INFRASTRUCTURE COMMITTEE

Monday, June 15, 2026
Immediately following City Council Workshop
City Hall, Council Chambers, 73 Harlow St.
Agenda

1. **Selection of Forest Operations Contractor – Ben Arruda, Sophia Cameron**
   (Memo attached)

2. **Essex Woods Forest Management Plan – Ben Arruda, Sophia Cameron**
   (Materials attached)

CITY OF BANGOR

DEPARTMENT OF PUBLIC WORKS

FORESTRY DIVISION

June 15th, 2026

Infrastructure Committee Meeting

Notification of Selection of Forest Operations Contractor

Sophia Cameron, Ben Arruda, and Tracy Willette

Over the past several months members of the Forestry Division have been working to select a Forest Operations contractor to help bring the Rolland F. Perry City Forest and another City owned property called Twining Pit, located in Winterport, back into active management per their Forest Management Plans. These plans were written by consulting forester David Irving of Shelterwood Forestry Services in 2021. Since that time, no active management has been performed on either property, leading to several forest health concerns.

Because of the focal nature of the City Forest specifically, and its high use by recreators, it was important whoever the selected contractor was that they be selected by the quality of their past work as opposed to their rates. For this reason, in the initial request for proposals, a Do Not Exceed amount of $25,000 per fiscal year was included. This amount will come from the existing line item for contractors in the Forestry Division's budget.

We requested and received written proposals from three local contractors. After careful review of each, we determined that the best option for these projects is Prentiss & Carlisle Forest Resource Management and Timberland Services. They are a local Bangor company that has been in operation for over 100 years. They are known throughout the state as providing excellent forest management services for both private landowners as well as non-profit, public access entities. Notably, they provide contracted services for Maine Woodland Owners, New England Forestry Foundation, and Maine Inland Fisheries & Wildlife.

Joe Hutton will be the licensed forester from Prentiss & Carlisle serving as the operations forester for these projects. He will be working in partnership with the City Forest Manager to bring each of the properties back into compliance with their Forest Management Plans. The initial term for this contract is one year with the option for renewal, and the stated Do Not Exceed amount of $25,000 per fiscal year.

No further action is needed from council at this time.

CITY OF BANGOR

Department of Parks and Recreation
Department of Public Works—Forestry Division

June 15th, 2026

Infrastructure Committee Meeting

Essex Woods Forest Management Plan

Sophia Cameron, Ben Arruda, and Tracy Willette

The management of forested land is typically governed by a document called a Forest Management Plan. These plans are approved by a licensed forester on behalf of the landowner and share information regarding the current state of boundary lines, forest soil resources, forest health, wildlife considerations, recreation opportunities, and silvicultural prescriptions. In circumstances where timber harvesting is desired by the landowner, they can also include information about that. Forest Management Plans typically govern a piece of land over the course of 10 years, at which time they must be updated.

The last time a Forest Management Plan was written for Essex Woods was in 2003 by Charles Simpson of Woodchuck Forestry Services. To the knowledge of the current land managers, the recommendations within that plan were not carried out. The purpose of this plan is to adapt those recommendations made in the previous plan where appropriate and resume active management of Essex Woods.

Essex Woods is made up of 9 parcels totaling +/- 113 acres. It contains a wide diversity of habitat types, from open wetlands to mature conifer forest. This makes it excellent for birding, mountain biking, walking, running and generally being in nature. It is also the site of an old landfill that was decommissioned in the ‘60s. Because of this, land managers must be strategic about how the site is used by recreators to maintain public safety on the property.

The management objectives for Essex Woods over the next 10 years are:

Provide safe recreational opportunities for the Citizens of Bangor. Managers will prioritize continued access to the trail systems for recreators, promote safety through the removal of hazardous trees along trails, and promote wildlife habitat for public enjoyment. Essex Woods has a community of visiting birders and is listed as one of the top 10 birding locations in Penobscot County, so promotion of diverse bird habitat is a priority.

Protect local waters, cultural artifacts, and wildlife habitats. Managers will strive to create and/or maintain diverse habitats, with early to late successional forest conditions, varied forest structure, and unique nesting and feeding sites. Managers will identify and protect natural and cultural features of significance, including sites that support rare or unusual species, as well as cellar holes, stonewalls, etc.

Improve tree quality and forest health. Managers will strive to regenerate and grow vigorous forests rich in high value tree species, improved tree quality, and with diverse age structures, to best appreciate, and defend against climate, insect, and disease concerns. To the extent possible, non-native trees, shrubs, and pests will be eradicated. This will require active management of the property.

Demonstrate good forest management. Maine's Best Management Practices for erosion control and water quality protection will be followed during all phases of forest management and harvest operations.

Provide educational opportunities. When possible, managers will interact with the public to provide educational and volunteer opportunities for diverse groups of Bangor's citizens and visitors focused on helping the public interact with nature and land management.

The management recommendations for the next 10 years made by the City Forest Technician, Sophia Cameron, and approved by the City Forest Manager, Ben Arruda, are:

1. Survey all of Essex Woods to determine both external and internal boundary lines of the property. These lines should then be blazed and maintained on a five-year schedule.
2. No commercial timber harvesting is recommended over the next 10 years except when being used as a tool to promote forest health or improve public safety.
3. Pruning along the trails should be done on a three-to-five-year basis to maintain clearance for recreators and vehicle access for land managers.
4. Invasive plant control using integrated pest management should be the priority for this management period.
5. Replanting with native tree and shrub species could be done as needed in areas where there is low species diversity or an even-age structure.
6. Special consideration should be taken to maintain and improve various bird habitats. This may look like maintaining forest edges with once-a-year mowing, planting soft-masting tree and shrub species, planting native herbaceous plants to increase the number of insects, adding nest boxes and platforms, and girdling poorly formed trees to create snags.
7. Continue to monitor for and respond to infestations of red pine scale, emerald ash borer, hemlock woolly adelgid, and beech bark and leaf disease.
8. Post educational signage to teach recreators about the various habitat types and bird species in Essex Woods, as well as other natural resources.
9. Update and repair the PAL building so that it can be repurposed for either use by the City or for use by a nature or recreation-based non-profit for the benefit of the citizens of Bangor.
10. Improve and expand the mountain biking trail network following the recommendations made by OSI in their trail plan, which is currently being authored.

11. Control erosion in the areas of the capped landfill following all DEP standards and regulations.
12. Control erosion caused by the Bangor Water District tank outflow that goes through Essex Woods.

Further details of how all these recommendations can be accomplished are shared in the complete Essex Woods Forest Management Plan. We are seeking council approval to approve this Forest Management Plan as the governing document for Essex Woods from June 15th, 2026-June 15th, 2036.

CITY OF BANGOR

FOREST MANAGEMENT PLAN

Planning Period 2026-2036

Essex Woods

Bangor, Penobscot County, ME
9 parcels totaling +/- 113 acres

City of Bangor, ATTN: Parks & Recreation
207-992-4490
tracy.willette@bangormaine.gov
647 Main St, Bangor, ME 04401

Prepared by:
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sophia.cameron@bangormaine.gov
Reviewed and Finalized by:
Ben Arruda, LF 4330, Foresty Manager
ben.arruda@bangormaine.gov
530 Maine Ave, Bangor, ME 04401

This plan meets specifications for Maine's Tree Growth Tax Law and the USDA/NRCS Conservation Activity Plan and addresses proposed activities between now and 2036 when it should be updated. It is intended to help owners conduct forest management activities and ***does not represent legal advice.***

I assume responsibility for the development of the above stated Forest Management Plan provided. The plan provided: (1) complies with all applicable Federal, State, Tribal Lands, local laws and requirements; (2) meets applicable standards, specifications, statements of work; (3) is consistent with the particular goals and objectives of the landowner; and (4) incorporates alternatives that are both cost effective and appropriate to address the resource issues.

Forester License #4330 Signature _____ Date 10 June 26

Landowner Signature _____ Date 6-10-26

CITY OF BANGOR

Contents

Background

Essex Woods is comprised of nine total parcels owned by the City of Bangor Parks & Recreation Department. Their map and lot numbers can be found in Table 1 below, and they are visualized in Figure 5. The total acreage of Essex Woods is +/- 113 acres, however, the forested acreage is only +/- 65 acres. Powerline rights-of-way, access roads, parking lots, a basketball court, dog parks, a sliding hill and the Police Athletic League (PAL) building take up eight acres.

Two of the forested parcels, R55-002-C and R55-002-F, are under one acre in size, close to residential properties, and are entirely contained within a 250-foot wetland buffer. Five of these parcels are entirely open-wetland or forested-wetland. These seven parcels were not inventoried because of their lack of standing timber, and because there will be no active harvesting on them in the next 10 years. Invasive plant management may occur on these parcels, and all state and federal regulations regarding the use of chemical pesticides will be strictly adhered to across the entire property.

Through the middle of the parcels runs the old Veazie Railbed, which has been converted into a walking trail for recreation, and is referred to as the “rail trail” in this plan. The southernmost portion of R48-007 was once a landfill, and remnants of waste can still be seen above ground in some places. This landfill was capped sometime in the 70s. There is also a sliding hill leading down to the marsh on this lot, that is managed as grassland habitat for birds through spring, summer, and fall, and used as a public sledding hill in the winter when there is snow on the ground. This sliding hill covers only part of the capped landfill. R48-007 also shows evidence of being pastured long ago. This is supported by a lack of stumps or old snags, and smoothness to the forest floor characteristic of rock and debris removal. It is further supported by documentation of a homestead once being present on the property.

In 1993 the City Forester at the time, Rolland Perry, planted two pine plantations totaling eight acres. This included red pine and Jack pine. Five acres of this was thinned in a timber stand improvement (TSI) in 2002. As of 2026, only two acres remain of distinctive red pine plantations, likely because of the low suitability of the site for red pine. Initial integrated pest management (IPM) efforts were undertaken in Fall 2025 to remove invasive plants that had regenerated underneath the pine plantations. Smaller Scots pine and Norway Spruce plantations have been reintegrated into the naturally occurring cover type and are assumed to have been planted at the same time. These are contained in Stand 1 but were not captured in the inventory.

A management plan was written for Essex Woods in 2003 by Charles Simpson of Woodchuck Forestry Services. To the knowledge of the current land managers, the recommendations within that plan were not carried out. The purpose of this plan is to adapt those recommendations made in the previous plan where appropriate and resume active management of Essex Woods.

Table 1. Map, lot, and unit identification of the nine parcels that make up Essex Woods in Bangor, ME, along with the dominant cover type and acreage of each.

Parcel Map, Lot & Unit	Cover Type	Total Acreage
R48-007	Forest	61.0
R49-004	Forest	11.3
R55-012	Forested Wetland/Shrubland	3.7
R55-012-A	Open Wetland	12.6
R55-012-B	Forested Wetland/Shrubland	13.7
R55-012-C	Forest	0.1
R55-012-F	Forest	0.8
R56-002-D	Open Wetland	5.0
R56-002-E	Open Wetland/Forested Wetland/Shrubland	5.4

History

The indigenous people of what we now know as the Bangor area are the Penobscot. Their presence in the area is thought to date back at least 11,000 years. They heavily utilized the Penobscot River for travel and trade and referred to Bangor as *kkátaskkik* or later "Kenduskeag" by settlers. This means "at/on the water parsnip ground" (Francis, 2008). There is no documented history of the presence of the Penobscot people specifically in Essex Woods. European exploration of the Penobscot Valley began as early as 1524, and Samuel de Champlain arrived in 1605 (Fischer, 2008). Bangor was first settled in 1769 and called Kenduskeag Plantation. It was incorporated as the Town of Bangor in 1791. It is unknown if the name was derived from the Welsh term for "wattle enclosure" or the Irish term for "horned curve". In 1834 it was incorporated as the City of Bangor because of its rapid growth resulting from the log trade.

The earliest deed that could be found for this property was from June 30th, 1860. At that time, it was purchased by Patrick Wall of Bangor from Elisha H. Allen, also of Bangor. In this deed there is reference to the Holland Plan. This plan was made in 1801 by Park Holland and outlined the original subdivision for the City. At some point, the property was sold by Wall and foreclosed in 1862, but this deed of sale could not be found. It was purchased again in 1868 before being sold to Byron Roberts in 1876. It had five more owners until it was sold to the City of Bangor on April 7th, 1933, by Ray D. Strickland. This deed is included as *Appendix F*. Within these deeds there is record that at one time there was a homestead on the property, but it is unknown where this would have been located.

Essex Woods was the site of the City's landfill starting in the 1930s. In the 1970s the City converted the landfill into a slope, using approximately 15,000 yards of fill and the services of the Maine National Guard, per a letter sent in 1971 by Thaxter R. Trafton, former Parks & Recreation director for the City. This letter is included as *Appendix G*. In 1973 a ski lift was added, opened for use and operated for six seasons following. The PAL building was originally built as a ski lodge at the top of this hill (Burnham, 2023). In 1993 the areas near the upper parking lot were cleared of brush and replanted with a red pine plantation.

Figure 1. A scan of the historical Holland Plan outlining the original parcels of Bangor. Scan acquired from the [Digital Maine Repository](#).

Figure 2. Photo of the initial clearing and planting of the red pine plantation at Essex Woods. Photo taken in the Summer of 1993. The photographer is unknown but assumed to be Rolland Perry, former City Forester.

Figure 3. Another angle of the red pine plantation at Essex Woods, taken in 1993.

Figure 4. Photo of the PAL Building (then Ski Lodge) being built at Essex Woods. Date of photo is unknown, and the photographer is unknown but assumed to be Rolland Perry.

Parcel Map

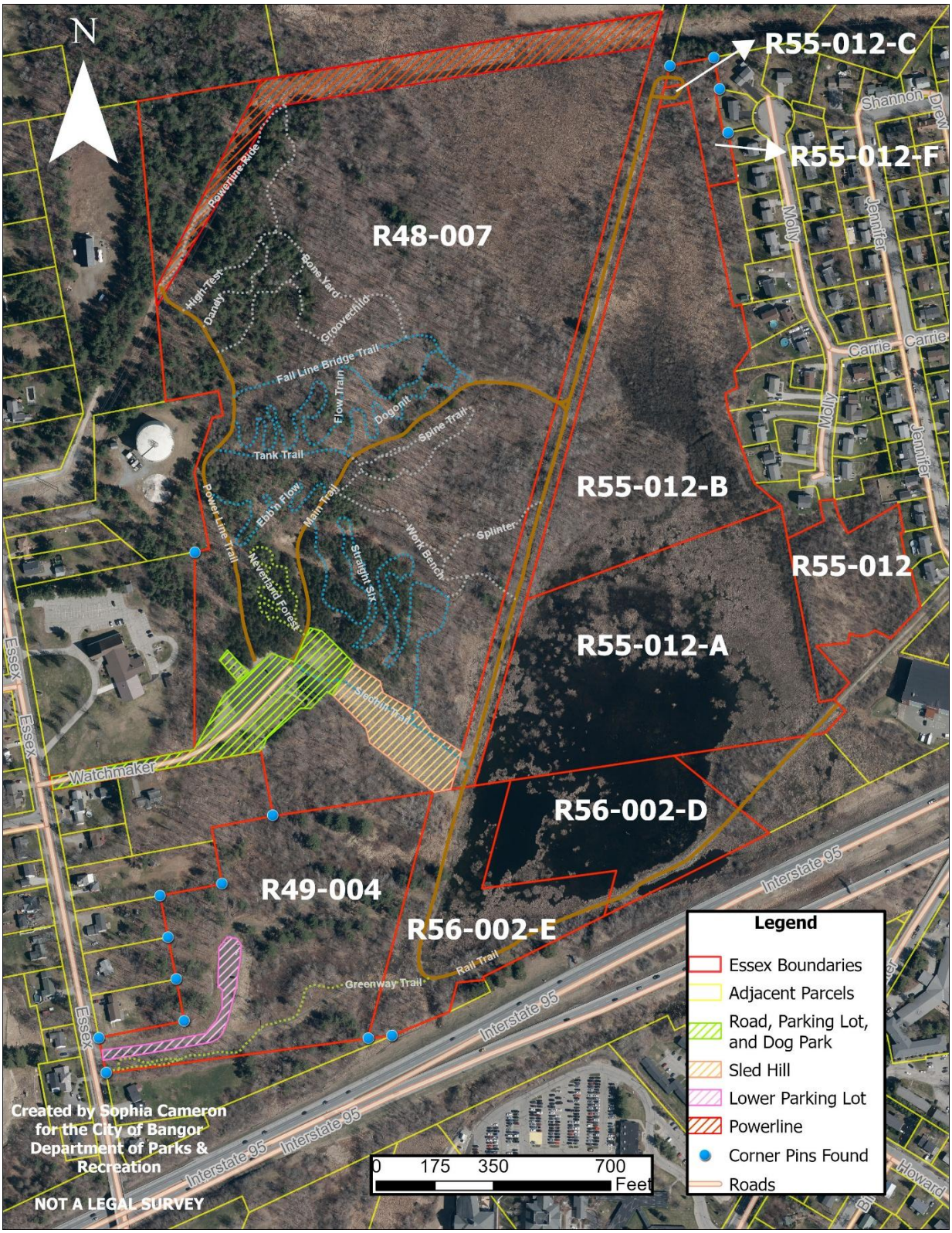


Figure 5. Map of the nine parcels making up Essex Woods with adjacent landowners' parcels shown in yellow. Improved areas are also shown, and the locations where corner pins were found in winter 2026.

Boundary Lines

The condition of the boundary lines of each of these parcels is variable. External boundary lines (those abutting other landowners) were checked in the winter of 2026. The findings are shared by parcel below and visualized in Figure 5. It is recommended that all external boundary lines be surveyed eventually by a licensed surveyor and where blazing is not present new blazes be established. Where existing blazing is present it should be refreshed in the same color. All boundary lines on this property should be maintained on a five-year cycle. Boundary lines should be established and maintained to the standards of *Appendix E*. Monitoring for encroachment on a routine basis is recommended, especially along lines that fall within a 250-foot wetland buffer (R55-012, R55-012-A, R55-012-B, R55-012-C, and R55-012-F).

R48-007 (61.0 acres)—This is the largest parcel of Essex Woods. The southern boundary line abuts parcel R49-004, as well as two private landowners. For the portion abutting the larger of the two private residences, only one corner pin was located. The remainder of the line is indicated by the right-of-way of Watchmaker Street. The western boundary line abuts the First Methodist Church of Bangor, a Bangor Water District holding tank property, and a private residential property. Only one corner pin was located along this line, and while there was some old blazing, it appeared to be incomplete, specifically along the portions abutting the church and the holding tank facility. It was noted that a portion of a Penobscot Region New England Mountain Bike Association (PR NEMBA) trail crossed a blazed portion of this line and went on to private property near the holding tank. The northern boundary line abuts two private properties, one residential and one commercial. The status of this line is currently unknown but should be checked and blazed during other boundary line management. A large portion of it is indicated by the edge of a powerline right-of-way. The eastern boundary line is entirely made up of the rail trail. No blazes were found along this line either.

R49-004 (11.3 acres)—The southern boundary of this parcel abuts a single residential property. All corner pins indicating this line were found. The western boundary abuts several different residential properties. Five out of the eight corner pins that indicate this line were located and flagged with orange flagging. The northern boundary of this parcel abuts one residential property and R48-007. Only one pin was found to delineate this line. The eastern boundary is the western boundary of R56-002-E.

R55-012 (3.7 acres)—This parcel has a highly irregular shape and abuts private landowners on three sides. Two portions of the southern boundary line run parallel to the rail trail, but no corner pins or blazes were found. No corner pins were found along the highly irregular portion of this line either. The western boundary is made up entirely of R55-012-A. This line was not checked because of difficulty of access along the wetland edge. The northern boundary abuts two private residential properties. No corner pins or blazes were found along this line. The eastern line of this parcel abuts three private residential properties, and no corner pins or blazes were found along this line either.

