Brightwood Park Ecological Mapping Report – September 2020

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Purpose
The purpose of this report was to evaluate ecological conditions related to restoration potential and an evaluation of existing fencing conditions (including consideration of converting existing fencing to exclude deer and/or installation of additional deer exclosure fencing). The report also includes evaluation of public uses relative to ecological features. The report format follows the Scope of Work provided by the Town of Westfield on August 1, 2020.

Following the report text, this report contains two tables related to the existing perimeter fencing condition and a map (shown at full extent, then closer up versions of the northern and southern portions of the Park) showing all relevant features including high-quality ecological areas, existing and proposed trails, wetlands and streams.

Findings and Recommendations

1. Map, specify (including types and quantities of materials), stake out and prioritize the lightly disturbed areas (dominated by native species) and undisturbed areas (old growth, high value "gem" forest and wetland areas) for exclosing both deer and mountain bikers (and hikers, where necessary), on the inside of the park using recent and historical aerial photos and the 2008 report maps followed by ground truthing.

There are two high-quality areas recommended for deer exclosures (if entire Park perimeter fencing is not converted into a deer exclosure). The first area is located in the northern portion of the Park and the second area is located in the southern / southeastern portion of the Park. Deer exclosures would allow the forest understory to fully develop to include a diversity of native tree seedlings / saplings, shrubs and wildflowers, thus minimizing future infestations of invasive species.

New deer exclosure fencing should be a minimum of 7.5 feet tall (including fencing and one or two wires above the main fencing). Fence material should be woven-wire galvanized metal fencing (4 to 6-inch openings) attached to pressure treated posts of at least 6 inches in diameter. Any gates should be constructed of metal with hinges to allow self-closure.

It is recommended that any new trails (regardless of use) not be placed within the two high-quality areas to minimize disturbance / destruction of native plant communities and minimize spread of invasive species such as Japanese Stiltgrass. Additionally, any new trails within the Park should avoid wetlands and stream crossings as these areas are sensitive to disturbance that would degrade wetland and stream health. The publicly available NJDEP GIS wetlands layer is only approximate (not determined through a formal wetlands delineation) - for example, there is a large unmapped wetland

area (potentially a vernal pool) located just south of a mapped wetland patch along the eastern boundary of the Park. Therefore, it is recommended that the Town of Westfield contact the NJDEP to determine the need to complete a GP-17 permit (relates to the construction of trails in wetlands) if any new trails are being considered.

Area #1 Attributes:

- Area #1 is 5.5 acres with a perimeter of 2,350 feet (includes 1,050 feet of existing Park perimeter fence)
- Area #1 boundary was drawn to minimize interference with existing trails, but two self-closing pedestrian gates are required on the existing gravel trail.
- Non-infested or lightly infested areas cover 75% of Area #1.
- Heavily infested areas (especially Chinese Wisteria but also Japanese Knotweed, Multiflora Rose and others) are included in Area #1 so that post-treatment recovery is hastened by the lack of deer browse.
- There are no NJDEP GIS wetlands in Area #1.
- Area #1 features mature trees including Red Oak, White Oak, Black Oak, Sweet Birch, American Beech, Mockernut Hickory, Flowering Dogwood, Maple-leaved Viburnum, Lowbush Blueberry, Black Huckleberry, Sarsaparilla and Pennsylvania Sedge. The entire area has sparse native wildflowers due to excessive deer browse.

Area #2 Attributes:

- Area #2 is 9.5 acres with a perimeter of 3,290 feet (includes 1,780 feet of existing Park perimeter fence).
- There are no trails within Area #2, but two self-closing pedestrian gates off of the existing unimproved road are recommended for stewardship access (at eastern and western ends of area).
- Non-infested or lightly infested areas cover 75% of Area #2 (two distinct 'clean areas' occur on the western and southeastern portions of Area #2).
- Heavily infested areas (located in between the cleaner portions of the area) are included in Area #1 so that post-treatment recovery is hastened by the lack of deer browse.
- There is a significant amount of NJDEP GIS wetlands in Area #2, but any new fencing would primarily be installed along the edge of the unimproved access road with only a small portion constructed in uplands (175 feet, forming the western boundary of Area #2).
- Area #2 features both dry upland and wetland / transitional plant communities. Dry areas include Chestnut Oak, White Oak, Black Oak, Red Oak, Mockernut Hickory, Sweet Birch, Flowering Dogwood, Sassafras, Lowbush Blueberry and Pennsylvania Sedge. The wetland and transitional communities include Tulip Poplar (including very large specimens), Swamp White Oak, Red Maple, White Oak (including very large specimens), Red Oak (including very large specimens), Black Tupelo, Ironwood, Sassafras, Lowbush Blueberry, Black Huckleberry, Bracken Fern, Christmas Fern, Wood Reed and New York Fern. The entire area has sparse native wildflowers due to excessive deer browse.

