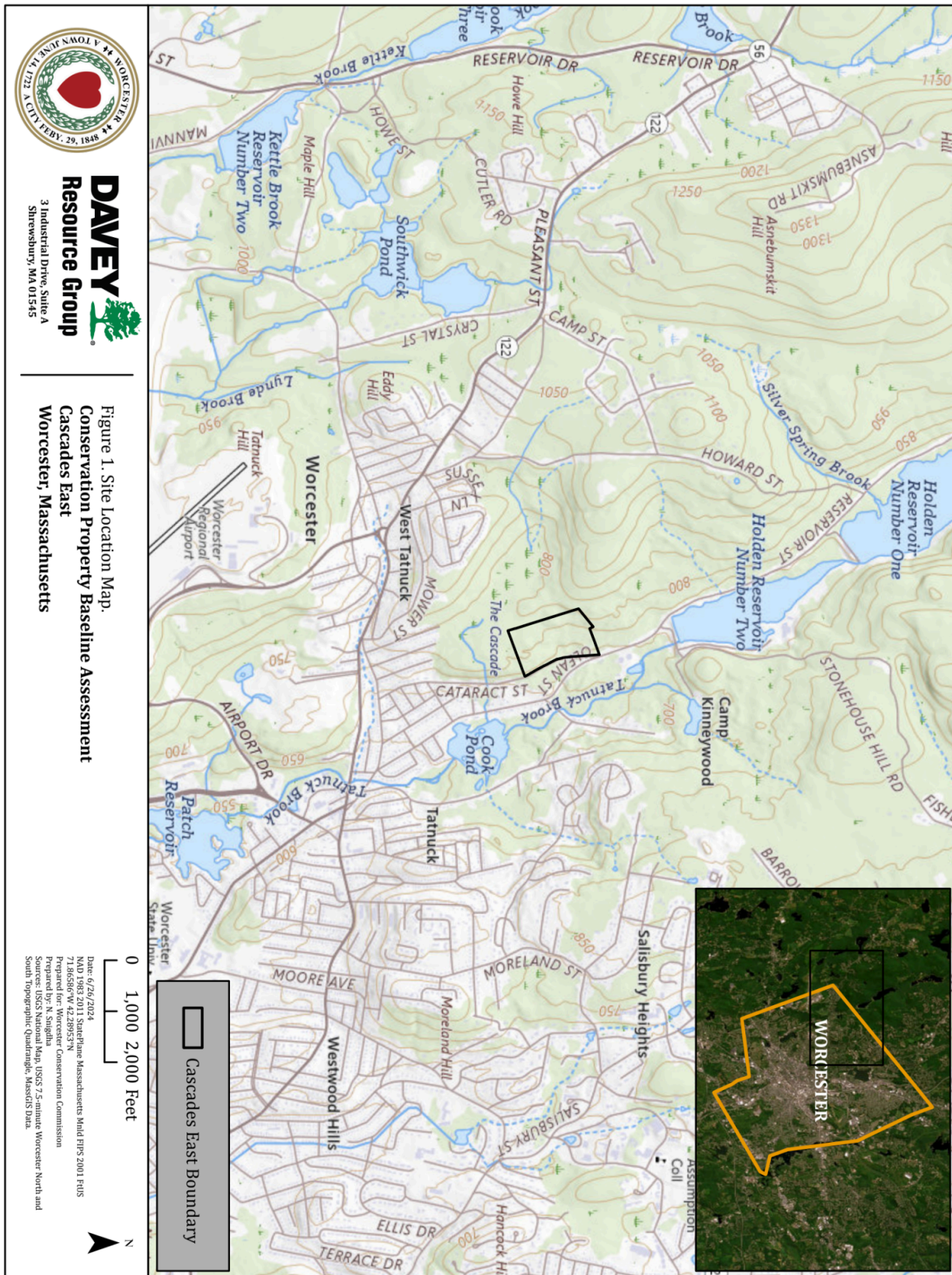
Please note that the trees at Cascades East provide many additional benefits not calculated here. Only benefits for which there are well-supported algorithms were estimated for this project.