R55-012-A (12.6 acres)—This parcel is entirely open wetland. Its southern boundary abuts a small piece of property owned by the Department of Transportation, as well as R56-002-D and R56-002-E. Its western boundary is the rail trail, but no corner pins were found along this stretch. The northern boundary is entirely the southern boundary of R55-012-B, and the status of this boundary is undetermined because of difficulty of access. The eastern boundary line abuts two private properties,

one commercial and one residential. Most of the eastern boundary, however, is the western boundary line of R55-012. No corner pins or blazes were found along this boundary line. Only accessible portions of this boundary line need to be blazed.

R55-012-B (13.7 acres)—This parcel is entirely forested wetland/shrubland. The southern boundary line is the northern boundary line of R55-012-A. This line is inaccessible because it goes through the wetland. The western line is the rail trail, and no corner pins or blazes were found along this line. The northern line is R55-012-C, no corner pins or blazes were found on this line either. The eastern boundary line abuts seven private residential properties as well as R55-012-F. No corner pins or blazes were found along this line. Only accessible portions of this boundary line need to be blazed.

R55-012-C (0.1 acres)—This is the smallest parcel making up Essex Woods. Its southern line is the northern line of R55-012-B, where no pins or blazes were found. The western line is the rail trail, and the northern and eastern lines are R55-012-F. No corner pins or blazes were found here either.

R55-012-F (0.8 acres)—The southern line of this parcel abuts one private property. The western line abuts R55-012-B, R55-012-C, and the rail trail. The northern line also abuts one private property and both corner pins for this line were found. The western line abuts four private residential properties, and someone has built a shed within the parcel. Three corner pins were found along the western line, and the northern-most private landowner on this line has established a false boundary approximately eight feet into the parcel. A surveyor should locate the remaining corner pins of this lot and blaze it.

R56-002-D (5.0 acres)—The southern boundary of this parcel is parallel to I-95. No discernable boundary markers were found along this line, though it is indicated by the I-95 corridor. The western line is the eastern line of R56-002-E and the northern line is the southern line of R55-012-A. These lines land in the middle of the open wetland, so no boundary markers were located. The eastern line abuts the Maine DOT parcel along I-95. No boundary indicators were located here either. It is recommended that eventually these lines be surveyed and marked, however it is not a priority at this time because no active management will occur within this parcel and there are no points of encroachment.

R56-002-E (5.3 acres)—The southern boundary of this parcel is also parallel to I-95, and no discernable boundary markers could be found here either. The western line is the eastern line of R49-004, and the northern line is the southern lines of R48-007 and R55-012-A. The eastern line is the western line of R56-002-D. No indicators were found on any of these lines. It is recommended that eventually these lines be surveyed and marked, however it is not a priority at this time because no active management will occur within this parcel and there are no points of encroachment.

Access and Trails Map

Figure 6. Map of Essex Woods' access points and trails.

Access and Trails

Essex Woods can be accessed via three routes into three of the different parcels. These are shown in Figure 6. The first and most easily accessible is via Watchmaker Street off Essex Street. Watchmaker Street is a paved road leading to a large, paved parking lot used by recreators. This provides direct access into lot R48-007 via two gravel access roads. These roads do not extend into any of the other lots. They could be connected for recreational access only by improving the Fall Line Bridge Trail, so that recreators could have a formal loop trail for walking, running, and less technical mountain biking.

The second access point is also off Essex Street via an improved access road. This leads into a gravel parking lot situated in lot R49-004. There are two maintained but unimproved trails off this parking lot, both of which tie into the rail trail.

The final access point leading directly into Essex Woods is off Molly Lane. This road is part of a larger residential development off Stillwater Ave. The access point here is unimproved but leads into lot R55-012 off Molly Lane. Because of the proximity of this access point to private, residential properties, it is not a preferred mode of access for management.

There is additional access via the rail trail at the corner of Jennifer Lane and Garden Way in the same development as Molly Lane. This trail passes through private property before entering lot R55-012-A. It quickly leads out of R55-012-A and enters a lot owned by the Maine Department of Transportation, before exiting this and entering lot R56-002-D. Because this trail goes through private properties, it is not a preferred mode of access for management. While it is an improved trail that is typically maintained by Parks & Recreation, portions that are not owned by the City should not be used for access with heavy equipment without express permission from the landowner.

There are many mountain biking trails throughout the property. These trails will likely change throughout the next ten-year management period as they are updated to suit the needs of Bangor's recreators. Further details regarding this can be found in *Appendix H.*

Management Objectives

Upon this land, the landowner intends to:

Provide safe recreational opportunities for the Citizens of Bangor. Managers will prioritize continued access to the trail systems for recreators, promote safety through the removal of hazardous trees along trails, and promote wildlife habitat for public enjoyment. Essex Woods has a community of visiting birders and is listed as one of the top 10 birding locations in Penobscot County, so promotion of diverse bird habitat is a priority.

Protect local waters, cultural artifacts, and wildlife habitats. Managers will strive to create and/or maintain diverse habitats, with early to late successional forest conditions, varied forest structure, and unique nesting and feeding sites. Managers will identify and protect natural and cultural features of significance, including sites that support rare or unusual species, as well as cellar holes, stonewalls, etc.

Improve tree quality and forest health. Managers will strive to regenerate and grow vigorous forests rich in high value tree species, improved tree quality, and with diverse age structures, to best appreciate, and defend against climate, insect, and disease concerns. To the extent possible, non-native trees, shrubs, and pests will be eradicated. This will require active management of the property.

Demonstrate good forest management. Maine's Best Management Practices for erosion control and water quality protection will be followed during all phases of forest management and harvest operations.

Provide educational opportunities. When possible, managers will interact with the public to provide educational and volunteer opportunities for diverse groups of Bangor's citizens and visitors focused on helping the public interact with nature and land management.

Soil and Forest Resources

A large portion of the total Essex Woods acreage is classified as wetlands and was not included in the timber inventory because there will be no active management on these portions. The major soil in these areas is Swanville-Wonsqueak association with 0-3% slopes (38.5% of the total acreage or 41.2 acres). This soil type has a drainage class of poorly drained, and a parent material of fine-silty glaciomarine deposits. This aligns with the wetland cover type currently present. These soils are rated as poorly suited for harvesting equipment and log landings due to ponding and low strength of soils. This enforces the delicate nature of these soils and there should be absolutely no operations requiring machinery carried out on this soil type or within a specified buffer of these wetlands.

Other major soil components in Essex Woods include Elliotsville-Chesuncook association, 8-15% slopes (9.6% or 10.2 acres), Monson-Elliotsville-Abram complex, 15-30% slopes (30.0% or 32.1 acres), and Pushaw-Swanville complex, 0-8% slopes (14.4% or 15.4 acres). Minor soil components Chesuncook-Telos-Urban land association, 0-8% slopes (0.2% or 0.2 acres), Elliotsville-Chesuncook association, 3-8% slopes (0.9% or 1.0 acre), Monarda-Telos complex, 0-8% slopes (0.2% or 0.2 acres), and Pushaw-Swanville-Urban land association, 0-8% slopes (1.4% and 1.5 acres). Drainage classes range from poorly drained to excessively well-drained. Operability ranges from poorly suited to moderately well-suited.

Because there is such a wide range of soil types with variable operability requirements, operations should only be carried out in the winter when there is frozen ground to protect soil integrity. Essex Woods management will likely never require intensive operations, so utilizing smaller equipment will also help to preserve soils.

Much of the acreage of lot R48-007—the largest lot in Essex Woods and where most management will occur—is the Monson-Elliotsville-Abram complex soil type. This soil type is highly productive for Eastern white pine, with a site index of 69 and the potential to produce 129.00 cubic ft/acre/year of wood fiber volume. It is also productive for white spruce, American beech, balsam fir, paper birch, sugar maple, and yellow birch. Other large portions of R48-007 are Pushaw-Swanville complex, which is productive for balsam fir and red spruce. Telos-Chesuncook complex is present on R48-007 in a smaller percentage near the dog park and parking lot. This soil type is also highly productive for Eastern white pine.

Lot R49-004 is the other forested lot in Essex Woods, and the primary soil type in this lot is Elliotsville-Chesuncook association. Once again this is a highly productive soil for Eastern white pine. American beech, balsam fir, paper birch, white spruce, yellow birch, red maple, and sugar maple are also productive in these soils.

The full soils report, including a soil map, is included as *Appendix A*.

Wildlife

Essex Woods is home to many species of wildlife. Deer can often be seen grazing along the trail edges and on the sliding hill. Grey squirrels are abundant because of the large population of oak and white pine providing sources of food. Frogs can be heard along the rail trail in the spring. Rabbit, mouse and fox tracks have also been seen on the sliding hill. The diversity of wildlife in Essex Woods is largely due to the wide variety of habitat types present. Open wetlands host different species than forested wetlands, and mature softwood forests host different species than mature hardwood forests. Caring for and maintaining each of these habitat types will continue to encourage this wildlife diversity for both the health of the ecosystem and the enjoyment of recreators. Consulting Maine Inland Fisheries & Wildlife (Maine IF&W), Maine Audubon, and other wildlife groups will help to address this goal.

Deer

White-tailed deer can be found throughout Essex Woods. The population that has been spotted there does not appear unhealthy, and it is likely that they use Stand 1 (mature softwoods) as deer wintering area. Large deer populations create difficulty for forest managers, because they browse on hardwood seedlings, reducing the overall amount of natural regeneration. While there are signs of deer browsing, there may be enough alternative food sources (grasses, acorns, etc.) to maintain the Essex Woods herd and prevent extensive damage to natural regeneration. This should continue to be monitored, and any planted trees should be equipped with tree tubes or cages. Managing the population through hunting is not a possibility here, because of the large number of recreators and proximity to people's homes. Should the population become out of control and greatly affect the tree species composition, Maine IF&W should be contacted to come up with alternative solutions.

Beaver

No beavers have been found in the Essex wetland, but they should be monitored for. Beavers are incredibly important species to ecosystems and have significant influence over water levels and habitat types. While they would be engaging for recreators, they may cause trail washout issues and flooding if they move into the Essex wetland. If this occurs Maine IF&W should be contacted to establish a plan of action for their relocation.

Amphibians

The habitat combinations of moist forest floors covered in organic material, and wetlands means that many amphibians call Essex Woods home. Spring peepers can specifically be heard in the wetlands along the rail trail. To maintain these amphibian populations, water quality of the wetland should be tested regularly, as amphibians are highly sensitive to chemicals because of the mucous membranes on their skin. Because of the proximity of the capped landfill, the outflow from the Bangor Water District Tower, and the presence of Voluntary Response Action Program soils underneath the lower parking lot, water quality is something to monitor diligently. More details on these elements can be found in the Other Considerations portion of this plan. It is also important that pesticides be used correctly and sparingly in Essex Woods to maintain water quality.

Birds

One of the primary goals of management on this property is to protect and promote habitat for the species of birds that are found in Essex Woods. There are several that are considered endangered, threatened, or of special concern that have been identified here by local birders and recorded using the mobile birding app, eBird. Table 2 shows a list of these species, their protection category, and their general preferred habitats. Some of these species are simply migrating through, while others are nesting and breeding here. The northern part of the property is also zoned as Upland Sandpiper and Sedge Wren habitat by Maine Inland Fisheries & Wildlife. These species have not been identified in Essex itself. For further details, see *Appendix B*.

Special concern, endangered, and threatened are all protection categories under the Maine Endangered Species Act. Endangered species are defined as those that are threatened with extinction throughout all or part of its native range. Threatened species are those that are likely to become endangered in the future. Species of special concern are those that don't meet the requirements of being considered endangered or threatened, but that are particularly vulnerable for various reasons.

Table 2. List of endangered, protected, and special concern bird species that have been seen at Essex Woods and recorded using eBird. Includes scientific names, their protection category, whether they are likely nesting in the area or migrating through, and their preferred habitat types[1].

Common Name	Scientific Name	Protection Category	Nesting or Migratory?	Habitat
Least Bittern	*Ixobrychus exilis*	Endangered	Nesting	Freshwater & Brackish Wetlands
Black-crowned Night Heron	*Nycticorax nycticorax*	Endangered	Migratory	Wetlands
American Pipit	*Anthus rubescens*	Endangered	Migratory	Tundra
Blackpoll Warbler	*Setophaga striata*	Threatened	Migratory	Boreal Forest
Bank Swallow	*Riparia riparia*	Threatened	Nesting	Lakes & Ponds
Cliff Swallow	*Petrochelidon pyrrhonota*	Threatened	Nesting	Lakes & Ponds
Great Blue Heron	*Ardea herodias*	Special Concern	Nesting	Freshwater & Brackish Wetlands
Northern Harrier	*Circus cyaneus*	Special Concern	Nesting	Wetlands & Grasslands
Lesser Yellowlegs	*Tringa flavipes*	Special Concern	Migratory	Freshwater & Brackish Wetlands
Chimney Swift	*Chaetura pelagica*	Special Concern	Nesting	Urban & Suburban Areas
Olive-sided Flycatcher	*Contopus cooperi*	Special Concern	Nesting	Coniferous Forest Edges & Openings
Eastern Kingbird	*Tyrannus tyrannus*	Special Concern	Nesting	Forest Edges & Early Successional Forests

[1] Information acquired from Cornell Lab of Ornithology All About Birds website.

Eastern Wood-pewee	*Contopus virens*	Special Concern	Nesting	Deciduous Forest Edges & Openings
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Special Concern	Nesting	Rivers & Streams
Tree Swallow	*Tachycineta bicolor*	Special Concern	Nesting	Lakes & Ponds
Brown Thrasher	*Toxostoma rufum*	Special Concern	Nesting (scarce)	Scrubland/Shrubland
Bay-breasted Warbler	*Setophaga castanea*	Special Concern	Nesting	Mature Spruce/Fir Forests
Cape May Warbler	*Setophaga tigrina*	Special Concern	Nesting	Mature Spruce/Fir Forests
Canada Warbler	*Cardellina canadensis*	Special Concern	Nesting	Mixed Conifer & Deciduous Forests
Tennessee Warbler	*Leiothlypis peregrina*	Special Concern	Nesting	Boreal, Coniferous, or Mixed Coniferous & Deciduous Forests
Vesper Sparrow	*Pooecetes gramineus*	Special Concern	Nesting	Grasslands
American Kestrel	*Falco sparverius*	Special Concern	Nesting	Grasslands
Eastern Towhee	*Pipilo erythrophthalmus*	Special Concern	Nesting	Scrubland/Shrubland
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Nesting	Forested Wetlands/Wooded Swamps
Eastern Meadowlark	*Sturnella magna*	Special Concern	Nesting	Grasslands
Bobolink	*Dolichonyx oryzivorous*	Special Concern	Nesting	Grasslands

To maximize and improve existing bird habitat across Essex Woods, the Forestry Division and Parks & Recreation are working with Ag Allies, Maine IF&W, and Maine Audubon. Ag Allies is an organization through the Somerset County Soil & Water Conservation District that the City has worked with previously to improve grassland bird habitat in the City Forest. Part of this was taking Maine IF&W Songbird Specialist, Mackenzie Roeder, Ph.D., to Essex Woods. Her observations and recommendations are shared in *Appendix I*.

Since the sliding hill is adjacent to the open wetland it has been identified as good aerial insectivore (Swallows, etc.) habitat which should be maximized. The plan for how to do this is based off the recommendations made in *Appendix J*. The sliding hill has previously been planted with native herbaceous plants to promote insect habitat in partnership with Maine Audubon. It will continue to be monitored to determine if these plantings were successful, or if more planting will be needed. Widening the sled hill would also be advantageous to create more aerial insectivore habitat and reduce competition with other bird species. This could be accomplished simply by removing some of the boxelder and Norway maple growing along the edge.

Nesting boxes will help in promoting aerial insectivores as well. These should be placed both out in the open wetland as well as about 100 feet into the forested portions along the sliding hill. These boxes may be able to be supplied by Maine IF&W. Care should be taken to ensure nesting boxes are set away from trails, so they are not disturbed by recreators.

Dead wood is incredibly important for some bird species, so things like creating small slash piles off trails, leaving or creating non-hazardous snags, and leaving downed woody debris will help to improve habitat.

It is also the recommendation of Maine IF&W that leash ordinances in Essex Woods be put in place. This will protect ground nesting birds. This can be accomplished with a large public engagement and outreach approach and with signage. It may be beneficial to begin with interacting with the Essex Woods Dog Park stewards to get their input.

Recreation

Essex Woods is highly frequented by recreationists of all kinds. It includes amenities such as dog parks, walking and running trails, mountain biking trails, a sliding hill, and ample opportunities for Bangor's citizens to engage with nature. An additional assessment of the condition of the mountain biking trails and trail management recommendations in Essex Woods was performed by Outdoor Sport Institute, and a summary of their findings has been included in this document as *Appendix H*. Managing for recreation is a primary goal of this plan. Many of the recommendations made to enhance recreation in the previous management plan for Essex Woods are still recommended here.

Figure 7. The rail trail in winter. Footprints show that it is still highly trafficked throughout every season.

Walking/Running Trails

The integrity of the existing walking and running trails on this property should be maintained during any forest operations using heavy equipment when they will need to be used for access. This may require replacement of fill or culverts, erosion control, and run-off prevention. Frequent crossing of trails by equipment should be avoided whenever possible. Trails should be assessed for damage after they are used for management operations and their repairs prioritized.

Trails should be monitored on a yearly basis to identify hazardous trees within falling distance. The removal of hazard trees should be prioritized to ensure the safety of recreators.

Maintenance of the two improved trails in Essex Woods is shared by Public Works and Parks & Recreation. The rail bed trail has varied ownership. See the Other Considerations portion of this plan for further details. Recommendations for improved connectivity of the trails in Essex Woods to other public recreation trails across the city are made there as well.

Mountain Biking Trails

Essex Woods has an existing network of mountain biking trails. Assessment and recommendations for these trails are provided in further detail in *Appendix H*. Because of the presence of a landfill, no excavation is permitted for the purpose of building trails on any part of the property contained within the site of the old landfill (see Figure 33). For more details, please see the Other Considerations portion of this plan.

These trails are primarily maintained by volunteers from the Penobscot Region New England Mountain Bike Association (PR NEMBA) in partnership with Parks & Recreation. It was noted in the previous management plan that there are concerns regarding erosion caused by using these trails. Erosion remediation should occur in areas where it is necessary, though this will likely be addressed by the trail work recommended in *Appendix H*.

There has been unauthorized trail work occurring in Essex Woods. This includes the cutting of blow downs across unmapped trails and has even led to the unauthorized excavation of the capped landfill on the property. This should be stopped immediately and enforced by park rangers whenever possible. It not only risks the safety of those doing the work, but also that of other recreators and land managers. Additionally, the creation of unauthorized trails damages important wildlife habitat. Any desire trails not mapped should be closed using logs, signage, and possibly replanting to prevent use. Signage at trailhead kiosks discouraging unauthorized trail creation may also be beneficial.

Dog Parks

There are three fenced dog runs surrounding the upper parking lot of Essex Woods. These make up the Essex Woods Dog Park. There are trees within two of these fenced-in areas, and they should be regularly monitored for hazards to ensure the safety of dogs and their owners, and to protect the integrity of the fencing. There is no leash ordinance for Essex Woods currently. Signage should be posted, particularly around the dog park area, anytime management is occurring to encourage the leashing of dogs for their safety and the safety of operators. A leash ordinance should also be explored to protect and promote wildlife.

Sliding Hill

In the southern portion of lot R48-007 there is a sliding hill. This hill leads from the dog park at the top, down to the rail trail and open wetland below. The hill is mowed only once a year to provide a small area of grassland habitat on the property in the hopes of enhancing bird habitat. Recommendations for improving this hill for pollinator and bird habitat can be found in the Wildlife section of this plan. Regulations around how this hill can be managed because it is a capped landfill can be found in *Appendix N* and is discussed in the Other Considerations portion of this plan.

Cross-country Skiing and Snowshoeing

Figure 8. The frozen, open wetland below the sliding hill at Essex Woods.