2. Using the same approach as in step 1, map the areas most disturbed by invasive species, including which invasive species are dominant there, and/or occurring in closest proximity to the high value areas and associated hiking trails, and prioritize those areas in terms of the technical and cost feasibility of eradicating or controlling the invasive species there to minimize the risk of them encroaching on the high value areas and associated hiking trails.

The most highly threatening infested areas adjacent to the high-quality areas are included within the recommended deer exclosure boundaries outlined above. By including these infested areas within fencing, post-treatment recovery is accelerated by allowing native species to effectively compete against any invasive species attempting to re-establish within the exclosures.

Area #1 Protection:

- Contains approximately 4.0 acres of native plant community virtually free of invasive species. The understory and ground layers have been largely removed through years of excessive deer browse.
- Contains approximately 1.5 acres of heavily infested area. Control is feasible but could require up to 150 hours of effort including well-trained volunteers or contractors specializing in invasive species control. Following initial treatment, follow up spot treatments would be required annually. The initial treatment, if conducted solely by a contractor, has an estimated cost of $5,500.
- Species include Chinese Wisteria (extensive but currently being treated), Japanese Knotweed, Multiflora Rose, Garlic Mustard, Mugwort, Northern Catalpa, Black Locust, Japanese Stiltgrass and English Ivy.

Area #2 Protection:

- Contains approximately 7.0 acres of native plant community virtually free of invasive species. This area contains at least one dozen exceptionally large old trees. The understory and ground layers have been largely removed through years of excessive deer browse.
- Contains approximately 2.5 acres of heavily infested area. Control is feasible but could require up to 250 hours of effort including well-trained volunteers or contractors specializing in invasive species control. Following initial treatment, follow up spot treatments would be required annually. The initial treatment, if conducted solely by a contractor, has an estimated cost of $8,500.
- Species include Norway Maple, Garlic Mustard, Northern Catalpa, Winged Burning Bush, Privet, Japanese Honeysuckle, Japanese Knotweed, Phragmites, Wineberry, Japanese Stiltgrass, and Multiflora Rose.
- The adjacent unimproved access road is heavily infested on both sides of the road and is therefore a high priority for treatment to protect Area #2. In addition to species listed above, this area also includes Japanese Barberry and Chinese Wisteria. This area is an additional 2.5 acres and would require significant heavy clearing utilizing a forestry mower followed by hand spraying of resprouts. Costs of forestry mowing varies but may be up to $5,000 to clear the entire 2.5 acres. Hand treatments following forestry mowing, if solely conducted by a contractor, has an estimated cost of $2,500.

3. Map the gaps in the existing perimeter fence, including the number of affected post-to-post sections involved in each gap, and specify the additional height and type and quantity of materials (e.g., wire strands) needed to reinforce the entire perimeter fence to exclude deer from the entire park. Also specify the cattle grates and visitor gates needed at the two entrances. (The Town will follow up with fencing contractors to provide costs for all of these items.)

The entire fence perimeter is approximately 7,310 feet. A summary of fence condition by damage type is provided in Table 1 with details of 60 mapped locations provided in Table 2. Approximately 27% (1,975 feet) of the fence requires removal of dense vegetation (6%), extension of fence bottom

to reach ground level (10%) or significant repair / replacement (11%). Approximately 3% of the fence perimeter includes sections replaced by neighbors and/or replaced by the Township in the recent past.

Two cattle grates and two pedestrian gates are recommended for the main entrance (24' wide x 8' deep cattle grate) and secondary entrance at John Street (12' wide x 8' deep cattle grate). Pedestrian gates should be self-closing and 4' wide.

The entire fence perimeter is 6 feet in height. It is recommended that two additional wire strands be placed at 1-foot intervals to increase the effective height to 8 feet.