Section Three: Management Recommendations

Recommendations in Priority Order

1. Manage ground elder and Japanese knotweed invasive species infestations around the bottle and can dump clean-up area.
 - a. Develop a management strategy specific to the species and scope of the infestations.
 - b. Carry out management tasks and reseed cleared areas with native species from a reputable and knowledgeable source.
 - c. Monitor invasive species management areas several times annually to identify resprouting undesirable species and adjust management accordingly.
2. Manage or eradicate Japanese knotweed patch at the top of the stone stairs.
 - a. Due to the small size of the infested area, it may be possible to eradicate this infestation.
 - b. Chemical methods will likely be needed to manage Japanese knotweed, as it is very difficult and inadvisable to attempt manual or mechanical removal alone since it can easily resprout or spread from any scraps left behind.
 - c. Monitor the area several times annually after invasive removal to look for resprouting and continue to treat as needed to control and ultimately eradicate the infestation.
3. Continue clean-up of the bottle and can dump. Past clean up efforts may have resulted in invasive species infestations.
 - a. Consider posting signage to warn hikers of the hazards around the dump area (broken glass, sharp metal, etc.)
 - b. Minimize soil disturbance wherever possible to reduce suitable habitat for invasive species.
 - c. Ensure that any new soil brought into the site is clean and free from invasive propagules. Japanese knotweed, in particular, is known to be present in many commercially available soils.
 - d. Replant or reseed disturbed areas after clean-up with native plants purchased from a knowledgeable and reputable source to limit suitable habitat for invasive species to take root.
 - e. Monitor cleared areas annually to look for invasive species that may have been brought in or encouraged by the soil disturbance.
 - f. Many of these tasks could potentially be done, wholly or in part, by volunteers or conservation stewards to provide educational opportunities.
4. Repair the Olean Street parking area.
 - a. Fill in potholes and areas of erosion in the parking lot to provide a better surface for parking of vehicles.
 - b. Consider assessing the site for erosion control practices that could help prevent erosion in the future.
5. Monitor forest health.
 - a. Have conservation agents or knowledgeable conservation stewards walk the property annually to look for signs and symptoms of forest pests and disease and new invasive plant pests.
 - b. Monitor the decline of white ash and American beech due to pests and determine if supplemental planting is needed to ensure forest regeneration to fill those canopy gaps.
 - c. Stay up to date on any new treatments or remedies for known pests and diseases such as emerald ash borer and beech leaf disease, and consider implementing treatments if advisable on a small landscape scale to preserve some individuals of those tree species on the landscape.