Cross-country skiing and snowshoeing are very popular in Bangor's forested parks, and many snowshoeing and skiing tracks can be seen specifically along the rail trail on a snowy day. The sliding hill also creates a wonderful opportunity for cross-country skiers.

To maximize Essex Woods for winter recreationists, it is recommended that the improved trails be routinely groomed using a snowmobile and a tow-behind groomer/drag. This could be maintained either through volunteer efforts of local skiing/snowshoeing clubs or by City staff. A single track exclusively for cross-country skiers could also be added parallel to the existing improved trails to encourage use and

reduce frequent need for grooming. Organizations to reach out to for this effort could be the New England Nordic Ski Association (NENSA), the Caribou Bog Cross-country Skiers group, and the Penobscot Valley Ski Club (PVSC). Drags can be purchased new or used and are typically affordable. A snowmobile could be purchased as a shared asset between the Forestry Division and Parks & Recreation, since it could be used for other winter operations and management as well. This equipment could be housed in the garage next to the PAL building for ease of access.

Birding

Essex Woods is home to a wide array of bird species. For this reason, it has been identified by the Penobscot Valley Maine Audubon chapter as one of the best places to bird in the county. According to eBird, 200 species have been identified and recorded on the property. This includes several species considered to be Endangered, Threatened, or of Special Concern in the state of Maine. For more details on the species of birds and the habitats that support them, see the Wildlife section of this plan.

Parks & Recreation and the Forestry Division consulted with Bob Duchesne to learn more about the birding community in Essex Woods. Mr. Duchesne has played a large role in the birding community in Bangor as an author of a birding column for the Bangor Daily News, a guide for Maine birding, author of the Maine Birding Trail Guide, and as a board member for the Penobscot Valley Maine Audubon chapter. He often leads bird walks in Essex Woods and has been observing bird populations there year-to-year for decades. This makes him an excellent wealth of information for this property.

Mr. Duchesne did not recommend the addition of any structures to Essex Woods to improve bird watching. This is largely because it is a highly frequented area by recreators, and most of the birds there have adjusted to the presence of humans, so things like blinds are unnecessary. He encouraged the addition of a variety of bird boxes to improve the habitat of different species. This would include larger duck boxes for mergansers, and boxes to mimic cavities in trees in the wetlands. Additionally, during a site visit, he suggested that some cattails could be removed along certain portions of the rail trail, as they have grown too thick and block views of sora and Virginia rails that could previously be seen. He also supported the need for signage like what can be found along the Bog Boardwalk at the Rolland F. Perry City Forest, noting this would be particularly appropriate in this location because of the diversity of habitats.

During the completion of the previous management plan Jerry Longcore of the U.S. Geological Survey out of the Orono office was consulted to make recommendations regarding the management of the wetlands to enhance birding recreation through habitat improvement. This full report is included as *Appendix K*. His recommendations are reiterated in this plan. They are as follows:

1. *Removing trash, specifically along the wetland edge*—Because it was previously the City's landfill, old refuse is often unearthed through erosion and deposited at the bottom of the hill and along the wetland edge. Litter is also common because of high levels of recreation.
2. *Establish control of the water level*—Beavers are a significant influence on the water levels of most Maine wetlands, and while there are not any identified in Essex Woods at this time, their presence should be monitored for to explain changes in water level. There is a single storm drainage pipe leading out of R56-002-D from which this wetland drains into the Bangor storm sewer system. This pipe should be located and marked by Parks & Recreation to monitor

blockages and to be used to maintain or alter water levels of the wetland as needed to improve wildlife habitat.

3. *Establish a nest box program for cavity-nesting waterfowl*
4. *Establish a bluebird nest box program*
5. *Establish Canada Goose nesting platforms*
6. *Maintain American woodcock singing ground sites*
7. *Build an interpretive station*—There is an existing kiosk at the main parking lot of Essex Woods, and this would be an excellent place to start sharing information regarding the birding opportunities there. More kiosks could be erected along other trails to share this information as well, specifically at the trailheads off the lower parking lot.

Signage may be able to be provided through organizations like Maine Audubon, Maine IF&W, and Ag Allies. It would be particularly interesting to coordinate signage with each of the different habitat types across Essex Woods to educate about the species of birds found there. Signage could also promote the need for protected wetlands.

Police Athletic League (PAL) Building

PAL was founded in New York City in the 20th century. The chapter was established in Bangor in 1990 and relocated to the building at Essex Woods in 1999. Many events for youth were hosted here. Around 2010 the league stopped hosting events, and was officially disbanded in 2022 (Russell, 2022).

Since then, the building has been used intermittently by Parks & Recreation for various purposes, such as local band practices for the Maine Academy of Modern Music. The exterior of the building, especially the overhang structure off the back of the building, will require attention in the next few years if not sooner. This may be a considerable cost depending on the extent of the work. Quotes should be procured soon to determine if the repairs of this building are feasible through the Parks & Recreation budget. If not handled soon, it may become a public safety hazard because of its proximity to the dog parks and sliding hill.

An alternative solution is to seek out an organization that aligns with the goals for Essex Woods to lease or purchase only the PAL building and assume the costs of renovations and maintenance. This could be nature organizations, recreation organizations, or others. If this route is taken, the organization that assumes occupancy of the PAL building should endeavor to benefit the citizens of Bangor.

Off-Highway Vehicles (OHVs)

OHVs are not permitted in Essex Woods or any other City-owned property for the purpose of recreation without express permission from the Department of Parks & Recreation. At Essex Woods, the nonprofit organization, Paul Bunyan Snowmobile Club, has a yearly agreement with Parks & Recreation to utilize the Railbed Trail to access their other trails throughout the City.

Hunting

Hunting is not permitted on any City-owned property.

Forest Health

Invasive Plants

One of the primary concerns for forest health in Essex Woods is the population of invasive plants present. Invasive plants are very aggressive in how they grow, taking resources from native vegetation and reducing overall biodiversity. They can also directly impact wildlife habitats and food sources. They are often introduced into an area through ornamental plantings by property owners and then spread uncontrollably through a variety of ways. They are most commonly introduced as seeds in fill taken from an area where there is a population of invasive plants. Both methods of introduction are difficult to regulate and control. Public education regarding invasive plants can help to prevent homeowners from planting them, and making best efforts to purchase and use only "clean" fill can prevent introduction of seeds. The invasive species seen in Essex Woods are as follows:

- Japanese knotweed (*Fallopia japonica*)
- Asiatic bittersweet (*Celastrus orbiculatus*)
- Glossy buckthorn (*Frangula alnus*)
- Common buckthorn (*Rhamnus cathartica*)
- Multiflora rose (*Rosa multiflora*)
- Black locust (*Robinia pseudoacacia*)
- Norway maple (*Acer plantanoides*)
- Japanese barberry (*Berberis thumbergii*)
- Ornamental grapevine (*Vitis vinifera*)
- Japanese honeysuckle (*Lonicera japonica*)
- Garlic mustard (*Alliaria petiolata*)

Norway maple is an invasive species of specific concern here. Across the whole property, Norway maple seedlings are regenerating and there has been little to no work done to control the continued spread of seed from the mature trees. In several of the forest stands it appears that Norway maple seedlings are succeeding over native tree species regeneration.

There is also a large "stand" of Japanese knotweed between Stands 3 and 4. Japanese knotweed is particularly difficult to control because of its root structure or rhizomes. These roots spread laterally and new stems can sprout from these. This means that if you just cut the stems, they will resprout from the roots very quickly. This also means that if the roots are not fully removed from the soil there is always a chance it will sprout again. Herbicides and repeated and regular cutting are effective methods of controlling Japanese knotweed. The first round of cutting occurred in spring 2026, and the old stalks were mowed down. The mower must be sterilized after each mowing so as to not spread seed.

Figure 9. A "stand" of Japanese knotweed underneath the red pine plantation in Essex Woods between Stands 3 and 4.

Invasive Insects and Pathogens

Like invasive plants, invasive insects and pathogens are non-native species that were unintentionally introduced to North America. Because of their lack of predators or other biotic controls here, their populations grow unchecked, often causing significant damage to forested ecosystems.

Many of these are species specific, for example, Emerald Ash Borer (EAB) only feed on ash tree species and Hemlock Woolly Adelgid (HWA) only feed on hemlock species. This means that knowing the tree species in the forests being managed is incredibly important to determine how the ecosystem may be impacted in the future and what to monitor for. In Essex, the invasive insects and pathogens of greatest concern are:

- Beech bark disease (BBD)
- Beech leaf disease (BLD)
- Red pine scale (RPS)
- Hemlock woolly adelgid (HWA)

Figure 10. Beech leaf disease (BLD) banding on an American beech tree. Image retrieved from the New York State Department of Environmental Conservation.

BBD and BLD are a concern in Essex Woods because of the gaps in the canopy that will be left by their resulting mortality, as both only affect beech species. BBD is caused by a scale insect that then spreads a fungus, creating cankers along the typically smooth bark of American beech trees. Beech trees can continue to survive with BBD for a long time; however, it does create points of entry for other pathogens that can lead to mortality. BLD is caused by a nematode (microscope worm) that lives and feeds inside the leaves and buds of beech trees. Their feeding creates cellular damage that causes the papery leaves to become leathery and dark with banding. This reduces photosynthesis year after year, eventually killing the tree. Currently, there are no viable treatment options for either BBD or BLD in a forest setting. Unfortunately, this means that there will likely be decline and eventual mortality of American beech in Essex Woods.

RPS is also of great concern in Essex Woods because of the red pine plantation in Stand 4. RPS has been found in neighboring Washington County and is anticipated to spread to Penobscot County. How to manage RPS on this property is addressed in further detail in the Red Pine Scale Response Plan for the City of Bangor (2026). The infestation of the red pine plantation by RPS would create a significant public safety hazard but would also open the forest floor to sunlight that would likely lead to the enhanced growth of the invasive plant species already found below. RPS has not yet been detected in Bangor but monitoring efforts in partnership with the Maine Forest Service are ongoing.

There is a population of Eastern hemlock in Essex Woods, mostly in the Northwestern corner of the property. At the time of the inventory, they all seemed to be in good health. Hemlock woolly adelgid (HWA) is a concern on this property because of these trees. HWA is an insect that infests hemlock trees by attaching to the underside of their needles and feeding on the nutrients that should be used for

photosynthesis. While it may take a while, large enough infestations will kill a tree. HWA was not detected during the inventory but should continue to be monitored for.

Figure 11. Hemlock woolly adelgid (HWA) egg sacs on the underside of Eastern hemlock needles. Image retrieved from Wikipedia.

Figure 12. Red pine scale (RPS) insects on the branch of a red pine tree. Image retrieved from the National Park Service.

Public education around wood quarantines and invasive pests and pathogens should be prioritized to prevent future spread into Prentiss Woods and protect other forested properties across Bangor.

Erosion

Erosion is also of concern in Essex Woods. Because of the sloping nature of the property, its use for mountain biking, and the previous use of certain areas as a landfill there are high levels of erosion in some places. It was also observed that there is a high level of erosion caused by the outflow drainage of the Bangor Water District water tower found at the top of the hill. This is addressed further in the Other Considerations section of this plan. Erosion was noted as a concern in the previous management plan for Essex as well.

Stand and Cover Type Map

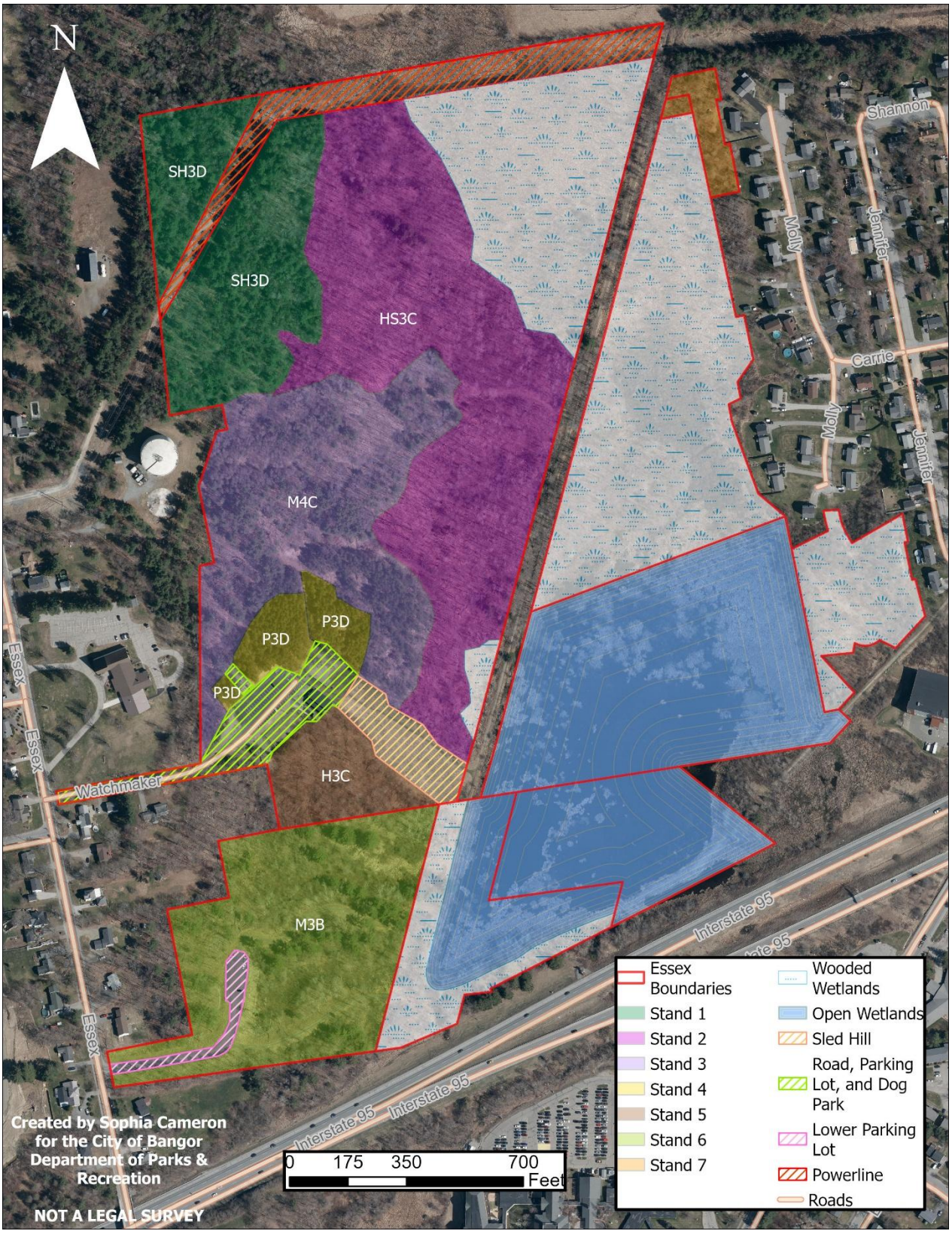


Figure 13. Stand and cover type map of Essex Woods.

Stand Descriptions

Table 3. Stand typing of each delineated, forested stand in Essex Wood with their respective acreages. Refer to the stand typing scheme found in Table 3 for an explanation of stand types.

Stand ID	Stand Type	Stand Size (Acres)
Stand 1	SH4D	8.6
Stand 2	HS3C	17.0
Stand 3	M4C	11.2
Stand 4	P3D	1.9
Stand 5	H4C	2.4
Stand 6	M4D	10.5
Stand 7[2]	H3C	0.9

Table 4. Stand typing scheme.

Dominant and Codominant Tree Type	Average Diameter Class	Crown Closure
H- Hardwood	1- Sapling (0-4 inches DBH)	A- 0-25%
S- Softwood	2- Pole (4-6 inches DBH)	B- 25-50%
SH- Mix of hardwood and softwood, but majority softwood	3- Pulp (6-10 inches DBH)	C- 50-75%
HS- Mix of hardwood and softwood, but majority hardwood	4- Saw (10+ inches DBH)	D- 75-100%
M- Even mix of hardwood and softwood		

Stand 1 (SH3D)—Softwood dominant pulpwood and sawlogs, 8.6 acres

This stand is dominated by mature Eastern white pine and Eastern hemlock. White pine is 40.5% of the species composition and makes up 66.1% of the basal area in the stand. The average diameter of white pine in this stand is 17.9 inches at breast height, and the average height is 77 feet. Hemlock is the second most abundant species and makes up 21.6% of the species composition and 22.1% of the basal area. It has an average diameter of 14 inches, and an average height of 82 feet.

Paper birch, red oak, and white cedar are also present in the stand, but at lower percentages. Cedar makes up 18.9% of the species composition, but only 3.9% of the basal area in the stand and has an average diameter of 6.5 inches. Red oak is 13.5% of the species composition, 5.5% of the basal area, and has an average diameter of 8.8 inches. Paper birch was 2.7% of the species composition, 1.7% of the basal area, and had an average diameter of 11.3 inches.

Norway maple—an invasive tree species—was also captured in this stand during the inventory. It was 2.7% of the species composition and only 0.8% of the basal area. While this is a very low percentage,

[2] Stand 7 is included here because it is classified as forestland, however it was not inventoried because of its very small size and poor accessibility, so it will never be harvested.

Norway maples are prolific seeders at maturity and outcompete native maple species such as sugar maple. The average diameter at breast height for Norway maples in this stand was 7.8 inches, which is the size of a mature, seed-producing tree. Because of their currently low percentage in this stand, it is important to consider how management may impact their populations in the future.

Because of the high levels of shade produced by the dominant white pine and hemlocks, there is currently limited regeneration in the understory. Some hemlock, balsam fir, white pine, and cedar were regenerating, along with hardwood species like birch on the stand edges where there is more sun. However, this has also worked in our favor, as we believe it has controlled the invasive plant species populations in this stand. Invasives that are heavily present in other parts of the forest were not found here, such as glossy and common buckthorn and black locust. This may also explain why the Norway maple population has remained low compared to the rest of the forest. These invasive species should continue to be monitored within this stand going forward.

There was some single-tree mortality in this stand, but nothing indicative of a large-scale insect infestation or disease presence. Since there is a dominant population of hemlock, hemlock wooly adelgid should be monitored regularly. Some of the white pine appeared to have old weevil damage, but there seems to be high enough levels of shade that this may not be an issue for future white pine regeneration.

Table 5. Summary values for Stand 1.

SH3D		
Basal Area (Ft 2)	Trees Per Acre	QMD (in.)
123.3	241.4	9.7

Stand Management Recommendations:

Some parts of this stand are beginning to exhibit features characteristic of old growth, though the specific previous use history is unknown, as is the number of years since the last harvest here. For this reason, and because of the lack of accessibility, it is recommended that this stand be allowed to continue to grow without a harvest. Specifically, no new mountain biking trails should be constructed in the northwestern corner of the property across the powerline trail, to allow for an area of the park that is undisturbed for wildlife habitat. There could be periodic interventions to attempt to fully remove any invasive plants from this stand, and regular monitoring for hemlock woolly adelgid as well as other pests and diseases. To improve tree species diversity—thus improving forest health—tree species appropriate to the soil type in this stand could be planted in existing gaps from areas of blowdown. Refer to the soils report in *Appendix A* for species that would be suitable for planting.

Figure 14. An overstory of white pine and hemlock with limited natural regeneration and a more complex horizontal structure in Stand 1.