4. Conduct a comparison of the three alternatives listed below relative to their technical feasibility, ballpark cost ranges, and effectiveness of excluding deer, bikers (and hikers, where necessary) out of the high value areas:

    - Using the exclosure approach only (see step 1)
        - This approach is not recommended as costs for new fence lengths for either high-quality area approach costs to repair all severely damaged sections of the existing perimeter fence (see below). Total estimated cost is approximately $20,000 (see below for additional costs that can only be determined through a contractor bid).
        - The installation of two deer exclosures containing the high-quality areas includes 2,810 feet of new exclosure fencing (approximately $20,000 if $7/linear foot) and heightening of 2,830 feet of existing perimeter fencing (cost unknown but likely to be relatively inexpensive).
        - For Area #1, repairs to existing perimeter fence primarily involve extending existing fencing to ground level and are likely to be relatively inexpensive (See Table 2, damage area numbers 54-60). New fencing would be required along 1,300 feet for an approximate cost of $9,100. One existing trail occurs in this area, additional biking trails have been proposed but are not recommended for this area.
        - For Area #2, damage to the existing perimeter fence is more extensive and would incur additional costs to exclude deer (See Table 2, damage area numbers 17-34). New fencing would be required along 1,510 feet for an approximate cost of $10,600. This area does not have any existing trails and it is recommended that the proposed biking trail not be built in this area.

    - Using the perimeter approach only (see step 2)
        - This approach is strongly recommended. Total estimated costs are $17,000 (see below for additional costs that can only be determined through a contractor bid).
        - There are significant cost savings in utilizing existing fencing and eliminating the need to install new fencing within Park boundaries. It is ecologically desirable, protecting the entire Park and allowing for significant improvements to ecological health. It would facilitate current invasive species control and reduce the need for future control efforts by allowing native species to effectively compete with invasive species because of the elimination of excessive deer browse. It would also maintain the existing visitor experience (i.e., perimeter fencing is virtually invisible and there is no need to traverse internal gates while utilizing trails).
        - Approximately 1,560 feet of the existing 6-foot fencing requires extensive repair or replacement. If these areas are completely replaced with new deer exclosure fencing, then it would cost approximately $11,000.
        - The remaining 5,750 feet of intact 6-foot perimeter fencing would require a 2-foot height extension using wire strands (10 gauge minimum). This work requires

approximately $1,000 for materials (unknown labor costs until a bid is received from a contractor).
    - Cattle grate installation at two locations would cost approximately $5,000 for materials ($1,000 per unit x 5 units, Tractor Supply). Labor costs would have to be provided by a contractor.
    - Pedestrian gates can take any form desired by the Township, but would include special hardware (e.g., springs) to close behind entering/existing pedestrians. A rough estimate for quality spring sets would be $50 per gate or $100 for two gates.

- Using both the exclosure and perimeter approaches
    - This approach is not recommended as costs would be prohibitive compared to the other two options. The only potential benefit would be restricting human access to high value areas once they enter the Park's perimeter deer exclosure fencing.

5. Given the maps produced in steps 1, 2 and 3, are there places or corridors to locate a mountain bike trail that can be safely buffered from the high value areas and from the hiking trails that provide a peaceful nature experience?

There is a total of 5,044 feet of existing trails, this includes the main loop around the pond. Additional existing trails range from regularly utilized dirt trails to narrow trails apparently created by mountain bikers. The unimproved access road is 2,406 feet long. The proposed bike trail is 7,161 feet and is essentially independent of any existing trails (except for several hiking trail crossings).

It is recommended that new mountain bike or pedestrian trails should not be constructed within the two high-quality areas of the Park. If this recommendation is accepted, then it would not be possible to maintain a completely independent bike trail at the Park. The Park has a significant number of existing trails that could be considered for dual uses and it may be possible to create additional trail segments in lower quality areas to increase bike trail opportunities (e.g., parallel to existing pond trail loop, excluding high-quality area #1). It is a value judgement whether dual use is desirable as the two user groups tend to have opposing desires (quiet enjoyment vs. traversing the Park at higher speeds, creating ramps/jumps, etc.).

6. Prepare and submit a report summarizing your findings, conclusions and recommendations regarding steps 1-5.

Provided above.