APPENDIX A: MAPS

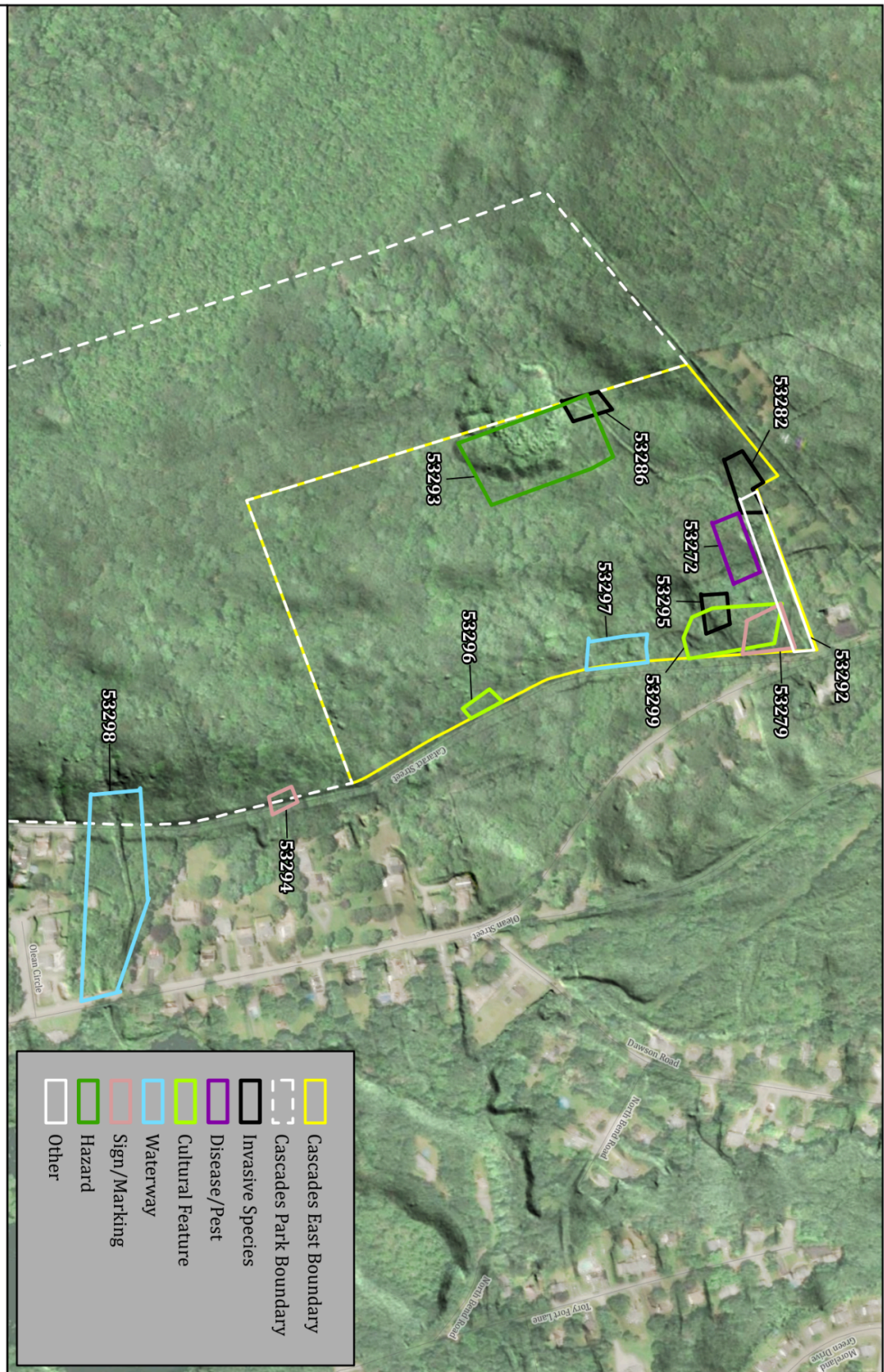


Map 1: Site location map.



DAVEY
Resource Group
3 Industrial Drive, Suite A
Shrewsbury, MA 01545

Figure 2. Existing Resources Summary Map.
Conservation Property Baseline Assessment
Worcester, Massachusetts