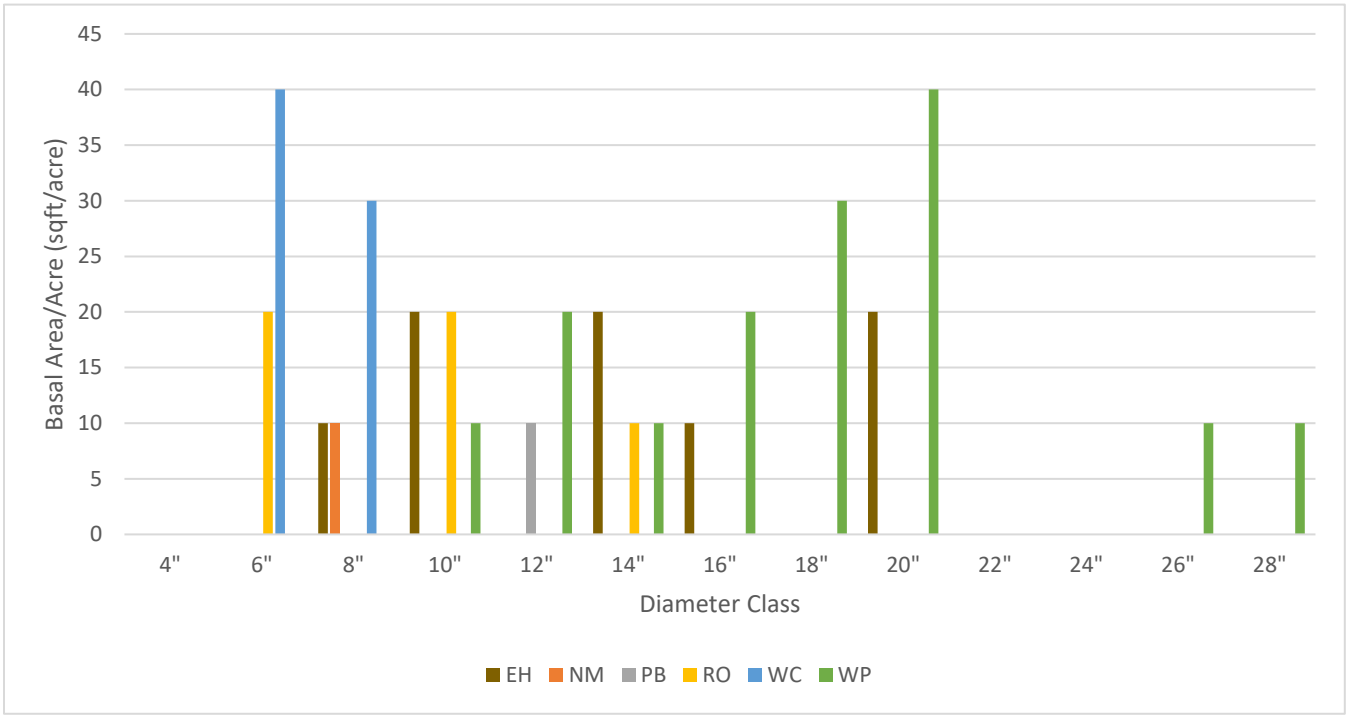


Figure 15. Diameter distribution of basal area per acre by species[3] for Stand 1.

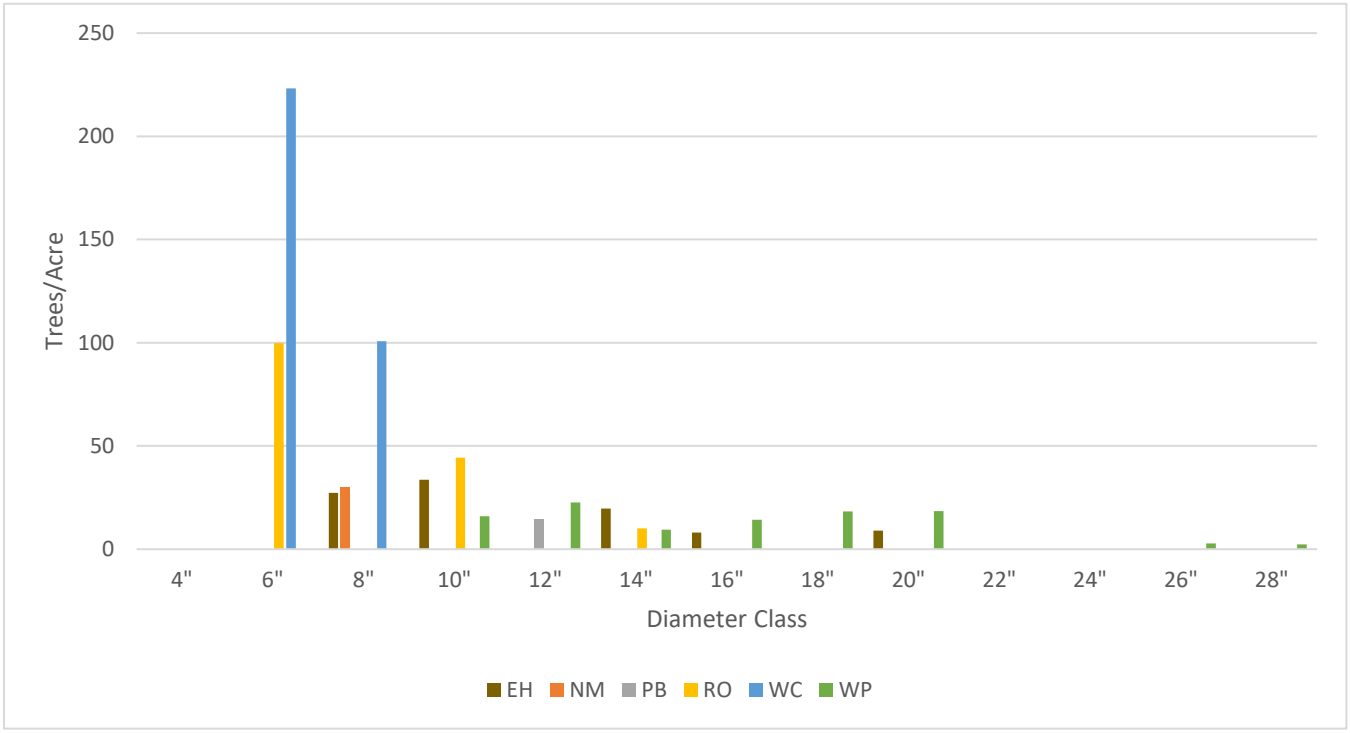


Figure 16. Diameter distribution of trees per acre by species for Stand 1.

[3] Species codes can be found in *Appendix I.*

Stand 2 (HS3C)—Hardwood dominant pulpwood and sawlogs, 17.0 acres

This stand is largely populated with hardwood species with a small percentage of Eastern white pine. Quaking aspen is the highest percentage of the species composition at 29.8%, and a basal area percentage of 20.8%. Bigtooth aspen is also present on the stand and has a species composition of 16.7% and a basal area composition of 24.1%. Bigtooth aspen has a larger average diameter at breast height (14.2 inches) than quaking aspen (9.7 inches), which accounts for the difference in basal area percentages. Quaking aspen has an average height of 63 feet, and bigtooth aspen has an average height of 83 feet. Red maple is 13.1% of the species composition and 5.1% of the basal area. Its average diameter at breast height is 7.1 inches and its average height is 34 feet. Most of these red maples are stump sprouts from previous harvesting.

10.7% of the species composition and 4.7% of the basal area is categorized as other hardwoods. These are non-timber species of hardwood, and in this stand it is boxelder, black locust, and previously cultivated apple trees. Boxelders have erratic growth forms, and are an aggressive, native tree species. They often colonize cleared areas and are prone to storm damage. Black locust is an invasive tree species in Maine and is not desired on this property.

Red oak makes up only 9.5% of the species composition but is 21.7% of the basal area. The average diameter at breast height is 17.5 inches and the average height is 61 feet. Sugar maple, white ash, white pine, grey birch, paper birch, and American beech are all present in the stand but at low percentages. Beech is 6% of the species composition and 2.3% of the basal area of this stand. While this is only a small part of the stand, it is important to continue monitoring them for decline.

Both beech bark disease and beech leaf disease were found on this property, and the inevitable mortality of all beech in Essex Woods should be planned for. This may create large gaps in the canopy which could promote colonization by invasive plant species present on the landscape. It may also contribute to excessive beech root sprouting, which could outcompete regeneration that will be more successful into the future. Signs or symptoms of emerald ash borer were not seen in the white ash in this stand. There was no evidence of other pests of diseases within this stand at the time of inventory. Japanese knotweed, honeysuckle, glossy and common buckthorn, and black locust were all found in this stand.

There was some beech regeneration, but not enough at the time of the inventory to be of concern. Quaking and bigtooth aspen were both regenerating, likely from root sprouts as opposed to seed, as it was localized to the existing mature groups of the parent species. Other hardwood regeneration was limited, likely due to deer browsing.

The leading concern in this stand is the over-maturity of both aspen species. Aspen is short-lived and grows quickly. Because of their ability to produce clones from root sprouts, mortality often occurs *en masse.* In this scenario, this would leave very large gaps in the canopy, which would likely be quickly colonized by invasive plants.

The southern portion of this stand was once a part of the City landfill. This has led to significant erosion on the slopes. See Figure 29 to visualize the location of the landfill in this stand.

Table 6. Summary values for Stand 2.

HS3C		
Basal Area (Ft 2)	Trees Per Acre	QMD (in.)
93.3	236.6	8.6

Stand Management Recommendations:

The primary goal for this stand is to reduce the invasive plant species population. Integrated pest management should be used to manage honeysuckle, black locust, Norway maple (if found), Japanese knotweed, and buckthorn. This will likely require the use of herbicides. The use of this stand for recreation and the proximity to wetlands should be considered when applying chemicals. Brush from this management should be chipped and removed from the stand to reduce possible seed sources. Monitoring for widescale mortality of beech and aspen could also occur periodically, especially to ensure trees are not hazardous to recreators or damaging to trails. Mortality without extensive management will eventually create a more diverse horizontal structure in this stand, which will be beneficial for wildlife. Erosion should continue to be monitored on the slopes where the landfill once was, and areas that fall within this area should be managed in accordance with the regulations outlined in *Appendix N*. Primarily, these areas should be cleared and maintained as grassland to reduce erosion potential. Existing erosion should be remediated following DEP standards.

Figure 17. An overstory of aspen with an understory of invasive plant species and regenerating aspen and beech in Stand 2.

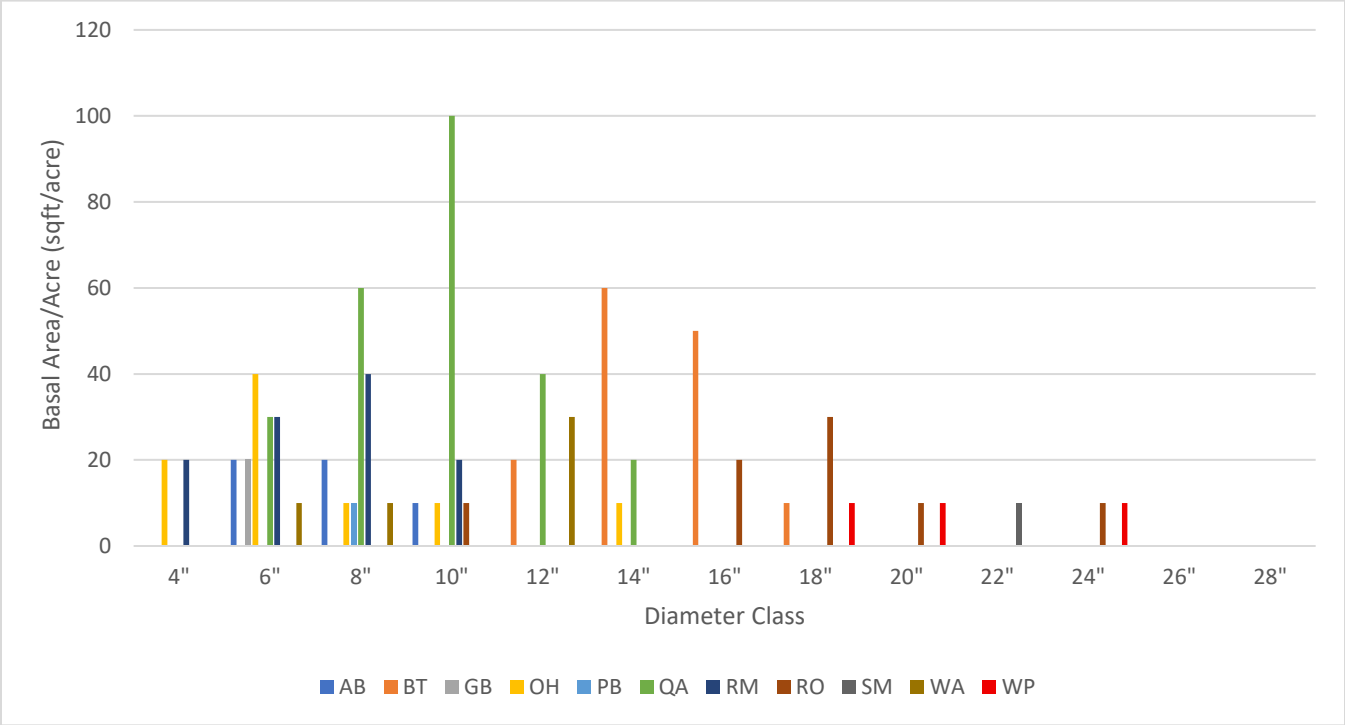


Figure 18. Diameter distribution of basal area per acre by species for Stand 2.

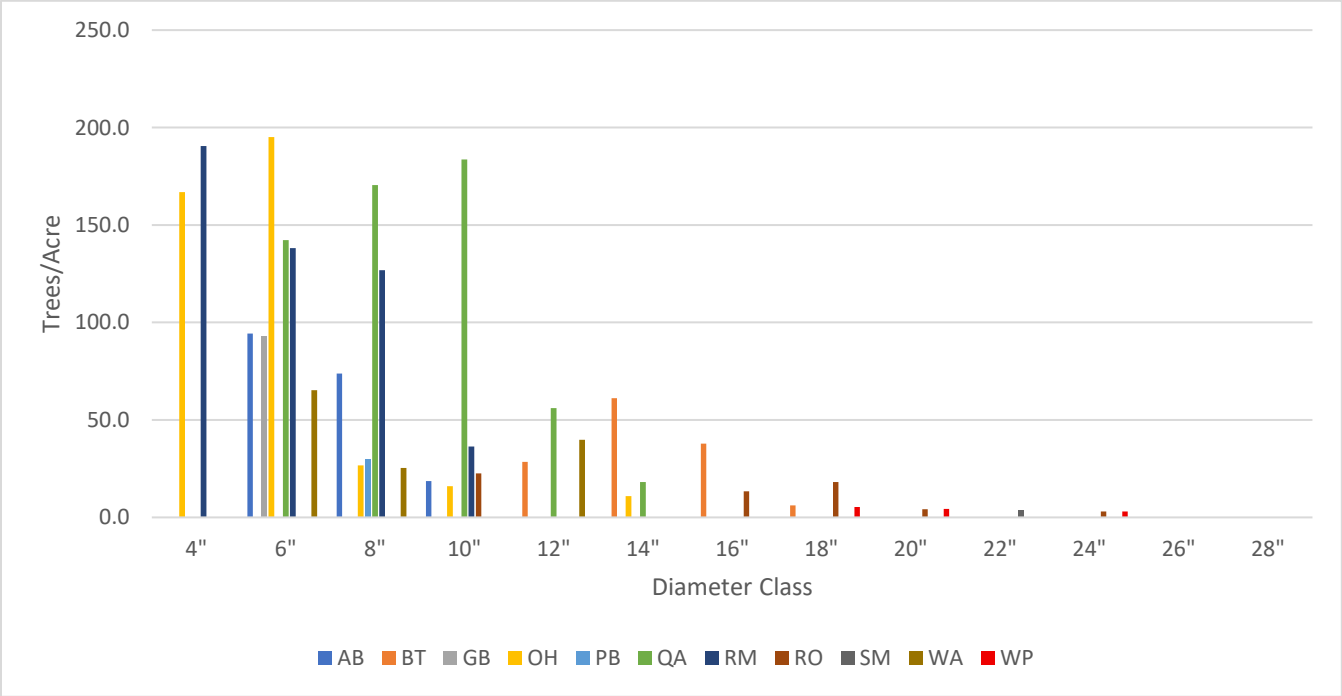


Figure 19. Diameter distributions of trees per acre by species for Stand 2.

Stand 3 (M4C)—Mixed wood sawlogs, 11.2 acres

Red oak and white pine are the dominant trees in this stand. Red oak is 48.9% of the species composition and 42.1% of the basal area. These are primarily sawlog sized trees with an average diameter at breast height of 12.8 inches and an average height of 45 feet. White pine follows at 31.1% of the species composition of this stand and 53.5% of the basal area. This higher basal area is because the pine is larger than the oak, and it has an average mean diameter of 17.8 inches and average height of 50 feet.

Norway maple is the third most common tree in this stand and is 15.6% of the species composition and 3.9% of the basal area. These percentages show that Norway maple is succeeding under the mature oak and pine, instead of native species. Paper birch and black cherry were also captured in the inventory of this stand. There are two small plantations in this stand that were not captured on the inventory; one is Norway spruce and the other is Scots pine. Neither is native to the U.S. but appear to be in good health. There is a lack of tree species diversity in this stand.

Browntail moths (BTM) have previously been an issue in this stand because of the high percentage of oak, which is a preferred host tree. BTM is an invasive species of lepidoptera that can cause extensive defoliation, and if there is repeated defoliation year after year, possible tree mortality. During the inventory it was noted that there was some canopy dieback, likely related to BTM, but nothing extensive or concerning at that time. The greater concern with BTM is the hazard it poses to recreators, especially along trails. The caterpillars of BTM have toxic hairs that cause skin irritation, and if inhaled can cause breathing problems and inflammation. These hairs often fall to the ground and can land on people walking below.

Most of the mature white pine show signs of previous weevil damage, so although their basal area within this stand is high, very few would be considered sawlog quality. They do, however, serve as excellent wildlife and bird habitat, and their cones are an excellent food source for grey and red squirrels.

Regeneration in this stand is primarily red oak and white pine, indicating that it is a good site for both. The midstory is largely Norway maple, likely because of the access to alternative food sources (in this case, acorns) there is limited deer browse of regeneration. There is currently adequate regeneration within this stand.

This stand is a highly focal area, because of the two main trails that go through it. It should be ensured that the highest standards of forest management are upheld in this stand. A small portion of this stand is identified as having once been part of the landfill, as shown in Figure 29.

Table 7. Summary values for Stand 3.

M4C		
Basal Area (Ft 2)	Trees Per Acre	QMD (in.)
75.0	193.3	10.2

Stand Management Recommendations:

Managing the invasive plant component—primarily Norway maple— is the priority in this stand. In doing so, aesthetic quality of the forest and safety of recreators is of the utmost importance. Trails

should be fully closed, and signs posted during management that requires machinery. Brush should be chipped and removed from the stand to reduce possible seed sources. Species diversity could be improved through planting of tree species appropriate for the soil type and light conditions. Refer to the soil report in *Appendix A* to identify appropriate species for planting. This could also include planting native shrub species to create bird habitat and provide additional food sources in this stand. Protection of planted and natural regeneration to prevent deer browsing may be required. Because of the high recreational use within this stand, snag creation is not recommended. Branches of oak trees that overhang trails should be routinely pruned to prevent the falling of toxic BTM hairs onto recreators below. The portion of this stand that is classified as part of the capped landfill should be fully cleared and maintained as grassland per the regulations in *Appendix N*.

Figure 20. White pine and red oak in the overstory with Norway maple in the midstory and red oak regeneration in the understory in Stand 3.