Table 1. Summary of Fence Condition by Damage Type

Damage Type	Length (feet)	Percentage of Fence Perimeter	Notes
Bottom Gap - 0.5-1'	490	6.7	Fence Extension Required, potential for deer to enter
Bottom Gap - 1-2'	220	3.0	Fence Extension Required, potential for deer to enter
Bottom Gap - 2-3'	50	0.7	Fence Extension Required, potential for deer to enter
Cattle Grate Required - 12 Feet	12	0.2	Access Road Entrance
Cattle Grate Required - 24 Feet	24	0.3	Main Entrance
Covered - Heavy Vegetation	410	5.6	Fence Intact, but requires vegetation clearing
Damaged / Down - Fence Leaning	30	0.4	Requires securing or replacement of posts
Damaged / Down - Heavy Vegetation	110	1.5	Replacement required following clearing of vegetation
Damaged / Down - Hole in Fence	40	0.5	Repair required
Damaged / Down - Top Post Bent	30	0.4	Repair required
Damaged / Down - Top Post Bent, Tree Leaning	20	0.3	Repair required
Damaged / Down - Tree Through	160	2.2	Replacement required following clearing of vegetation
Gate Installed by Neighbor	20	0.3	Repair required
Missing - Fence and Posts Missing	120	1.6	Replacement required
Missing - Fence Missing, Posts Present	60	0.8	Replacement required
New Fence - 4' Chainlink installed by neighbor	60	0.8	Replacement required
New Fence - 6' Chainlink installed by neighbor	80	1.1	Additional height required on neighbor fence
New Fence - 6' Metal Bars installed by neighbor	90	1.2	Additional height required on neighbor fence
New Fence - 6' Silver chainlink (matches existing)	70	1.0	Nothing required, 70 feet of new fencing
Tree Leaning - No damage yet	110	1.5	Clearing of vegetation required
Toal Damaged	**2,206**	**30.2**	
Total w/o Damage	**5,104**	**69.8**	
Toal Fence Perimeter	**7,310**	**100.0**	

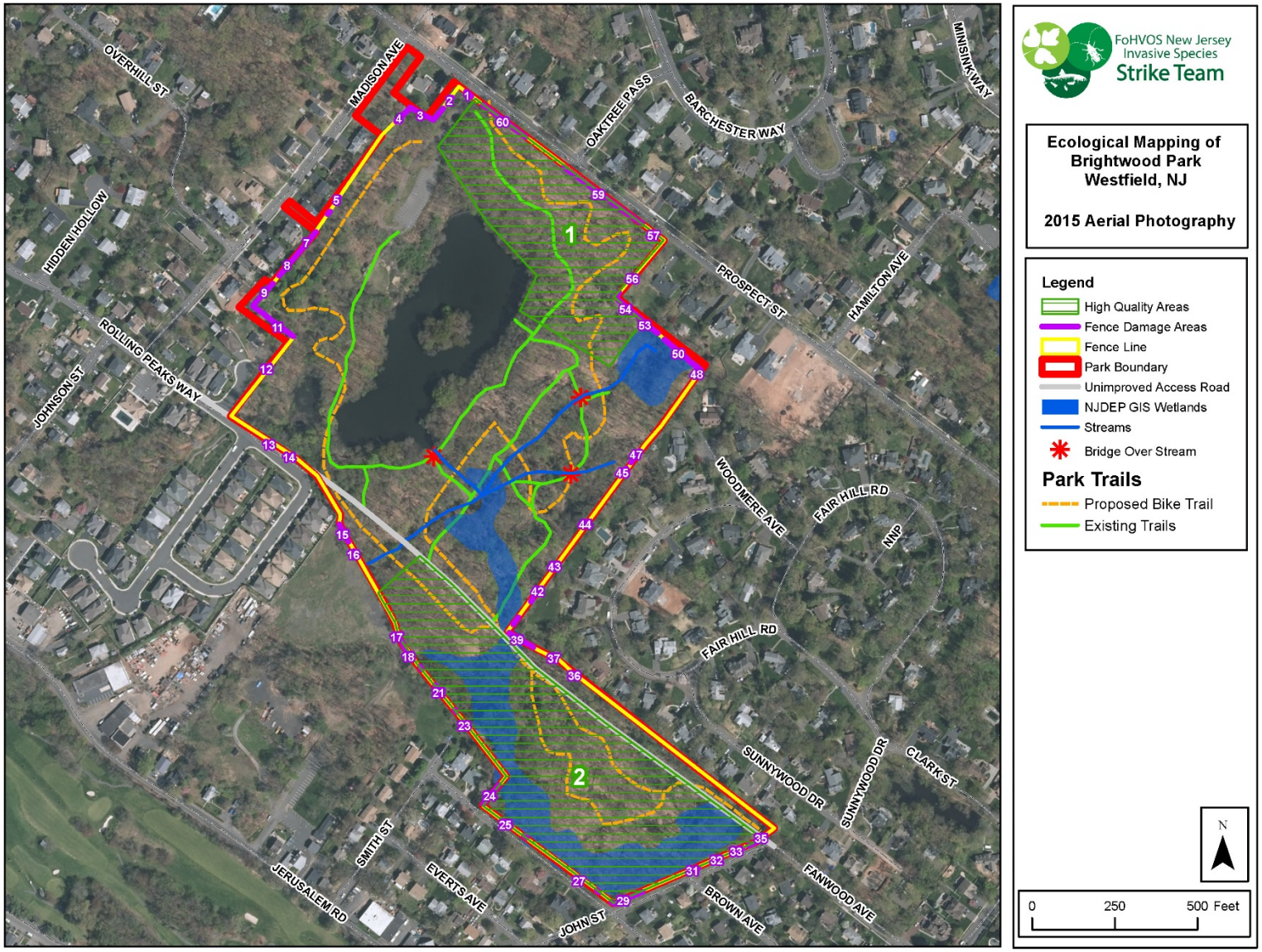
Table 2. Detailed Fence Damage Notes (Areas correspond to map below)