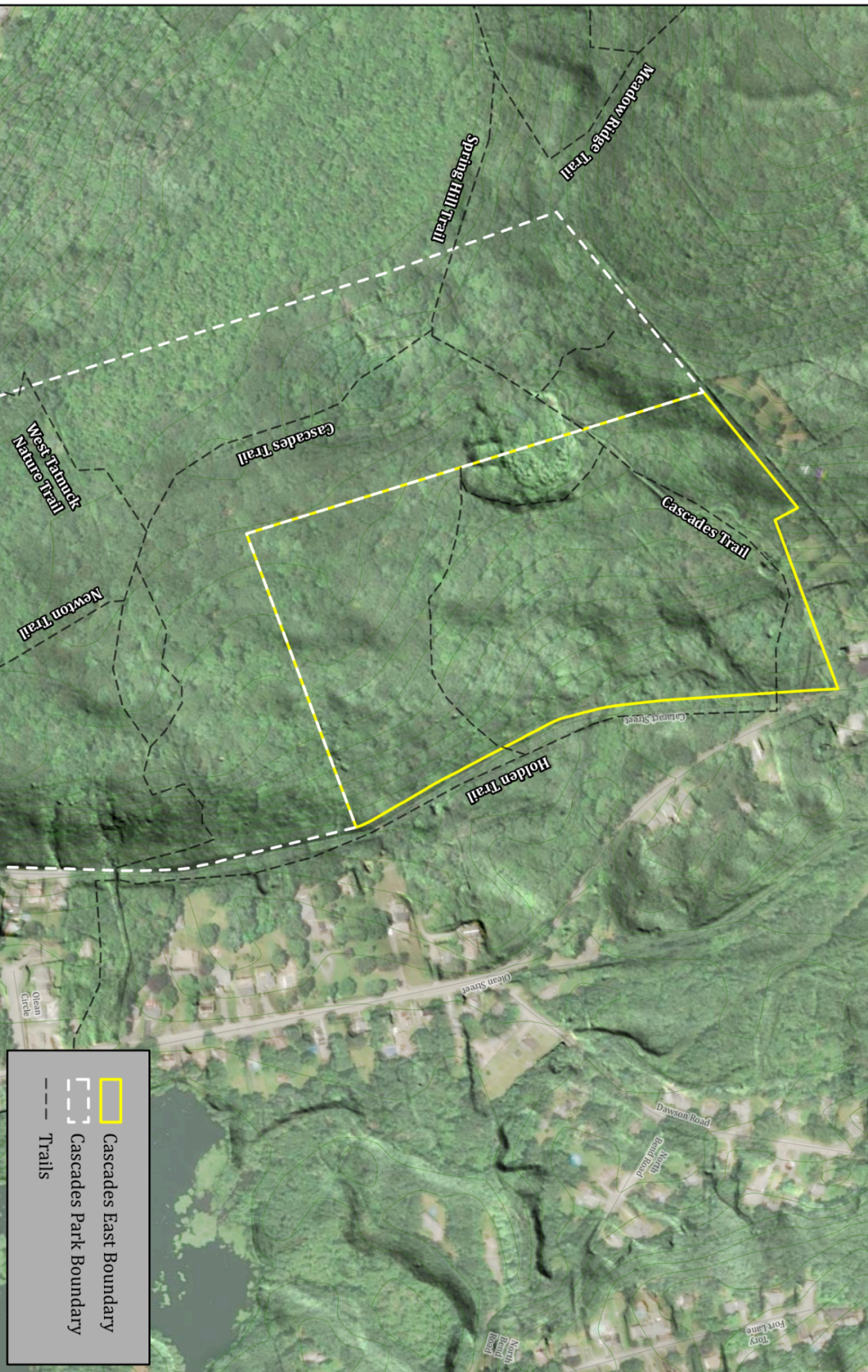
Map 2: Existing resources summary map.



DAVEY
Resource Group
3 Industrial Drive, Suite A
Shrewsbury, MA 01545

Figure 3. Existing Trails Summary Map.
Conservation Property Baseline Assessment
Cascades East
Worcester, Massachusetts

0 300 600 Feet
Date: 6/27/2024
NAD 1983 2011 StatePlane Massachusetts Mifg FIPS 2001 PUIS
71.86496°W 42.28863°N
Prepared for: Worcester Conservation Commission
Prepared by: N. Singh
Sources: ESRI World Imagery, MassGIS Data, Elevation Contours
Scale: 1:50,000 (approx.)
Data Source: 6/18/2024



Map 3: Existing trails summary map.



DAVEY
Resource Group
3 Industrial Drive, Suite A
Shrewsbury, MA 01545

Figure 4. Existing Tree Health Rank Summary Map.
Conservation Property Baseline Assessment
Cascades East
Worcester, Massachusetts