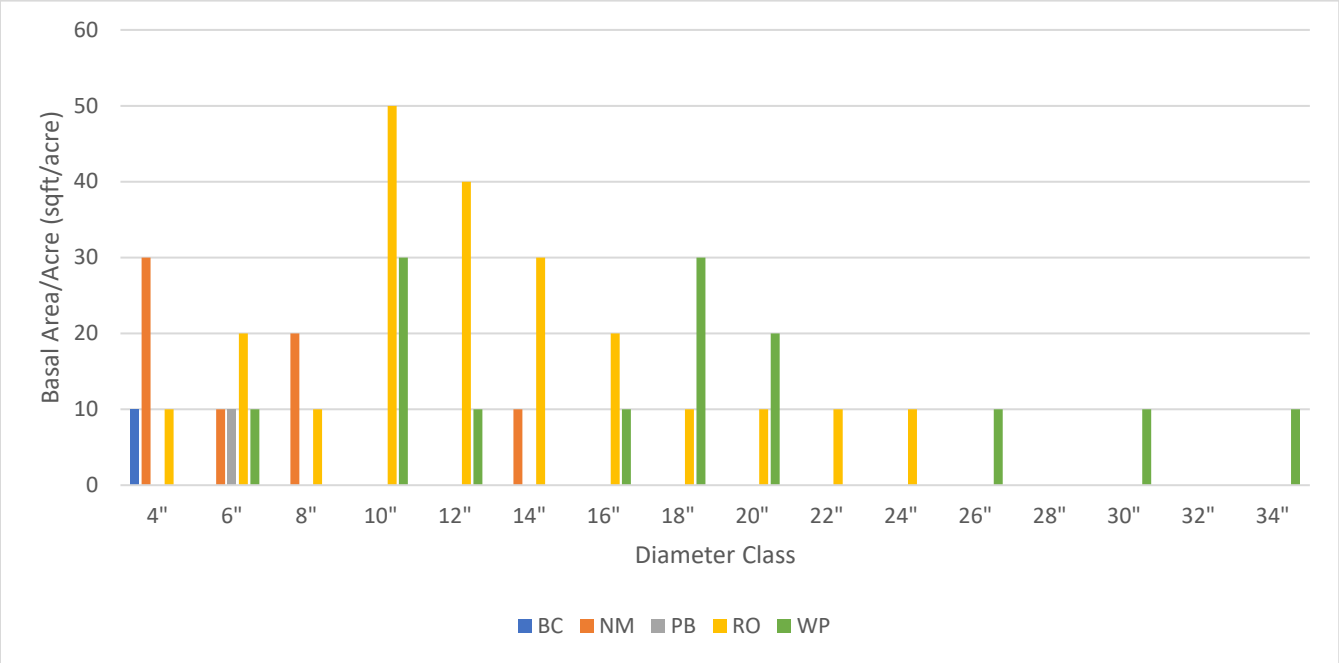


Figure 21. Diameter distribution of basal area per acre by species for Stand 3.

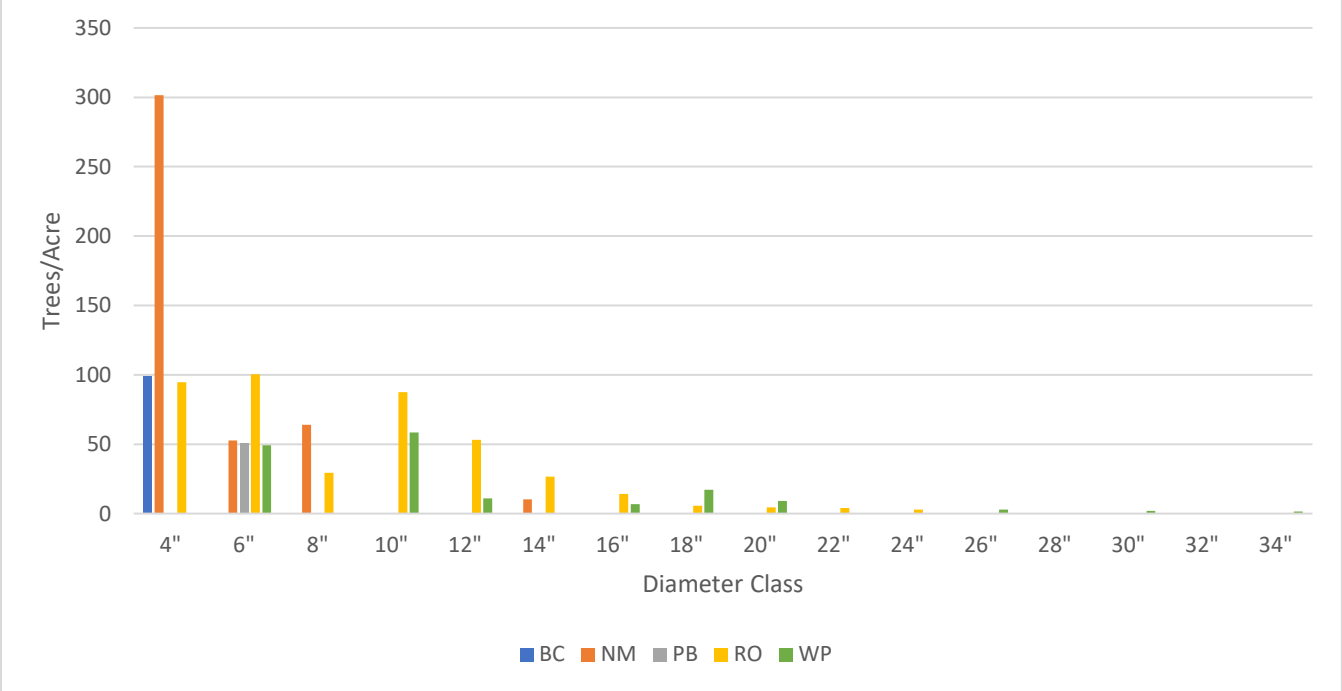


Figure 22. Diameter distribution of trees per acre by species for Stand 3.

Stand 4 (P3D)—Red and Jack Pine pulp plantation, 1.9 acres

Stand 4 is a plantation of both red and Jack pine. These trees were planted in 1993 by the City Forester at the time, Rolland Perry. 91.9% of the species composition of this stand is red pine, and 5.4% is Jack pine. Red pine makes up 96.3% of the basal area and Jack pine is 2.4%. The remaining 2.7% of the species composition is other hardwoods, primarily boxelder. The average diameter at breast height for red pine in this stand is 8.4 inches, and the average height is 35 feet.

The low height for age of the red pine indicates that this is not a good site for this species. This, along with the approaching threat of red pine scale (RPS), provides rationale for fully removing red pine from this stand and allowing it to convert back to naturally regenerating forest.

The understory of this stand is a mix of naturally regenerating tree species and invasive plants. Glossy and common buckthorn and Norway maple are the biggest problems here, but black locust, multiflora rose, Japanese barberry, grape vines, and bittersweet vines are also present. Red oak, white pine, and black cherry are readily regenerating. There are some sections of the stand where staghorn sumac colonies have also established themselves.

Table 8. Summary values for Stand 4.

P3D		
Basal Area (Ft 2)	Trees Per Acre	QMD (in.)
123.3	370.9	7.9

Stand Management Recommendations:

An initial mechanical removal of invasive plants was performed in the Fall of 2025, and all species of invasive plant were removed from approximately 50% of this stand. Native species regeneration was flagged and retained. A follow-up in the Summer of 2026 is planned to do a stump application of herbicide to prevent resprouting of what was removed. Monitoring for regrowth will continue over the summer, and in the Fall of 2026 the remaining invasives will be mechanically removed. All harvesting of red pine must be performed in the winter. An initial pre-commercial thinning of poorly formed or unsuccessful stems is recommended to allow the more successful trees to maximize their growth. Once RPS is detected in Bangor, the remaining red pine will be harvested. Depending on markets this harvest may be merchantable. All management should be performed using low-impact equipment because of the proximity to the dog parks and parking area. Replanting with appropriate tree species for the site may be necessary in areas where natural regeneration is not adequate. Refer to the City's Red Pine Scale Response Plan for further details.

Figure 23. Red pine plantation with the invasive species understory removed and desirable native regeneration flagged in various colors in Stand 4.

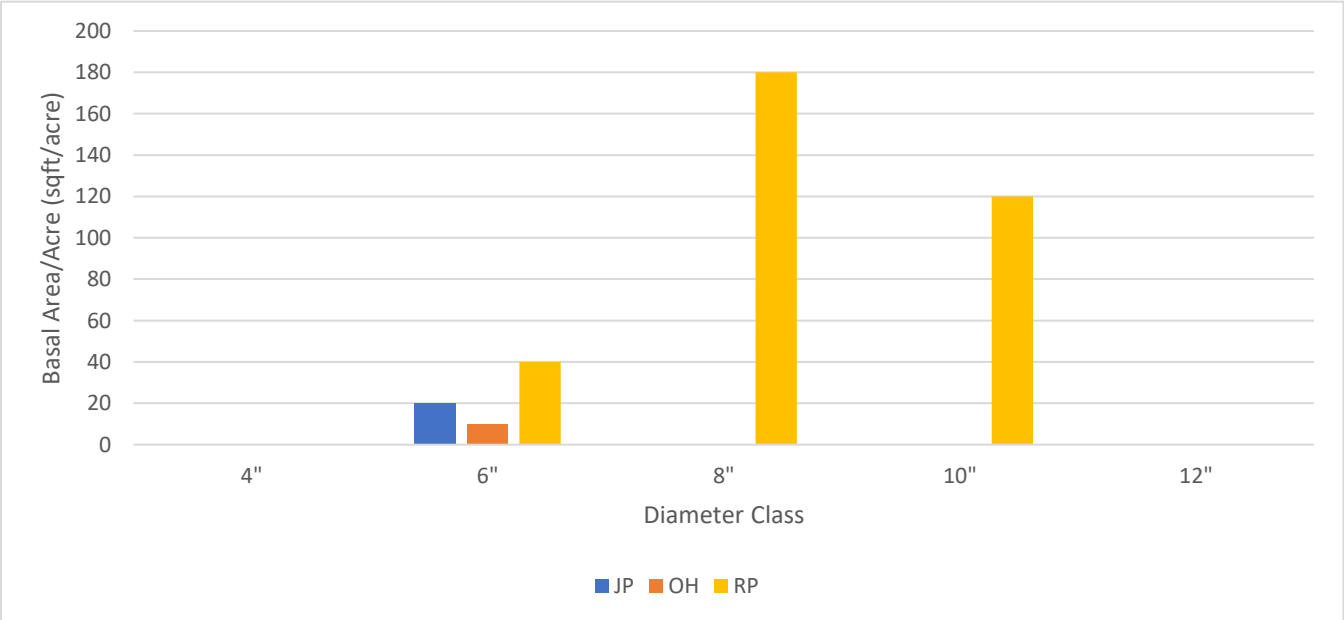


Figure 24. Diameter distribution of basal area per acre by species for Stand 4.

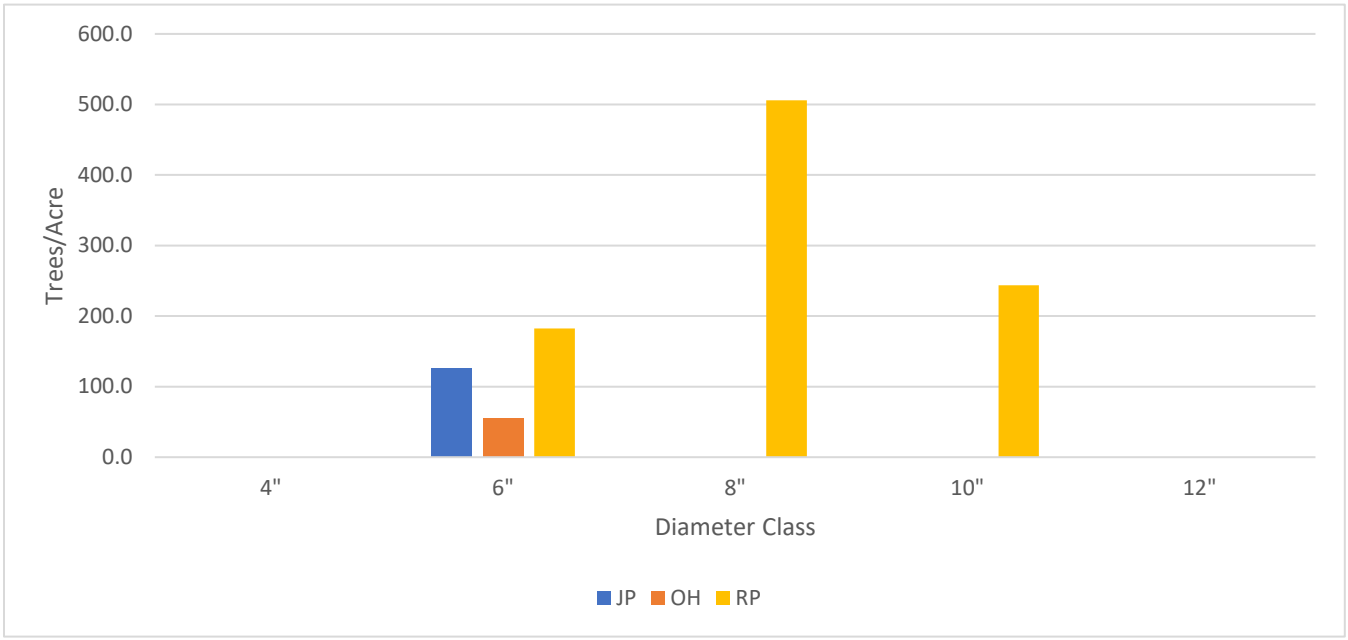


Figure 25. Diameter distribution of trees per acre by species for Stand 4.

Stand 5 (H3C)—Norway maple, boxelder, and black locust, 2.4 acres

60% of the species composition of this stand is categorized as other hardwoods—specifically boxelder and black locust. This is 83.9% of the basal area of the stand. 35% of the species composition is Norway maples, and they make up 14.2% of the basal area. There are very few desirable species in this stand. Along the edge of the stand at the top of the hill there is a handful of red pine that were likely planted when the plantations were. These make up about 5% of the species composition of the stand and 1.9% of the basal area.

The western portion of stand 5 was once a part of the landfill. This is evident due to the presence of trash emerging from the ground across it, and the steep pitch of the slope. It has been colonized by invasive and aggressive native tree species. Per the Maine Department of Environmental Protection, trees are not permitted to grow on capped landfills such as this. This is because trees can easily blow over and expose waste and can lead to water infiltration. Instead, they should be seeded with native herbaceous plants and mowed, as is done with the sliding hill already. More details regarding DEP regulations for capped landfills can be found as *Appendix N*.

Most of the regeneration in this stand is the same as the mature species, with a skew towards Norway maple seedlings. There is very little natural regeneration of native species.

One large elm can be found on the edge of this stand next to the PAL building. It is clearly infected with Dutch elm disease, and declining.

Table 9. Summary values for Stand 5.

H3C		
Basal Area (Ft 2)	Trees Per Acre	QMD (in.)
100.0	242.3	8.7

Stand Management Recommendations:

The red pine in this stand should be managed in alignment with the management of the red pine plantations in Stand 4. All management on this stand performed within portions that are a part of the capped landfill should follow the appropriate DEP regulations in *Appendix N*. Complete removal of all tree species within these areas and replanting with native herbaceous species would improve erosion control and prevent the exposure of waste when trees inevitably blow over. This could be managed for insect habitat in the same way that the sliding hill will be managed and could provide for increased habitat for certain bird species. This would also greatly reduce the seed source for invasive tree species present in this stand and keep them from spreading to the rest of the forest. Further removals of invasive tree species in other parts of this stand could create valuable early successional habitat for bird species.

Figure 26. Norway maple, boxelder, and black locust in the overstory with Norway maples and other invasive species growing in the understory in Stand 5. Image taken from the top of the hill.

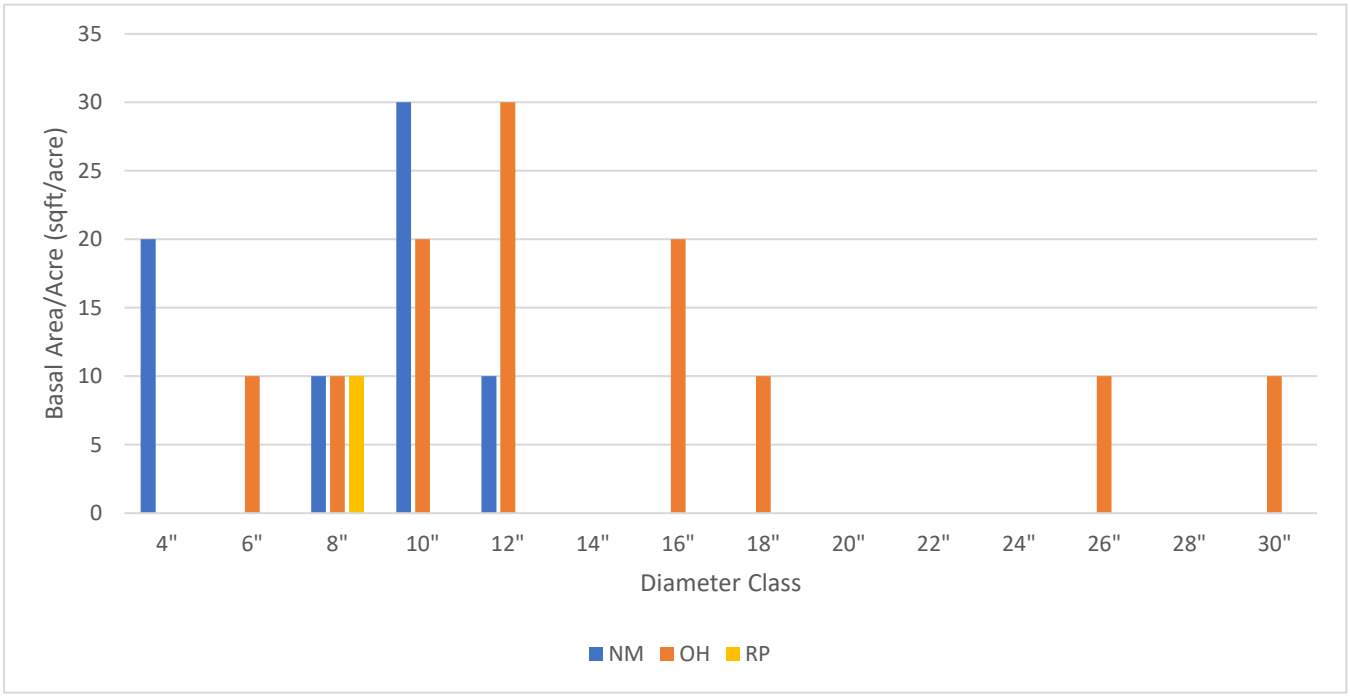


Figure 27. Diameter distribution of basal area per acre by species for Stand 5.

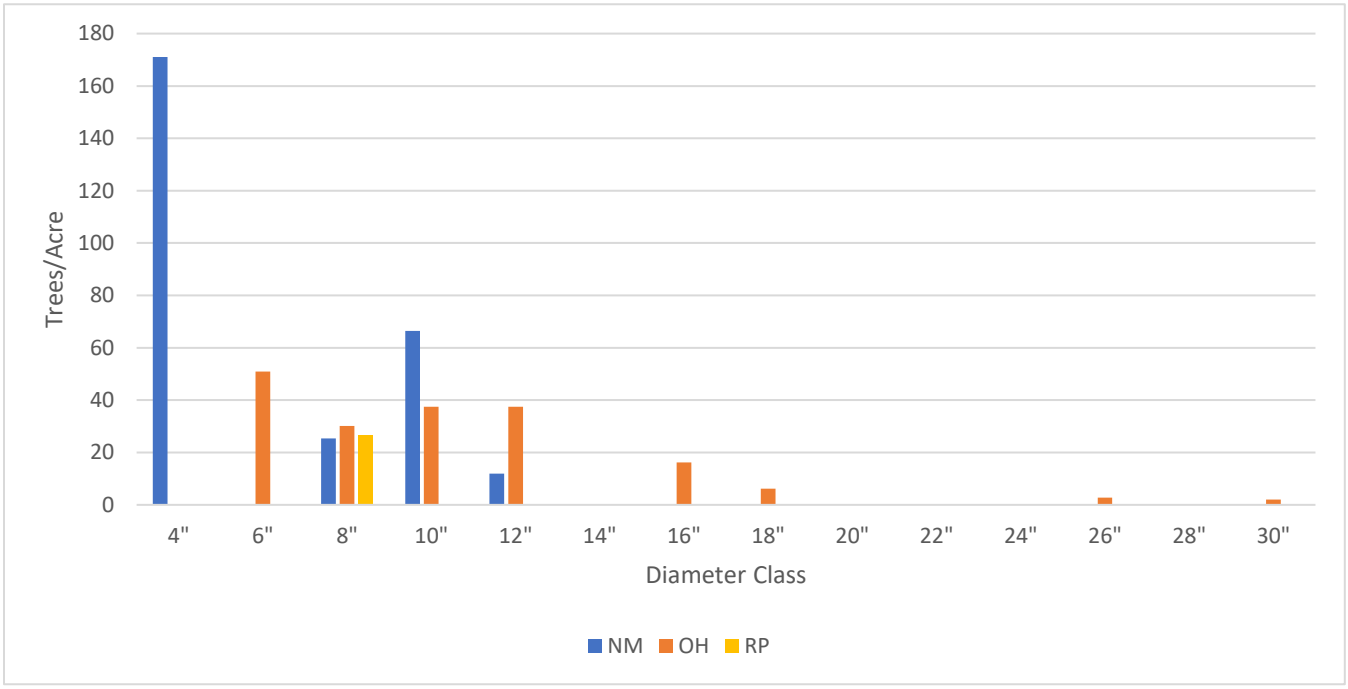


Figure 28. Diameter distribution of trees per acre by species for Stand 5.