Area Number	Damage Type	Number of Posts	Length (Feet)
1	Cattle Grate Required - 24 Feet	N/A	24
2	Damaged / Down - Top Post Bent, Tree Leaning	1	10
3	Covered - Heavy Vegetation	12	120
4	Damaged / Down - Tree Through	5	50
5	Damaged / Down - Hole in Fence	1	10
6	Damaged / Down - Hole in Fence	1	10
7	New Fence - 6' Chainlink installed by neighbor	8	80
8	New Fence - 6' Metal Bars installed by neighbor	9	90
9	New Fence - 4' Chainlink installed by neighbor	6	60
10	Missing - Fence and Posts Missing	6	60
11	Covered - Heavy Vegetation	10	100
12	Covered - Heavy Vegetation	2	20
13	Tree Leaning - No damage yet	1	10
14	Tree Leaning - No damage yet	1	10
15	Missing - Fence Missing, Posts Present	6	60
16	Damaged / Down - Heavy Vegetation	1	10
17	Missing - Fence and Posts Missing	3	30
18	Tree Leaning - No damage yet	4	40
19	Damaged / Down - Heavy Vegetation	1	10
20	Tree Leaning - No damage yet	1	10
21	Damaged / Down - Heavy Vegetation	2	20
22	Damaged / Down - Heavy Vegetation	1	10
23	Damaged / Down - Heavy Vegetation	1	10
24	New Fence - 6' Silver chainlink (matches existing)	7	N/A
25	Damaged / Down - Fence Leaning	3	30
26	Tree Leaning - No damage yet	1	10
27	Tree Leaning - No damage yet	1	10
28	Tree Leaning - No damage yet	1	10
29	Bottom Gap - 1-2'	8	80
30	Bottom Gap - 0.5-1'	2	20