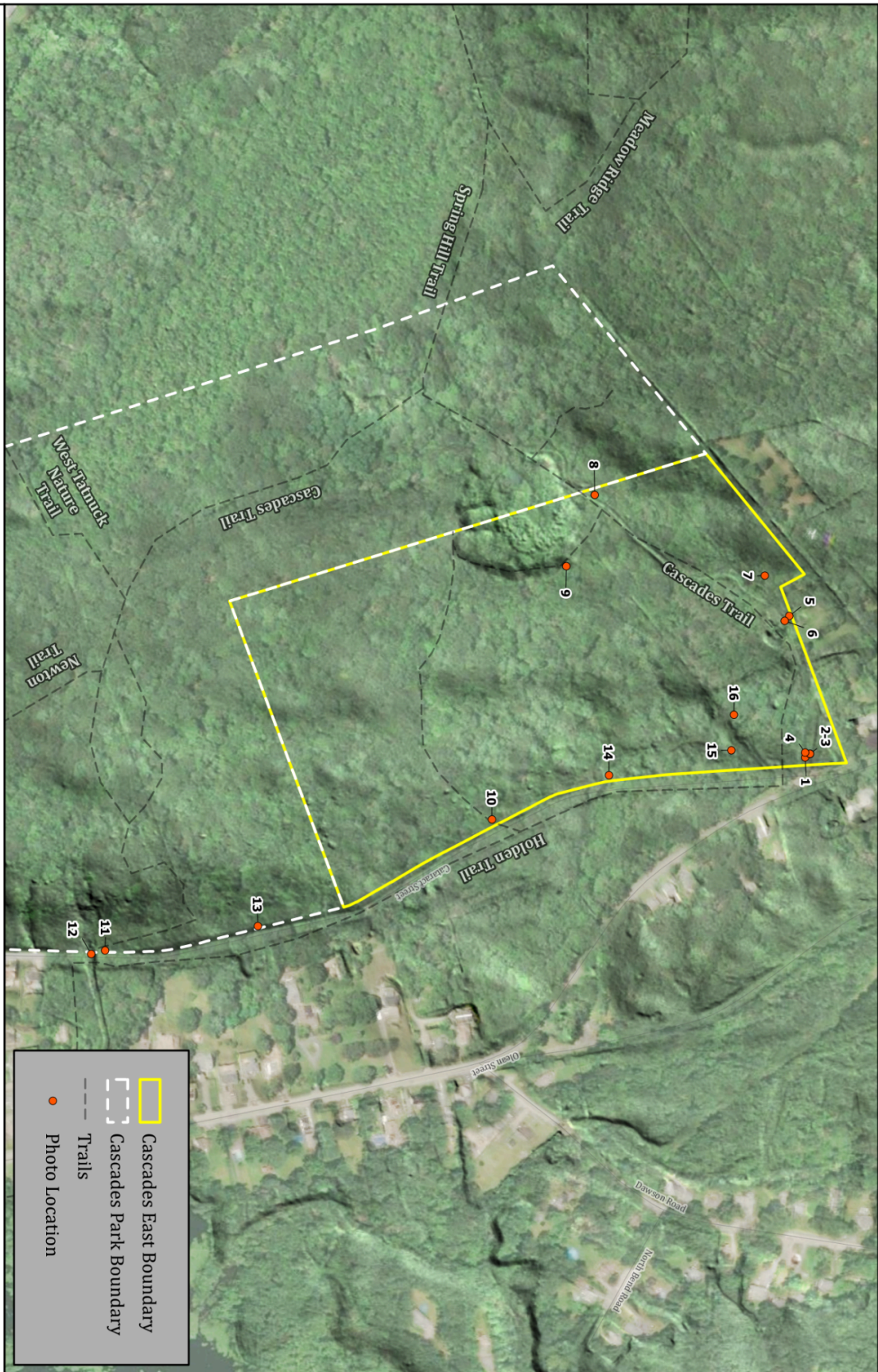
Date: 6/27/2024
MAD 1983 2011 StatePlane Massachusetts Mifg FIPS 2001 RUS
71.86532°W 42.28951°N
Prepared for: Worcester Conservation Commission
Prepared by: N. Singhla
Source: ESRI World Imagery, MassGIS Data, DRC Raster Analysis, DRC
Site Visits 6/18/2024.

Map 4: Existing tree health rank summary map.