Stand 6 (M3B)—Mixed wood pulpwood and sawlogs, 10.5 acres

White pine is 31% of the species composition of this stand and 70% of the basal area. The average diameter is 24.3 inches at breast height, and the average height is 86 feet. Most of these appear to be old field pines and show signs of extensive weevil damage over the years. Other hardwoods make up 20% of the species composition but only 6.6% of the basal area. These are mostly black locusts and previously cultivated apple trees with multiple stems.

Quaking aspen and red oak are both 13.8% of the species composition of this stand. Red oak is 11.8% of the basal area and quaking aspen is 8%. The average diameter at breast height of red oak is 14.5 inches, and the average diameter at breast height of quaking aspen is 12.4 inches. Black cherry is also present in surprising numbers on this stand. It is 17.2% of the species composition and 3.3% of the basal area, with an average diameter at breast height of 7.1 inches. Norway maples were 3.4% of the species composition and 0.3% of the basal area.

Regeneration of white pine and red oak was present in this stand, as well as quaking aspen, black cherry, black locust and Norway maple. There was also a small stand of balsam poplar regenerating. There were quite a few very large common buckthorn shrubs as well, and some birch in the wetter areas of the stand where it was more open. Invasive multiflora roses and barberries could be found along the trails going through this stand.

Table 10. Summary values for Stand 6.

M3B		
Basal Area (Ft 2)	Trees Per Acre	QMD (in.)
72.5	173.6	9.3

Stand Management Recommendations:

This stand has a very interesting variation in habitat types, and this could be maintained through management. Several areas may be appropriate for bird species that favor early successional habitats. These could be maintained through small (<1 acre) patch cuts to create small gaps in the forest, which would be feasible because of the ease of access into this stand. Invasive species management should be performed in this stand as well, especially to remove mature buckthorn shrubs to prevent the further spread of seed. Native shrub species could be planted to improve food sources and habitat for wildlife.

Figure 29. Mature white pine and hardwoods with ferns and some regenerating red oak and hardwoods in the understory in Stand 6.

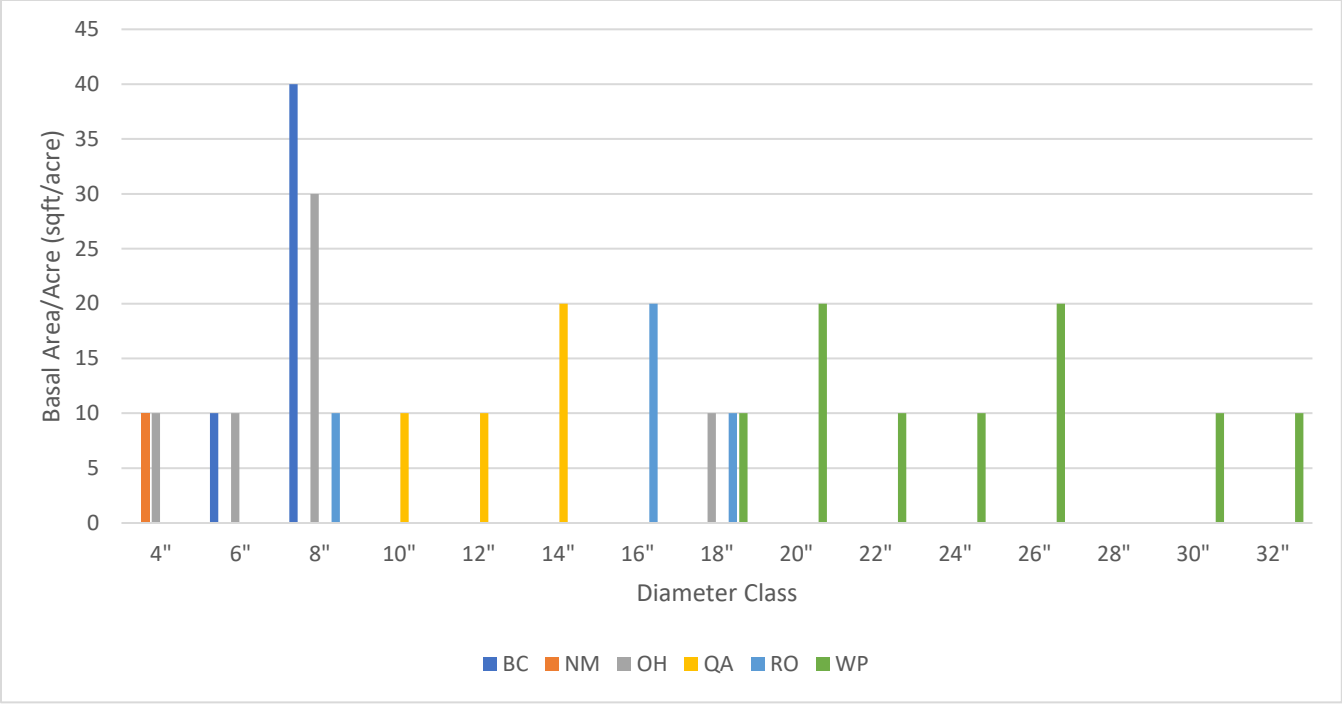


Figure 30. Diameter distribution of basal area per acre by species for Stand 6.

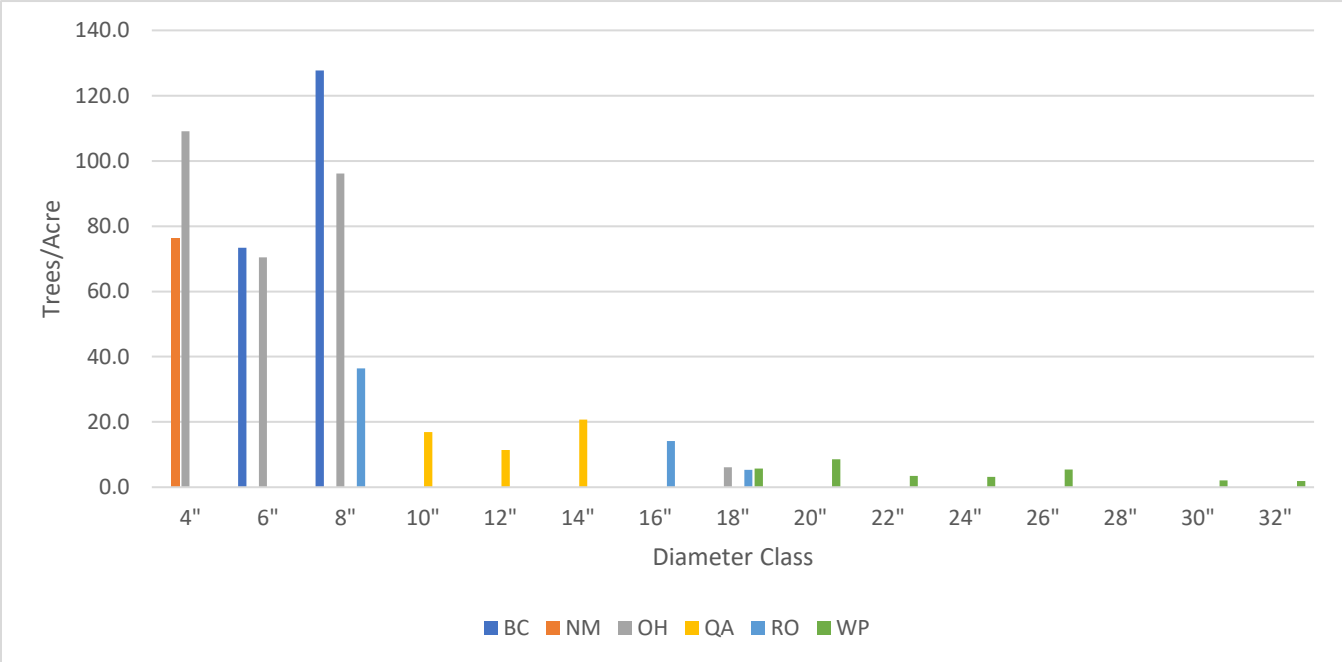


Figure 31. Diameter distribution of trees per acre by species for Stand 6.

Stand 7 (HS3B)—Hardwood dominant pole and pulpwood, 0.9 acres

This stand is forested, but because of its very small size and lack of accessibility, it was not inventoried. There is no need for management in this stand, except to continue to monitor and manage invasive species and periodically check for encroachment from abutting landowners.

Cruise Summary

The woodlot summary values were derived from a variable radius field cruise of randomly selected plot points based on a fishnet with a 75-foot spacing. 27 plots on this property returned an estimated mean basal area per acre of 97.9 square feet with an allowable error of 27.69% for Stand 1, 14.67% for Stand 2, 17.31% for Stand 3, 24.81% for Stand 4, 18.19% for Stand 5, and 27.09% for Stand 6—all at a confidence level of 68%. Trees greater than or equal to 4.0" DBH were recorded to the nearest tenth of an inch. 27 plots met the cruising standard for 10 BAF.

Table 11. Summary of the stocking for the whole property.

Whole Property Stocking		
Basal Area (Ft 2)	Trees Per Acre	QMD (in.)
97.9	243	9.1

Table 12. Stand-level statistics with a 68% confidence level.

	Stand 1 (SH3D)	**Stand 2 (HS3C)**	**Stand 3 (M4C)**	**Stand 4 (P3D)**	**Stand 5 (H3C)**	**Stand 6 (M3B)**
Basal Area (ft2)	123.33	93.33	75.00	123.33	100.00	72.50
Standard Deviation	45.09	38.73	28.81	40.41	14.14	33.04
% Standard Error	21.11%	13.83%	16.00%	19.00%	10.00%	23.00%
Allowable Error	27.69%	13.1%	17.31%	24.81%	18.19%	27.09%

Cruise Map

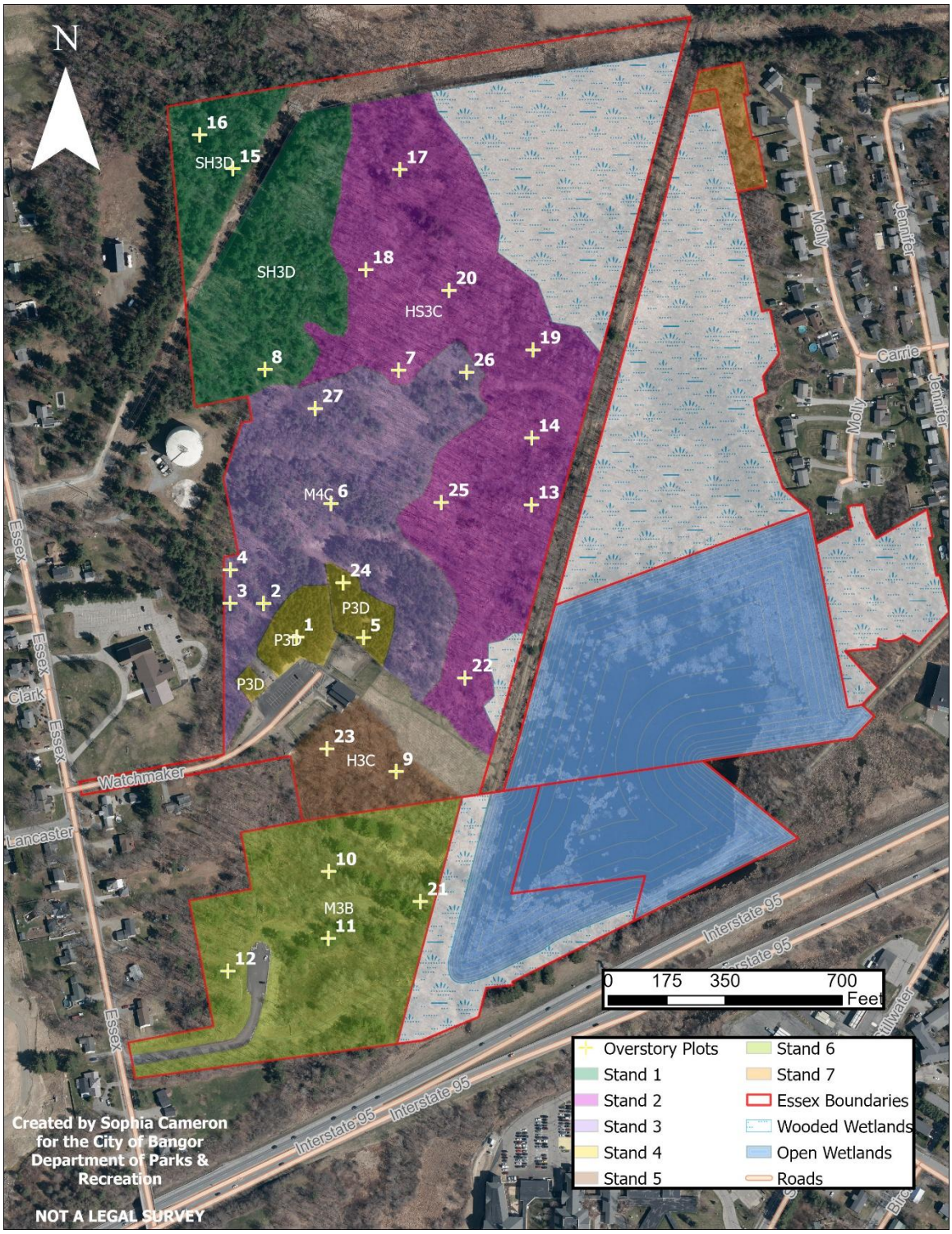


Figure 32. Map showing the variable radius plot points where inventory data was collected.

Management Recommendations

A survey of Essex Woods would be valuable to prevent future encroachment from neighboring landowners. Once a survey is conducted and boundary lines are established, they should be maintained on a five-year cycle following the guidelines in *Appendix E*. Any places of encroachment should be remediated.

No commercial timber harvesting is recommended during this management period aside from being used as a tool to promote forest health. This includes:

1. Performing a pre-commercial thinning of the red pine plantations in Stand 4 to remove poorly formed or dead stems as directed in the Red Pine Scale Response Plan written for the City of Bangor.
2. Removing trees encroaching on the sliding hill to widen that area for recreation, improve aerial insectivore habitat, and enter better alignment with DEP standards for landfills.
3. Removing undesirable species competing with desirable species, such as Norway maple, black locust, and boxelder.
4. Removing trees that pose a threat to public safety along trails.

These operations should only be completed using low-impact equipment to accommodate aesthetic considerations for recreators and to prevent further soil damage and erosion, and so as not to disturb the capped landfill. All stumps should be left for this reason as well, though they are able to be ground is necessary. Any upturned stumps must be disposed of to an appropriate waste site.

Pruning along trails should be done on a three-to-five-year basis to maintain clearance for recreators and vehicle access for land managers. Removal of oak branches along trails should be prioritized to prevent exposure of recreators to browntail moth.

Invasive plant control using integrated pest management should be the priority for this management period in Essex Woods. This will require the targeted use of herbicide which will be used following all state and federal laws and regulations and only when necessary. Only targeted applications of herbicide should be used in this area because of the number of recreators. All brush generated from the mechanical removal of invasive plants should be chipped and taken offsite to reduce the spread of seed.

Replanting with native tree and shrub species could be done as needed in areas where there is low species diversity or an even-age structure. These plantings will require protection from deer browsing to ensure that they are successful. This would specifically be useful in the red pine plantations in Stand 4 as recommended in the Red Pine Scale Response Plan.

Special consideration should be taken to maintain and improve the various bird habitats. This may look like maintaining forest edges with once-a-year mowing, planting soft-masting tree and shrub species, planting native herbaceous plants to increase the number of insects, adding nesting boxes and platforms, and girdling trees to create snags. Removal of the cattails encroaching on the open wetland could also help to improve habitat and maintain areas of open wetland. Maintaining areas as early successional habit would also increase habitat types on the property. This may be specifically appropriate in Stand 5 because most of these trees are invasive and should be removed. The sliding hill should continue to be mowed only once a year and could be planted with more native herbaceous plant species to promote

insect habitat. Nesting boxes for aerial insectivores could be placed along the edge of the hill to create habitat for those species. All recommendations provided in *Appendix I* should be followed.

Red pine scale, hemlock woolly adelgid, emerald ash borer, and beech bark and leaf disease should continue to be monitored for in Essex Woods. These pests and diseases may cause managers to adjust management strategies within the next ten years, specifically hemlock woolly adelgid because of the mature hemlocks in Stand 1. As of spring 2026 traps for red pine scale have been deployed in the red pine plantation. This same trapping protocol should be used in Stand 1 for hemlock woolly adelgid in the next few years. This program is in partnership with the Maine Forest Service.

Educational signage could be posted to teach recreators about the various habitat types and bird species in Essex Woods, as well as other natural resources. This could be done in partnership with Ag Allies, Maine Audubon, and Maine IF&W. Parks & Recreation should work with these organizations to put together outreach and educational events at Essex as well.

The PAL building requires updating and repairs. Once these are completed it could be an excellent home for a non-profit or nature and recreation-based programming. How this is accomplished will be at the discretion of the Director of Parks & Recreation.

Mountain biking trails should be improved following the recommendations made in *Appendix H*. Efforts should be made especially to remediate and prevent future erosion and damage to the capped landfill. See the Other Considerations portion of this plan for further details. There has been damaged from both animal and human use. Any new trails created for mountain biking down this hill should not prevent the annual mowing, or the use of the hill as a sliding hill in the winter. They should also be suitable for both bikers and other recreationists. Leash ordinances should be strictly enforced on this hill for the safety of mountain bikers, dogs, and wildlife. On no part of this hill may the cap be disturbed. New trails should be placed on one side or the other of the hill to be less intrusive to wildlife habitat and will need to be built up to prevent erosion from repeated use. Volunteers constructing trails or doing extensive maintenance of trails need to be always supervised by a staff member of either Parks & Recreation or the Forestry Division and must wear appropriate PPE. Any trails that go onto other properties need to be approved by those private property owners, otherwise those trails should be closed as soon as possible. At no time may volunteers or members of the public conduct trail work without the written permission of both Parks & Recreation and the Forestry Division.

Erosion also needs to be controlled in the areas of the capped landfill, specifically in Stands 2 and 3. This will require working with the Maine DEP to make sure everything remains in compliance and can be done in tandem with the removal of trees from these areas. The sliding hill trail needs to be closed permanently and rerouted elsewhere because of excessive erosion. Plans on how to do this are outlined in *Appendix H*.

Erosion control measures also must be taken in the case of the Bangor Water District tank outflow stream. To do so, modifications must be made to the existing drainage system, including the replacement of several culverts to appropriate sizes, periodic addition of riprap in areas of higher water velocity, and replacing the single culvert along the rail trail connecting the two wetlands with an appropriately sized open-bottom drainage structure following all State BMPs.