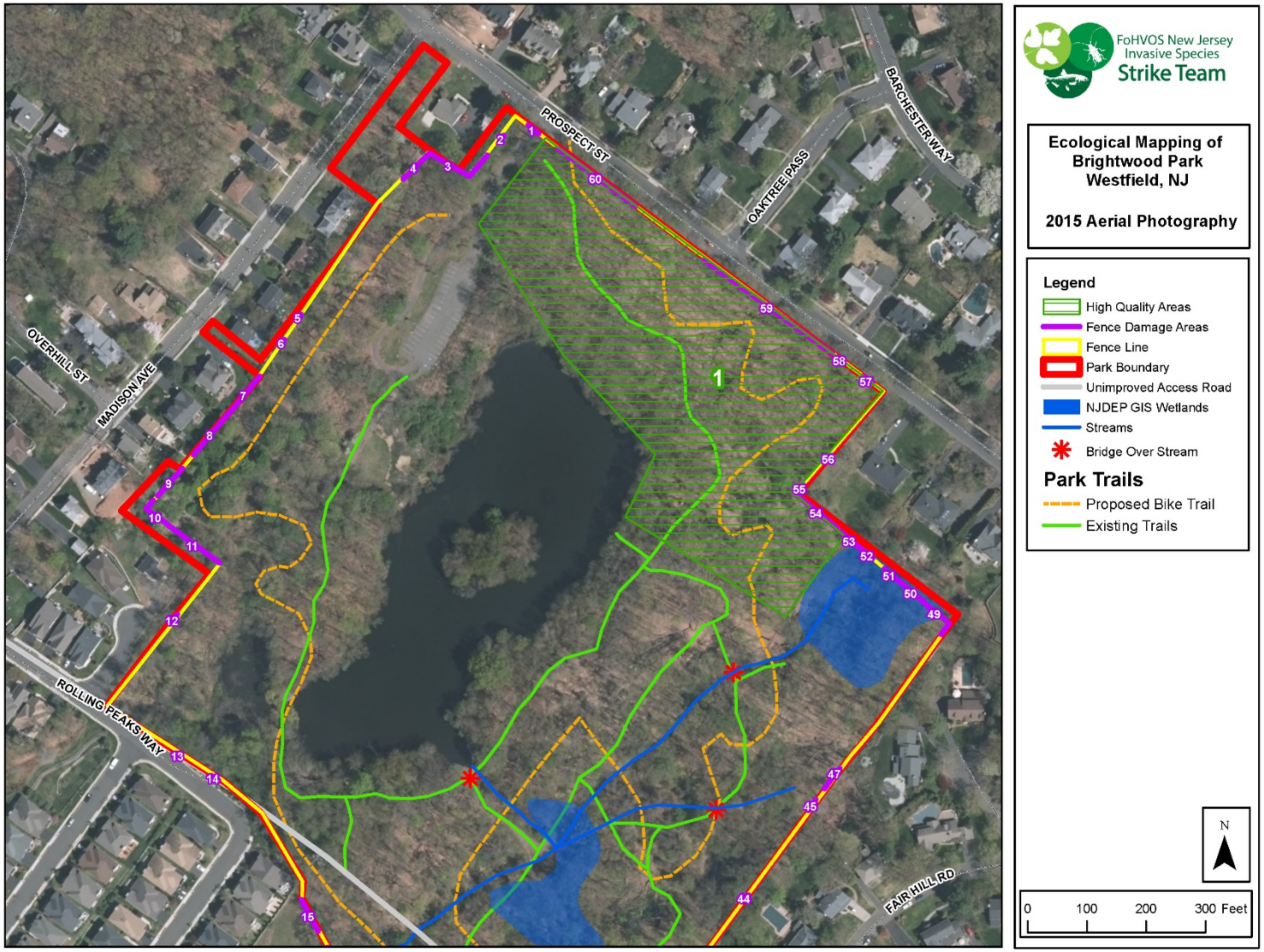
Table 2. Detailed Fence Damage Notes (Areas correspond to map below)

Area Number	Damage Type	Number of Posts	Length (Feet)
31	Bottom Gap - 1-2'	3	30
32	Damaged / Down - Top Post Bent, Tree Leaning	1	10
33	Bottom Gap - 1-2'	3	30
34	Bottom Gap - 1-2'	2	20
35	Cattle Grate Required - 12 Feet	N/A	12
36	Damaged / Down - Top Post Bent	1	10
37	Damaged / Down - Hole in Fence	1	10
38	Damaged / Down - Hole in Fence	1	10
39	Covered - Heavy Vegetation	7	70
40	Damaged / Down - Tree Through	3	30
41	Tree Leaning - No damage yet	1	10
42	Damaged / Down - Tree Through	1	10
43	Gate Installed by Neighbor	1	10
44	Gate Installed by Neighbor	1	10
45	Damaged / Down - Tree Through	2	20
46	Damaged / Down - Top Post Bent	2	20
47	Damaged / Down - Tree Through	2	20
48	Bottom Gap - 2-3'	2	20
49	Bottom Gap - 0.5-1'	4	40
50	Bottom Gap - 1-2'	6	60
51	Bottom Gap - 2-3'	3	30
52	Damaged / Down - Tree Through	2	20
53	Damaged / Down - Heavy Vegetation	5	50
54	Covered - Heavy Vegetation	8	80
55	Missing - Fence and Posts Missing	2	20
56	Missing - Fence and Posts Missing	1	10
57	Covered - Heavy Vegetation	2	20
58	Damaged / Down - Tree Through	1	10
59	Bottom Gap - 0.5-1'	27	270
60	Bottom Gap - 0.5-1'	16	160
Totals			**2136**

Map 1. Brightwood Park Ecological Mapping Evaluation – Entire Park



Map 1A. Brightwood Park Ecological Mapping Evaluation – Northern Portion of Park



Map 1B. Brightwood Park Ecological Mapping Evaluation – Southern Portion of Park