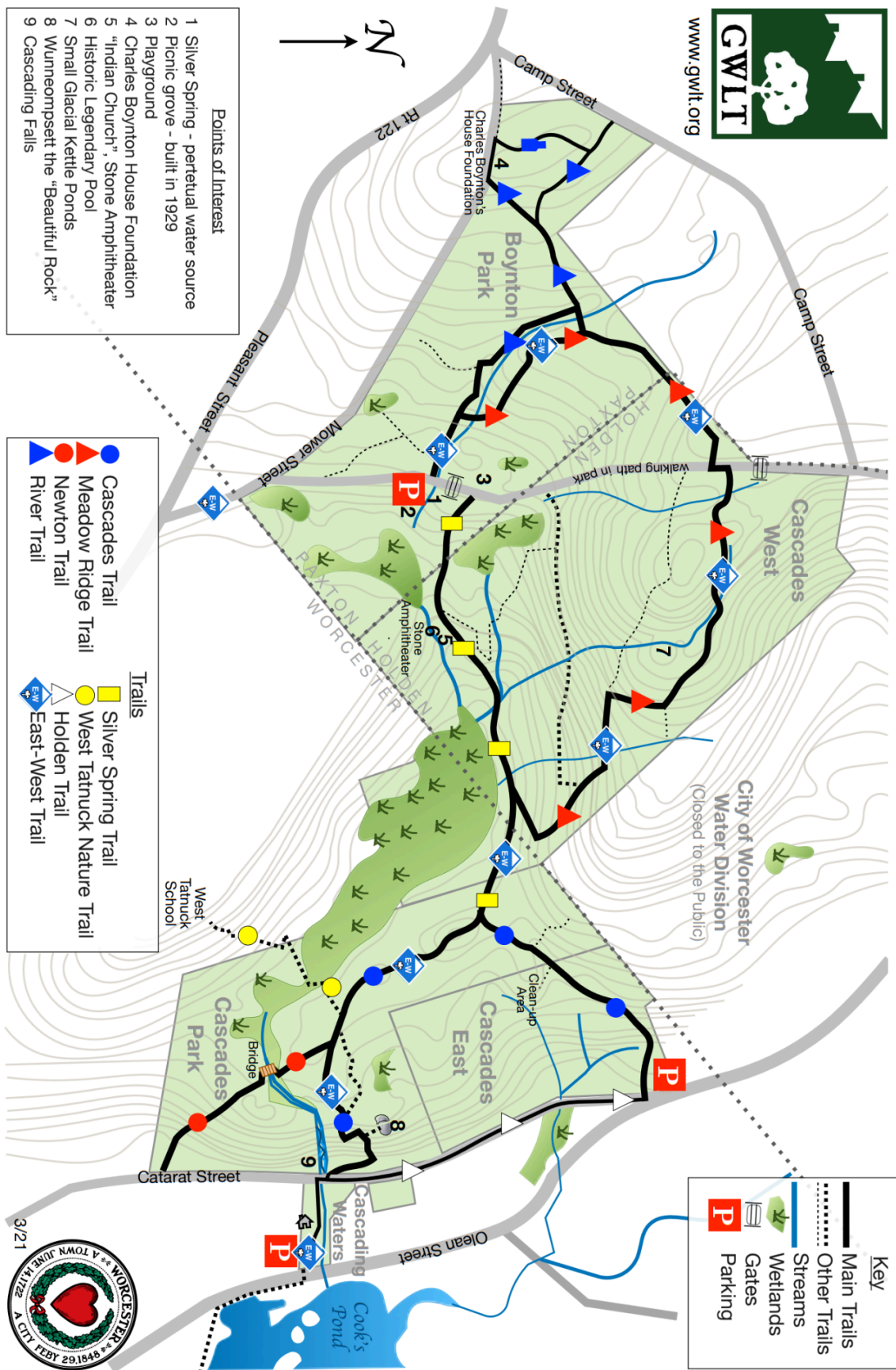
DAVEY
Resource Group
3 Industrial Drive, Suite A
Shrewsbury, MA 01545

Figure 5. Representative Photo Locations Summary Map.
Conservation Property Baseline Assessment
Cascades East
Worcester, Massachusetts



Map 5: Representative photo locations summary map.

The Cascades Trail System Paxton, Holden, Worcester



Map 6: Cascades Trail System map from Greater Worcester Land Trust.

APPENDIX B: FINDINGS BY PHOTO & POLYGON

Table 5. Summary of Field observations by photo and/or polygon ID.