Under no circumstances should private residents be permitted to fell standing trees, remove downed woody debris or snags, prune branches, remove brush, or remove herbaceous plants without the permission of the Director of Parks & Recreation and the City Forest Manager. All work along trails must be approved and supervised by either the Parks & Recreation Department or by the Forestry Division. All brush must be removed or chipped following trail work.

Other Considerations

Veazie Railbed Trail

The rail trail is not entirely owned by Parks & Recreation. Much of the north-south stretch of the trail is owned by the Department of Community & Economic Development. The east-west portion of the trail is accessed from the corner of Garden Way and Jennifer Lane and is partially owned by the Maine Department of Transportation and a private, commercial landowner. Efforts could be made for the City to acquire the portions of the rail trail owned by the private landowner and Maine DOT. Barring this possibility, contracted rights-of-way could be established to improve ease of access for future management or emergency response (e.g. wildfire response), as well as for continued use by recreators. Ownership of the portion owned by Community & Economic Development could remain with them or be transferred to Parks & Recreation.

Various culverts should be replaced along the rail trail within the next ten-year period to improve drainage.

Park Connectivity and Maintaining Natural Spaces in Bangor

In the previous management plan, it was recommended that efforts be made to purchase property to connect Essex Woods to protected Bangor Land Trust properties, which would then connect it to the City Forest. This would create a very large stretch of protected forest and wetlands from central Bangor northwards. This concept should continue to be explored, especially as Bangor becomes increasingly developed and habitat and recreation fragmentation becomes a larger issue. Even obtaining recreational right-of-way access through private properties to connect the rail trail would be beneficial. Signage to educate recreators on the consequences of habitat fragmentation could also be implemented to gain public support.

Lower Parking Lot and Access Road

In 2020 the lower parking lot and access road at Essex Woods were constructed. This area was previously a forested wetland, and all appropriate permits were granted before construction began. This parking lot created necessary direct access to the rail trail and lower part of the park.

A Beneficial Use Permit was granted to the City by the Maine DEP for the use of soils that were removed from Bangor's Waterfront Park through the Voluntary Remediation Action Program (VRAP). This program allows for the voluntary investigation and remediation of properties not in compliance with DEP standards. These specific soils were removed from Waterfront Park during the Davis Brook Combined Sewer Overflow (CSO) Storage Tank Project. These soils were used as fill for the construction of the road and parking lot. They were covered by two feet of an aggregate base on top, and clean, imported fill material on the sides at an unspecified depth. The full details of this project are shared in *Appendix L*.

Capped Landfill

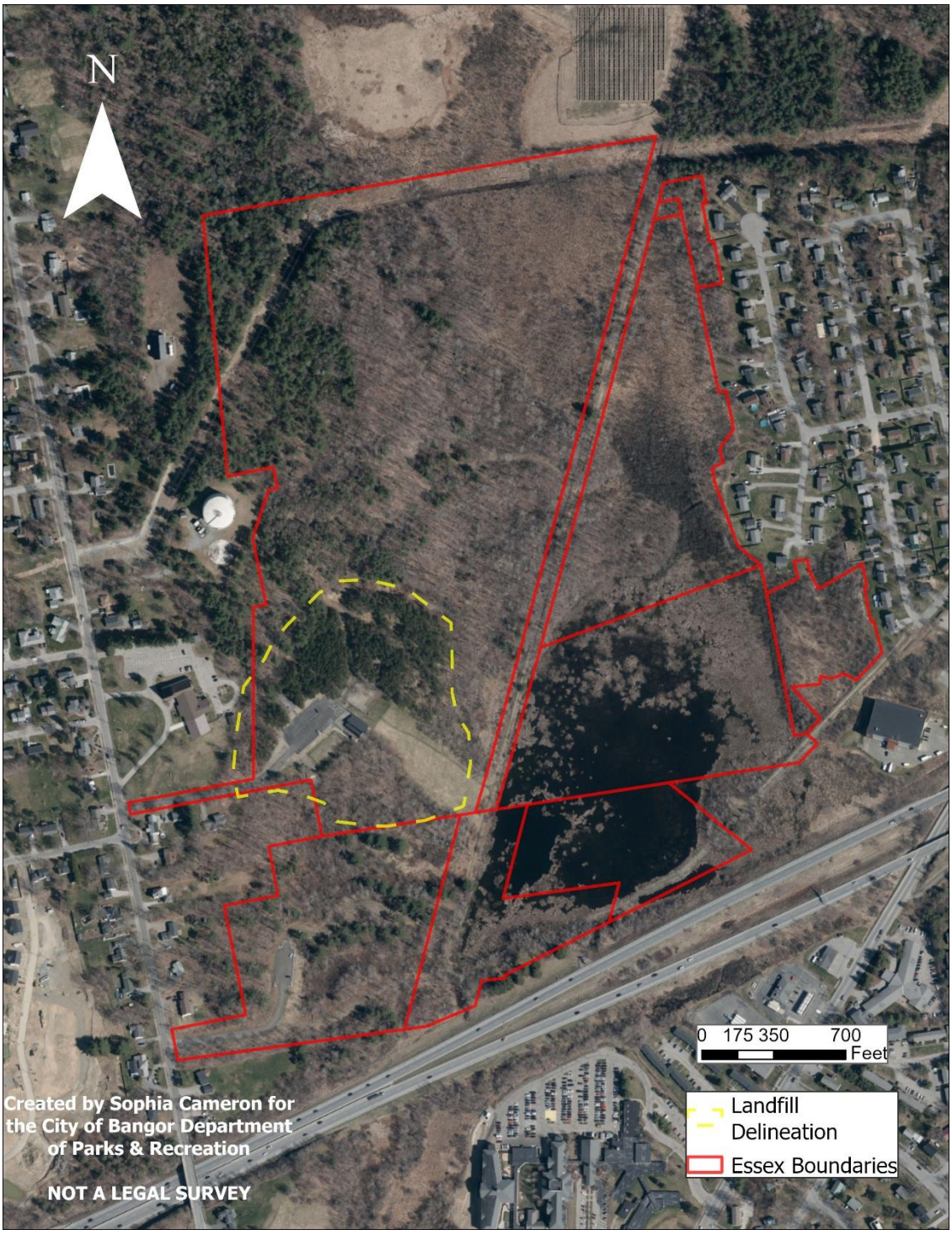


Figure 33. Map showing the current, mapped waste area of the capped landfill in Essex Woods by the DEP and which stands it is contained within.

The landfill at Essex Woods was capped sometime in the 70s. The estimated area of waste disposal can be seen in Figure 33. For this reason, no excavation is permitted anywhere in the area shown in Figure

33 to avoid exposing buried trash. In areas where trash is already exposed, there should be no attempt to remove it, as it would be futile.

Matt Young from the Maine Department of Environmental Protection was brought to the site of the landfill and his findings were in alignment with the following recommendations. His documentation is included as *Appendix M*.

The mapped area must be maintained following the guidelines laid out in *Appendix N*. Matt Young does not think it's necessary to fully remove all trees, however, the areas along the sled hill could be cleared and reseeded with native herbaceous species to create a larger cleared area for bird habitat. Volunteers are not permitted to deal with blow downs in which trash has been exposed and instead should contact the Forestry Division. Stumps and root balls of tip-ups will need to be disposed of properly and should not be left.

No new trails should be constructed in areas where there is already exposed trash to prevent injury to recreators. For trails that already exist and go by areas of exposed trash, fill or other cover materials (such as woodchips) could be used to provide at least somewhat of a buffer. Other measures may need to be taken to prevent recreators from encountering exposed trash, such as fencing or signage.

Because of the presence of this landfill, it is important that the groundwater and water from the wetland are tested on a regular basis to monitor for leaching.

Bangor Water District Tank Outflow and Erosion

Upon review of the historical aerial imagery of Essex Woods, there is a water tank present at the top of the property since at least 1939. At that time, it would have been owned by the City itself, though its ownership was transferred upon the creation of the Bangor Water District in 1957. All water arrives at this tank having already been treated using ozone/ultraviolet light disinfection systems and chloramines (*Bangor Water District*).

This tank must periodically empty out for maintenance, repairs, or to simply keep the water flowing to prevent fouling. For this purpose, there is an outflow point that drains across Essex Woods, downhill, to the wetlands below. This channel was never formally established aside from the initial point of the outflow, so the water has cut its own channel over time, reaching bedrock in some places. This has caused significant erosion in some places and has even washed out a bridge in the summer of 2025 that went across the channel and was used by recreationists. This bridge has since been replaced, and riprap was added to prevent further erosion.

The outflow has created several problems over the years that should be remediated over the next ten-year period of management at Essex Woods. The first is to better define the initial channel where the outflow begins before passing through a culvert under the improved Power Line Trail. Trees could be cut out of this channel to prevent them from falling into the trail in the future. New riprap could be added on either side of the culvert to prevent further erosion of the Power Line Trail. It may also be wise to reset and size up the current culvert, as it is undersized for the current channel and may be contributing to further erosion.

The outflow stream drains directly into the wooded wetland found in the northeastern corner of lot R48-007 (see Figure 34). For this reason, it's very important that all water coming out of the outflow is dechlorinated, which should be handled by Bangor Water District. As it travels across the property, it crosses several existing mountain biking trails. Whether or not culverts or other drainage measures should be taken across these trails is summarized in *Appendix H*. There are several points where the

topography allows the water to settle out before continuing down the hill, which is ideal, as this allows sediment to settle out before reaching the wetland. New trail construction should endeavor not to block these settling areas.

The wetland the outflow drains into is largely disconnected from the larger wetland on lots R55-012-A, B, D, and E. A single galvanized steel culvert was found connecting the two wetlands under the rail trail. It is too long and does not appear to be draining properly. This culvert should be replaced with an open-bottom drainage structure, or a larger culvert. This would prevent flooding across the trail during times when the water tank is draining.

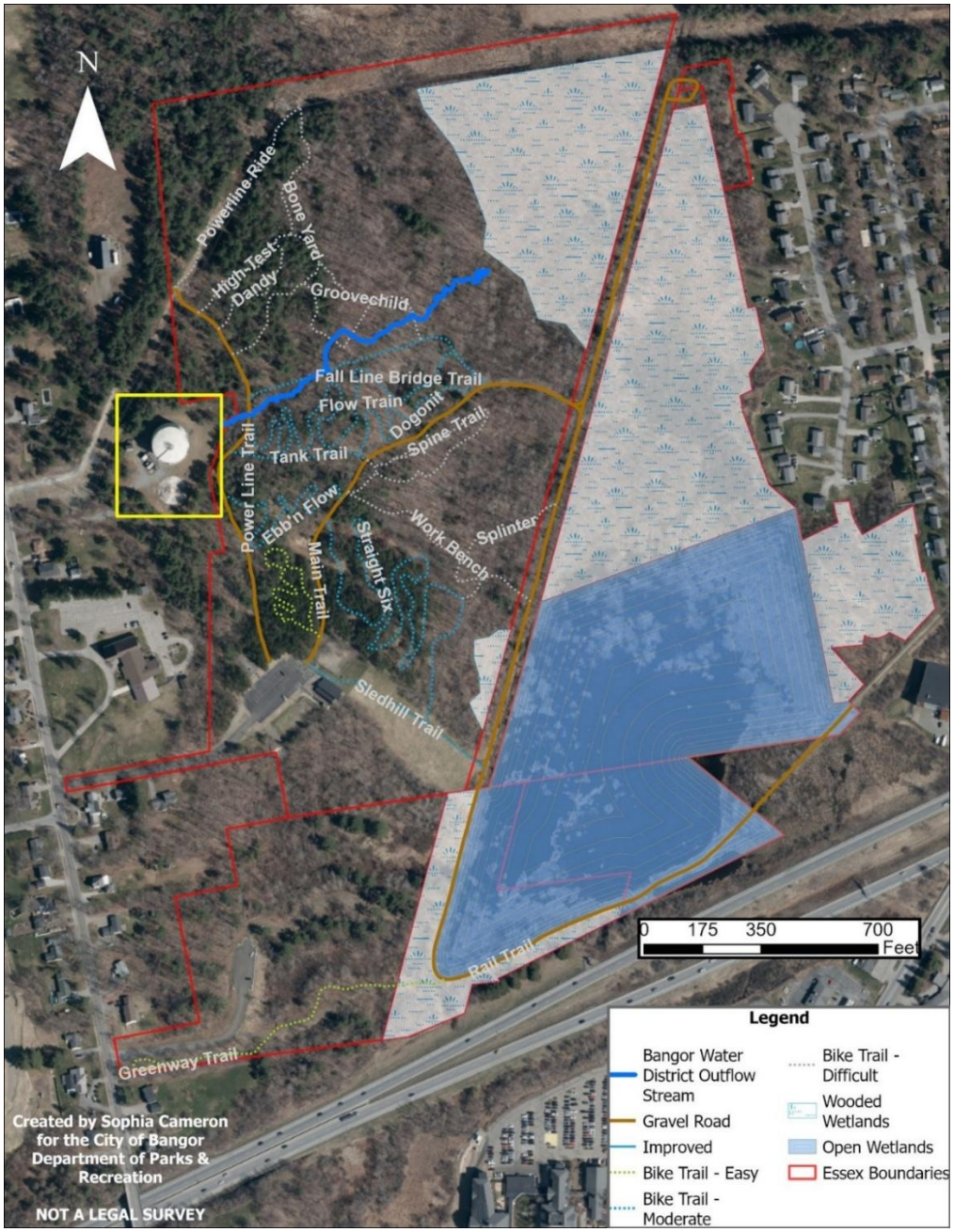


Figure 34. Map of the Bangor Water District water tank outflow stream that travels across Essex Woods. The tank is shown in the yellow rectangle.

Laws Impacting Land Management

Local timber harvesting ordinance – Bangor has no unique regulations.

Local vegetation clearing ordinance—The clearing of vegetation for development is governed by Chapter 165 section 49 of the City Code. Details of this ordinance can be reviewed here.

• Statewide Standards for Timber Harvesting in Shoreland Areas (SWS) – Bangor is enrolled in SWS. These laws are administered and enforced by the Maine Forest Service.

• Natural Resources Protection Act (NRPA) – NRPA regulates disturbing soil adjacent to water bodies, including all brooks with well-defined channels and exposed mineral soil, as well as brooks with seasonal water flows. The law requires that concerted efforts be used to ensure that soils don't wash into the brooks. Working within guidelines described in the Maine Forest Service's Best Management Practices for Forestry should ensure compliance. This law also addresses harvesting within or adjacent to significant wildlife habitat such as significant vernal pools. Permitted activities may require permit-by-rule (PBR) or full permitting. In the case of timber harvesting near a significant vernal pool, no permit is currently required if the significant vernal pool is not mapped by either DEP or Inland Fisheries and Wildlife (IF&W). The pool should be maintained in an undisturbed state, and within an area 250’ from the high-water mark edges of the significant vernal pool, soil disturbance should be avoided and a partial overstory should be maintained for shade.

• Protection and Improvement of Water Law – The law regulates activities, which discharge or may potentially discharge materials (pollutants) into water bodies. In the context of forestry, the law addresses pollutants originating from non-point sources and addresses the impact, not the location, of an activity.

• Erosion and Sedimentation Control Law – The Law requires that measures be taken to prevent unreasonable erosion of soil or sediment beyond the site or into a protected natural resource, such as a river, stream, brook, lake, pond, or wetland. Erosion control measures must be installed before the activity begins, be maintained, kept in place and functional until the site is permanently stabilized.

• Forest Practices Act – FPA mandates adequate regeneration must be present within five years of any harvest, establishes rules relating to planning requirements, size, and spacing of clearcuts. All landowners must notify the Maine Forest Service prior to harvesting and then report volume and price information for any year in which harvesting occurred.

• Liquidation Harvesting Act – Within five years of acquiring a parcel of land, Maine landowners may not harvest timber and then sell or offer to sell the land unless certain exemptions apply, including proof that statewide the landowner owns less than 100 acres, the parcel is less than 20 acres, the owner retains at least 50% of the standing timber, or the owner is legally permitted to change the land’s use to something other than forest growth.

• Forest Operations Notifications (FON) and Landowner Report – Landowners must notify the Maine Forest Service of planned timber harvesting. A FON is valid for up to two years and is not a permit. Each FON has a unique number which is used to identify a harvest.

Further Sources of Assistance

Maine Forest Service: A good source of educational material. Taxation and utilization specialists are also on staff. State House Station 22, Augusta, ME 04330. (207) 287-2791 or www.maine.gov/dacf/mfs/index.shtml

USDA-NRCS and Farm Service Agency: Information and applications for Federal forestry cost sharing programs, such as erosion control, road and trail repairs, tree planting, timber stand improvement, and management planning. www.me.nrcs.usda.

Potential Partners

Maine Forest Service—22 State House Station, 18 Elkins Lane, Augusta, ME 04333. (207) 287-3200. dacf@maine.gov. https://www.maine.gov/dacf/mfs/

Maine Department of Inland Fisheries & Wildlife—353 Water Street, Augusta, ME 04333. (207) 287-8000. mackenzie.roeder@maine.gov. https://www.maine.gov/ifw/

Maine Audubon—Gilsand Farm Audubon Center, 20 Gilsland Farm Road, Falmouth, ME 04105. (207) 781-2330. etopper@maineaudubon.org. https://maineaudubon.org/

University of Maine, School of Forest Resources—5755 Nutting Hall, Orono, ME 04469. (207) 581-2887. sfr@maine.edu. https://forest.umaine.edu/

Ag Allies/Somerset County Soil & Water Conservation District—USDA Service Center, 70 East Madison Road, Skowhegan, ME 04976. (207) 474-8323. laura.lecker@me.nacdnet.net. https://www.somersetswcd.org/ag-allies

Penobscot County Soil & Water Conservation District—1423 Broadway, Suite 2, Bangor, ME 04401. (207) 947-6622 Ext. 3. https://www.penobscotswcd.org/

Bangor Beautiful— bangorbeautiful@gmail.com. https://www.bangorbeautiful.org/home

New England Mountain Biking Association—P.O. Box 2221, Acton, MA, 01720. (800) 57-NEMBA. office@NEMBA.org. https://www.nemba.org/

Maine Big Night: Amphibian Migration Monitoring— mbn@mainebignight.org. https://mainebignight.org/

Maine Department of Environmental Protection—17 State House Station, 28 Tyson Drive, Augusta, Maine, 04333. (207) 287-7688. https://www.maine.gov/dep/

Penobscot Valley Ski Club—P.O. Box 873, Bangor, ME 04402. skiclub@pvskiclub.org. https://www.pvskiclub.org/

New England Nordic Ski Association—P.O. Box 97, Lyme, NH 03768. (715) 579-0884. ben@nensa.net. https://nensa.net/

Xerces Society for Invertebrate Conservation—1631 NE Broadway Street, #821, Portland, OR 97232. (503) 232-6639. outreach@xerces.org. https://xerces.org/

United Technologies Center—200 Hogan Road, Bangor, ME 04401. (207) 942-5296. https://www.utc4me.org/

Wabanaki Youth in Science—P.O. Box 215, Old Town, ME 04468. waysprogram@wabankiyouthinscience.org. https://www.wabanakiyouthinscience.org/

Appendix

Appendix A: Soils Report (Web Soil Survey, USDA)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CTB	Telos-Chesuncook complex, 0 to 8 percent slopes, very stony	5.3	4.9%
CuB	Chesuncook-Telos-Urban land association, 0 to 8 percent slopes	0.2	0.2%
EIB	Elliottsville-Chesuncook association, 3 to 8 percent slopes, very stony	1.0	0.9%
EIC	Elliottsville-Chesuncook association, 8 to 15 percent slopes, very stony	10.2	9.6%
MeD	Monson-Elliottsville-Abram complex, 15 to 30 percent slopes, rocky	32.1	30.0%
MOB	Monarda-Telos complex, 0 to 8 percent slopes, very stony	0.2	0.2%
PsB	Pushaw-Swanville complex, 0 to 8 percent slopes	15.4	14.4%
PuB	Pushaw-Swanville-Urban land association, 0 to 8 percent slopes	1.5	1.4%
SQA	Swanville-Wonsqueak Association, 0 to 3 percent slopes	41.2	38.5%
Totals for Area of Interest		**107.1**	**100.0%**