Photo ID	Polygon ID	Type	Comments
1-4	53279	Sign/Marking	(Photo 1) Well-maintained hiking trail map at parking area off Olean Street. (Photo 2) A metal gate blocks vehicle access to the gravel portion of Cascade Street from the Olean parking area. (Photo 3) Concrete barriers prevent vehicle access to the trail leading into Cascades East from the Olean parking area. (Photo 4) The Olean Street parking area has multiple potholes and eroded areas but was in use at the time of the assessment.
5-6	53292	Other	(Photo 5) To the northern side of the trail from the Olean parking area is a privately owned meadow providing birch habitat. (Photo 6) To the southern side of the trail from the Olean parking area is mid-successional deciduous forest.
No photo	53272	Disease/Pest	Beech leaf disease.
7	53282	Invasive Species	A patch of ground elder (<i>Aegopodium podagraria</i>) and evidence of past soil disturbance.
8	53286	Invasive Species	A patch of Japanese knotweed (<i>Reynoutria japonica</i>) and pachysandra (<i>Pachysandra</i> spp.) lie along the western boundary of the Cascades East parcel. There appears to have been soil disturbance in the area in the past.
9	53293	Hazard	Area labeled as “clean-up area” on trail maps appears to be an old dump filled with broken glass, wood, and metal debris. Signs of excavation may be related to clean-up efforts.
10	53296	Cultural Feature	The eastern boundary of Cascades East runs along the gravel Cataract Street trail and includes an old stone wall.
11-12	53298	Waterway	(Photo 11) Trail map for the East-West Trail off site at the neighboring Cascades Park. (Photo 12) The cascades of Cascades Park, visible from Cataract Street.
13	53294	Sign/Marking	Boundary marker for the Cascades East conservation property along Cataract Street.
14	53297	Waterway	Forest in the area is dense and multi-aged with signs of intermittent streams that may flood across Cataract Street when high.
15	53299	Cultural Feature	Stone steps to a small, unmapped trail may be related to a former homestead on the site.

Photo ID	Polygon ID	Type	Comments
16	53295	Invasive Species	A small patch of Japanese knotweed is present near the top of the stone stairs.



Photo 1

Polygon ID: 53279

Type: Sign/Marking

Comments: Well-maintained hiking trail map at parking area off Olean Street.



Photo 2

Polygon ID: 53279

Type: Sign/Marking

Comments: A metal gate blocks vehicle access to the gravel portion of Cascade Street from the Olean parking area.



Photo 3

Polygon ID: 53279

Type: Sign/Marking

Comments: Concrete barriers prevent vehicle access to the trail leading into Cascades East from the Olean parking area.

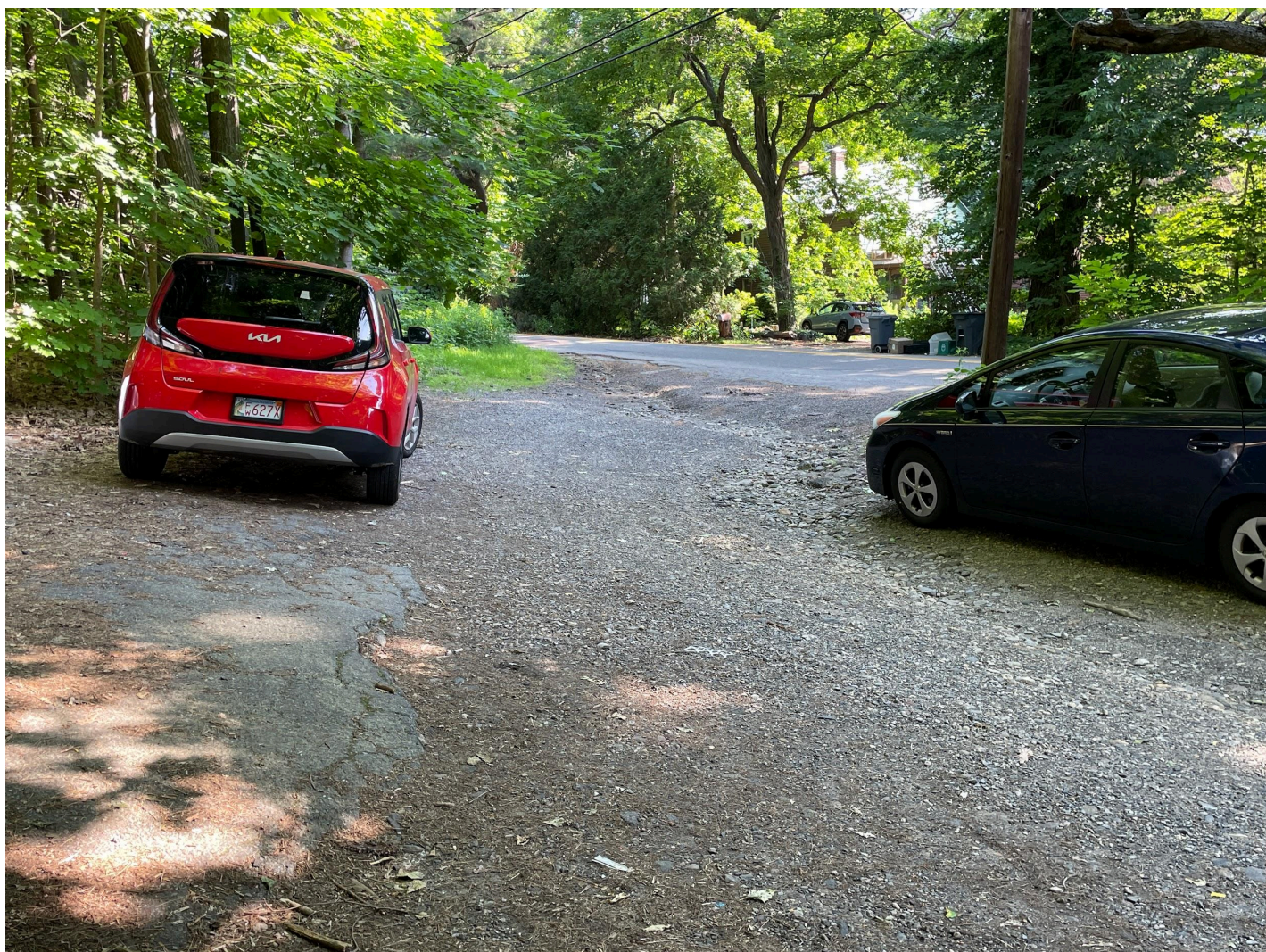


Photo 4

Polygon ID: 53279

Type: Sign/Marking

Comments: The Olean Street parking area has multiple potholes and eroded areas but was in use at the time of the assessment.



Photo 5

Polygon ID: 53292

Type: Other

Comments: To the northern side of the trail from the Olean parking area is a privately owned meadow providing birch habitat.



Photo 6

Polygon ID: 53292

Type: Other

Comments: To the southern side of the trail from the Olean parking area is mid-successional deciduous forest.



Photo 7

Polygon ID: 53282

Type: Invasive Species

Comments: A patch of ground elder (*Aegopodium podagraria*) and evidence of past soil disturbance.



Photo 8

Polygon ID: 53286

Type: Invasive Species

Comments: A patch of Japanese knotweed (*Reynoutria japonica*) and pachysandra (*Pachysandra* spp.) lie along the western boundary of the Cascades East parcel. There appears to have been soil disturbance in the area in the past.



Photo 9

Polygon ID: 53293

Type: Hazard

Comments: Area labeled as “clean-up area” on trail maps appears to be an old dump filled with broken glass, wood, and metal debris. Signs of excavation may be related to clean-up efforts.



Photo 10

Polygon ID: 53296

Type: Cultural Feature

Comments: The eastern boundary of Cascades East runs along the gravel Cataract Street trail and includes an old stone wall.



Photo 11

Polygon ID: 53298

Type: Waterway

Comments: Trail map for the East-West Trail off site at the neighboring Cascades Park.



Photo 12

Polygon ID: 53298

Type: Waterway

Comments: The cascades of Cascades Park, visible from Cataract Street.



Photo 13

Polygon ID: 53294

Type: Sign/Marking

Comments: Boundary marker for the Cascades East conservation property along Cataract Street.



Photo 14

Polygon ID: 53297

Type: Waterway

Comments: Forest in the area is dense and multi-aged with signs of intermittent streams that may flood across Cataract Street when high.



Photo 15

Polygon ID: 53299

Type: Cultural Feature

Comments: Stone steps to a small, unmapped trail may be related to a former homestead on the site.



Photo 16

Polygon ID: 53295

Type: Invasive Species

Comments: A small patch of Japanese knotweed is present near the top of the stone stairs.