Report—Forestland Harvesting (ME)

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. In the suitability for use of harvesting equipment and log landing columns, the larger the value, the greater the potential limitation. In the general harvest season column the value will always be 1.00. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Forestland Harvesting (ME)–Penobscot County, Maine, Southern Part							
Map symbol and soil name	Pct. of map unit	General harvest season (ME)		Suitability for use of harvesting equipment (ME)		Suitability for log landings (ME)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SQA—Swanville-Wonsqueak Association, 0 to 3 percent slopes							
Swanville	55	Winter only		Moderately suited		Poorly suited	
		Long term soil wetness	1.00	Wetness	0.83	Wetness	1.00
MOB—Monarda-Telos complex, 0 to 8 percent slopes, very stony							
Monarda	50	Winter only		Poorly suited		Poorly suited	
		Long term soil wetness	1.00	Wetness	1.00	Wetness	1.00
						Low strength	0.50
CuB—Chesuncook-Telos-Urban land association, 0 to 8 percent slopes							
Chesuncook	45	Summer & winter		Moderately suited		Moderately suited	
		Seasonal soil wetness	1.00	Wetness	0.50	Wetness	0.50
						Slope	0.50
EIC—Elliottsville-Chesuncook association, 8 to 15 percent slopes, very stony							
Elliottsville	45	Except spring		Well suited		Poorly suited	
		Seasonal soil wetness	1.00			Slope	1.00
EIB—Elliottsville-Chesuncook association, 3 to 8 percent slopes, very stony							
Elliottsville	45	Except spring		Well suited		Well suited	
		Seasonal soil wetness	1.00				

Forestland Harvesting (ME)–Penobscot County, Maine, Southern Part							
Map symbol and soil name	Pct. of map unit	General harvest season (ME)		Suitability for use of harvesting equipment (ME)		Suitability for log landings (ME)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CTB—Telos-Chesuncook complex, 0 to 8 percent slopes, very stony							
Telos	45	Summer & winter		Moderately suited		Poorly suited	
		Seasonal soil wetness	1.00	Wetness	0.83	Wetness	1.00
Chesuncook	40	Summer & winter		Moderately suited		Moderately suited	
		Seasonal soil wetness	1.00	Wetness	0.50	Wetness	0.50
						Slope	0.50
EIC—Elliottsville-Chesuncook association, 8 to 15 percent slopes, very stony							
Chesuncook	40	Summer & winter		Moderately suited		Moderately suited	
		Seasonal soil wetness	1.00	Wetness	0.50	Slope	0.50
						Wetness	0.50
EIB—Elliottsville-Chesuncook association, 3 to 8 percent slopes, very stony							
Chesuncook	40	Summer & winter		Moderately suited		Moderately suited	
		Seasonal soil wetness	1.00	Wetness	0.50	Wetness	0.50
						Slope	0.50
MeD—Monson-Elliottsville-Abram complex, 15 to 30 percent slopes, rocky							
Monson	40	Except spring		Moderately suited		Poorly suited	
		Seasonal soil wetness	1.00	Slope	0.50	Slope	1.00
PsB—Pushaw-Swanville complex, 0 to 8 percent slopes							
Pushaw	40	Summer & winter		Moderately suited		Moderately suited	
		Seasonal soil wetness	1.00	Wetness	0.83	Wetness	0.67
PuB—Pushaw-Swanville-Urban land association, 0 to 8 percent slopes							
Pushaw	35	Summer & winter		Moderately suited		Moderately suited	
		Seasonal soil wetness	1.00	Wetness	0.83	Wetness	0.67

Forestland Harvesting (ME)–Penobscot County, Maine, Southern Part							
Map symbol and soil name	Pct. of map unit	General harvest season (ME)		Suitability for use of harvesting equipment (ME)		Suitability for log landings (ME)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PsB—Pushaw-Swanville complex, 0 to 8 percent slopes							
Swanville	35	Winter only		Moderately suited		Poorly suited	
		Long term soil wetness	1.00	Wetness	0.83	Wetness	1.00
MOB—Monarda-Telos complex, 0 to 8 percent slopes, very stony							
Telos	35	Summer & winter		Moderately suited		Poorly suited	
		Seasonal soil wetness	1.00	Wetness	0.83	Wetness	1.00
MeD—Monson-Elliottsville-Abram complex, 15 to 30 percent slopes, rocky							
Elliottsville	30	Except spring		Moderately suited		Poorly suited	
		Seasonal soil wetness	1.00	Slope	0.50	Slope	1.00
PuB—Pushaw-Swanville-Urban land association, 0 to 8 percent slopes							
Swanville	30	Winter only		Moderately suited		Poorly suited	
		Long term soil wetness	1.00	Wetness	0.83	Wetness	1.00
SQA—Swanville-Wonsqueak Association, 0 to 3 percent slopes							
Wonsqueak	30	Winter only		Poorly suited		Poorly suited	
		Long term soil wetness	1.00	Wetness	1.00	Wetness	1.00
						Ponding	1.00
						Low strength	0.50
CuB—Chesuncook-Telos-Urban land association, 0 to 8 percent slopes							
Telos	25	Summer & winter		Moderately suited		Moderately suited	
		Seasonal soil wetness	1.00	Wetness	0.50	Wetness	0.50

Forestland Harvesting (ME)–Penobscot County, Maine, Southern Part							
Map symbol and soil name	Pct. of map unit	General harvest season (ME)		Suitability for use of harvesting equipment (ME)		Suitability for log landings (ME)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
MeD—Monson-Elliottsville-Abram complex, 15 to 30 percent slopes, rocky							
Abram	20	Except spring		Well suited		Poorly suited	
		Seasonal soil wetness	1.00			Slope	1.00
PuB—Pushaw-Swanville-Urban land association, 0 to 8 percent slopes							
Urban land	20	Not Rated		Not rated		Not rated	
CuB—Chesuncook-Telos-Urban land association, 0 to 8 percent slopes							
Urban land	15	Not Rated		Not rated		Not rated	

Report—Forestland Productivity

Forestland Productivity–Penobscot County, Maine, Southern Part				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			Cu ft/ac/yr	
CTB—Telos-Chesuncook complex, 0 to 8 percent slopes, very stony				
Telos	Balsam fir	53	100.00	Balsam fir, Red maple, Red spruce, White ash, White spruce, Yellow birch
	Eastern white pine	67	114.00	
	Red maple	55	29.00	
	Red spruce	44	86.00	
	White spruce	55	129.00	
Chesuncook	Balsam fir	55	114.00	American beech, Eastern white pine, Sugar maple, White ash, White spruce, Yellow birch
	Eastern white pine	69	129.00	
	Red maple	55	29.00	
	Red spruce	47	100.00	
	Sugar maple	55	29.00	
CuB—Chesuncook-Telos-Urban land association, 0 to 8 percent slopes				
Chesuncook	—	—	—	—
Telos	—	—	—	—
Urban land	—	—	—	—

Forestland Productivity–Penobscot County, Maine, Southern Part				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			Cu ft/ac/yr	
EIB—Elliottsville-Chesuncook association, 3 to 8 percent slopes, very stony				
Elliottsville	American beech	55	29.00	American beech, Eastern white pine, Sugar maple, White ash, White spruce, Yellow birch
	Balsam fir	55	114.00	
	Eastern white pine	69	129.00	
	Paper birch	55	57.00	
	Red spruce	47	100.00	
	Sugar maple	55	29.00	
	White spruce	55	129.00	
	Yellow birch	55	29.00	
Chesuncook	Balsam fir	55	114.00	American beech, Eastern white pine, Sugar maple, White ash, White spruce, Yellow birch
	Eastern white pine	69	129.00	
	Red maple	55	29.00	
	Red spruce	47	100.00	
	Sugar maple	55	29.00	
EIC—Elliottsville-Chesuncook association, 8 to 15 percent slopes, very stony				
Elliottsville	American beech	55	29.00	American beech, Eastern white pine, Sugar maple, White ash, White spruce, Yellow birch
	Balsam fir	55	114.00	
	Eastern white pine	69	129.00	
	Paper birch	55	57.00	
	Red spruce	47	100.00	
	Sugar maple	55	29.00	
	White spruce	55	129.00	
	Yellow birch	55	29.00	
Chesuncook	Balsam fir	55	114.00	American beech, Eastern white pine, Sugar maple, White ash, White spruce, Yellow birch
	Eastern white pine	69	129.00	
	Red maple	55	29.00	
	Red spruce	47	100.00	
	Sugar maple	55	29.00	

Forestland Productivity–Penobscot County, Maine, Southern Part				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			Cu ft/ac/yr	
MeD—Monson-Elliottsville-Abram complex, 15 to 30 percent slopes, rocky				
Monson	Balsam fir	52	100.00	Balsam fir, Red spruce, White spruce
	Red spruce	40	86.00	
	White spruce	58	129.00	
Elliottsville	American beech	55	29.00	American beech, Eastern white pine, Sugar maple, White ash, White spruce, Yellow birch
	Balsam fir	55	114.00	
	Eastern white pine	69	129.00	
	Paper birch	55	57.00	
	Red spruce	47	100.00	
	Sugar maple	55	29.00	
	White spruce	55	129.00	
	Yellow birch	55	29.00	
Abram	Balsam fir	33	57.00	Balsam fir, Black spruce, Red spruce, White spruce
	Red spruce	34	57.00	
	White spruce	37	72.00	
MOB—Monarda-Telos complex, 0 to 8 percent slopes, very stony				
Monarda	Balsam fir	45	86.00	Balsam fir, Black spruce, Northern white cedar, Red maple, Red spruce
	Paper birch	60	57.00	
	Red spruce	40	86.00	
	White spruce	53	114.00	
Telos	Balsam fir	53	100.00	Balsam fir, Red maple, Red spruce, White ash, White spruce, Yellow birch
	Eastern white pine	67	114.00	
	Red maple	55	29.00	
	Red spruce	44	86.00	
	White spruce	55	129.00	
PsB—Pushaw-Swanville complex, 0 to 8 percent slopes				
Pushaw	—	—	—	—
Swanville	—	—	—	—

Forestland Productivity–Penobscot County, Maine, Southern Part				
Map unit symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site Index	Volume of wood fiber	
			Cu ft/ac/yr	
PuB—Pushaw-Swanville-Urban land association, 0 to 8 percent slopes				
Pushaw	—	—	—	—
Swanville	—	—	—	—
Urban land	—	—	—	—
SQA—Swanville-Wonsqueak Association, 0 to 3 percent slopes				
Swanville	Balsam fir	55	114.00	Balsam fir, Red spruce
	Eastern white pine	58	100.00	
	Red maple	56	29.00	
	Red spruce	40	86.00	
	White spruce	50	114.00	
Wonsqueak	Balsam fir	30	57.00	Balsam fir, Black spruce, Northern whitecedar, Red maple, Red spruce, Tamarack
	Northern white cedar	25	29.00	

Appendix B: Maine Natural Areas Program (MNAP) Review

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

January 22, 2026

Sophia Cameron
City of Bangor Department of Public Works/Parks & Recreation
sophia.cameron@bangormaine.gov

RE: Forest Management Plan Review - Essex Woods property in the Town of Bangor

Dear Sophia Cameron:

On behalf of the Maine Department of Inland Fisheries and Wildlife (MDIFW), the Beginning with Habitat program (BwH), and the Maine Natural Areas Program (MNAP) we have reviewed your request received on **December 19, 2025**. The review includes all of the resources listed in the Forest Management Plan Review Section below. Non-regulatory management recommendations are provided for natural resource features within the parcel, as well as those nearby, should the landowner wish to manage the property for important landscape-level features. Good management of natural resources is consistent with good forestry, and BwH has the tools to assist you with your habitat management goals and objectives while allowing for forest management and timber procurement. Please contact Joseph Roy, MDIFW Private Lands Wildlife Biologist, or the staff listed below with any questions or requests for assistance.

NATURAL RESOURCES ON THE PROPERTY

The following natural resource features are located at least partially within the property. Below are management standards we recommend you follow for these natural resources.

Rare Animals

Upland Sandpiper

Upland Sandpipers have been known to occur on/near the area of interest. Upland Sandpipers are a state-listed Threatened species (see attachment for description) and are protected from illegal take, which includes the nest, eggs, individual birds, or any disturbance that results in mortality or nesting failure. These large shorebirds are strongly associated with open grassland-type habitats. It is important to limit activities in these open areas associated with this parcel, particularly during nesting and brood-rearing seasons (May 1 -Aug 15), and most importantly, to avoid locating log-landings or storing equipment in these open areas during this period. For more information about this species, contact MDIFW Biologist Adrienne Leppold at (207) 941-4482.

Wild Brook Trout

The property includes a stream that provides habitat for Wild Brook Trout. Brook Trout prefer cool, well-oxygenated waters that benefit from intact riparian corridors. Any forest management activities planned for riparian zones should closely follow Maine's Best Management Practices (https://www.maine.gov/ifw/docs/brook_trout_factsheet_forestry.pdf), including appropriate buffer distances, shade retention, and minimization of sediment runoff. Sediment management and erosion control are key factors to maintaining healthy fisheries in high quality habitats. Please see the attached fact sheet for more information, visit https://www.maine.gov/ifw/fish-wildlife/fisheries/wild-brook-trout.html, or contact the MDIFW Fisheries Biologist in the Project Location/Contacts Table below.

NATURAL RESOURCES NEAR THE PROPERTY

The following natural resource features are within 750 feet of the property. We have included these species and habitats to provide you with a landscape-level view of the important resources surrounding your management area. The management recommendations for these species are provided for your consideration.

Rare Animals

Upland Sandpiper
See recommendations above.

Wild Brook Trout
See recommendations above.

ADDITIONAL NATURAL RESOURCES NEAR THE PROPERTY

- **Vernal Pools:**
  https://www.maine.gov/ifw/docs/Forest%20Management%20and%20Vernal%20Pools.pdf

BEGINNING WITH HABITAT FOCUS AREA(S):

Beginning with Habitat Focus Areas are landscape-scale areas of conservations significance, containing exceptional concentrations of at-risk species/natural communities, high quality common natural communities, Significant Wildlife Habitats (as defined in Maine's Natural Resources Protection Act), and/or large blocks of undeveloped habitat. Additional information about Focus Areas is available at: https://www.maine.gov/dacf/mnap/focusarea. BwH Focus Areas associated with this property include:

- Caribou Bog Wetland Complex

CONSERVED LANDS

- City of Bangor, Holding Type: Fee, HOLDER: Maine Minor Civil Division
- Essex St Recreation Area, Holding Type: Fee, HOLDER: Maine Minor Civil Division

Other than those described above or listed in the Forest Management Plan Review section, no other natural resources of statewide significance have been documented in the reviewed area. The "unconfirmed presence" for Endangered, Threatened, or Special Concern Animals; Rare, Threatened, or Endangered Plants; or Rare/Exemplary Natural Communities may be due to a lack of comprehensive data rather than the absence of those resources in the reviewed area.

Thank you for using BWH, MDIFW, and MNAP in the forest management planning process. If you have questions, or if you would like more information about this site, please feel free to contact me. You can also visit our webpage:
https://www.maine.gov/ifw/fish-wildlife/wildlife/beginning-with-habitat/index.html.

Sincerely,

Joseph Roy

Joseph Roy, CWB®
Private Lands Biologist | Maine Department of Inland Fisheries and Wildlife
joseph.roy@maine.gov | Phone: (207) 592-3344

FOREST MANAGEMENT PLAN REVIEW

General Information			
Date Received	12/19/2025	**Date Reviewed**	1/22/2026
Tracking #	2026-01-16-KM-04	**Reviewed By**	Joseph M. Roy
Applicant/Landowner	Essex Woods	**Forester**	Sophia Cameron

Project Location/Contacts	
County	Penobscot
Town	Bangor
MDIFW Region	B
Wildlife Biologist	Keel Kemper, (207) 287-5369, keel.kemper@maine.gov
Fisheries Biologist	Jason Seiders, (207) 287-5300, dwayne.j.seiders@maine.gov
MNAP Ecologist	Abby Stepanauskas, (207) 287-8048, abby.stepanauskas@maine.gov

Natural Resources	In[a]	Near[b]
Animals: Endangered, Threatened, or Special Concern (ETSC)[c]	**Yes**	**Yes**
Canada Lynx Habitat[d]	No	No
Deer Wintering Areas (DWA)[e]	Unknown	Unknown
Inland Waterfowl/Wading Bird Habitat (IWWH)[d]	No	No
LUPC Protection Fish & Wildlife Zone[d]	No	No
Natural Communities: rare and/or exemplary[c]	Unconfirmed	Unconfirmed
Plants[c]	Unconfirmed	Unconfirmed
Shorebird Roosting Areas[d]	No	No
Signficant Vernal Pools[e]	Unknown	Unknown
Tidal Waterfowl/Wading Bird Habitat (TWWH)[d]	No	No
Wild Brook Trout Habitat[e]	**Yes**	**Yes**

a. Within the property.
b. Within 750 ft of the property.
c. "Yes" = observation data documents the presence of a species/natural community (see itemized table below for more details). "Unconfirmed" = there is insufficient data to document presence.
d. "Yes" = the habitat occurs there, "No" = it does not.
e. "Yes" = this potential habitat occurs there, "Unknown" = there is insufficient data to determine whether it occurs there.

Landscape Context Features	In[a]	Near[b]
Beginning with Habitat Focus Area(s)	**Yes**	**Yes**
Conserved Land(s)	**Yes**	**Yes**
New England Cottontail Focal Area(s)	No	No
MNAP Potential Inventory Sites	No	No

a. Within the property.
b. Within 750 ft of the property.

Plants/Animals/Natural Communities	State Status[a]	State Rank[b]	Global Rank[b]	SGCN Priority[c]	EO Rank[d]
RARE ANIMALS:					
Sedge Wren[e]	E	S1B	G5	1	Unknown
Upland Sandpiper[f]	T	S3B	G5	1	Unknown

[a] **State Status** - all species with E, T, or SC Status are listed as Species of Greatest Conservation Need (SGCN) in the State Wildlife Action Plan.
E (Endangered) = rare and may be lost from the state in the foreseeable future or federally listed as Endangered.
T (Threatened) = rare and, with further decline, could become endangered; or federally listed as Threatened.
SC (Special Concern) = a species that does not meet the criteria for E or T, but is particularly vulnerable and could easily become a Threatened, Endangered, or Extirpated species.

[b] **State / Global Rarity Rank**
B = breeding.
N = nesting.
Q = taxonomy questions.
S1/G1 = Critically Imperiled.
S2/G2 = Imperiled.
S3/G3 = Vulnerable.
S4/G4 = Apparently Secure.
S5/G5 = Secure.
T = infraspecific taxonomy.
? = inexact rank.

[c] **SGCN Priority.** Describes the prioritization of Species of Greatest Conservation Need based primarily on risk of extirpation, population trend, endemicity, and regional conservation responsibility. For more information, please visit the State Wildlife Action Plan (SWAP) - 2015 at https://www.maine.gov/ifw/docs/2015%20ME%20WAP%20All_DRAFT.pdf
1 = highest priority.
2 = high priority.
3 = moderate priority.

[d] **Element Occurrence (EO) Rank.** Describes the quality of a rare plant population or natural community based on size, condition and landscape context. Ranks range from A (excellent example of the community/population) to D (poor example of the community/population. E indicates that the community or population is Extant but there is not enough data to assign a quality rank.

[e] For more information, please contact Kenzie Roeder, (207) 941-4482.

[f] For more information, please contact Brad Zitske, (207) 485-1039.

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

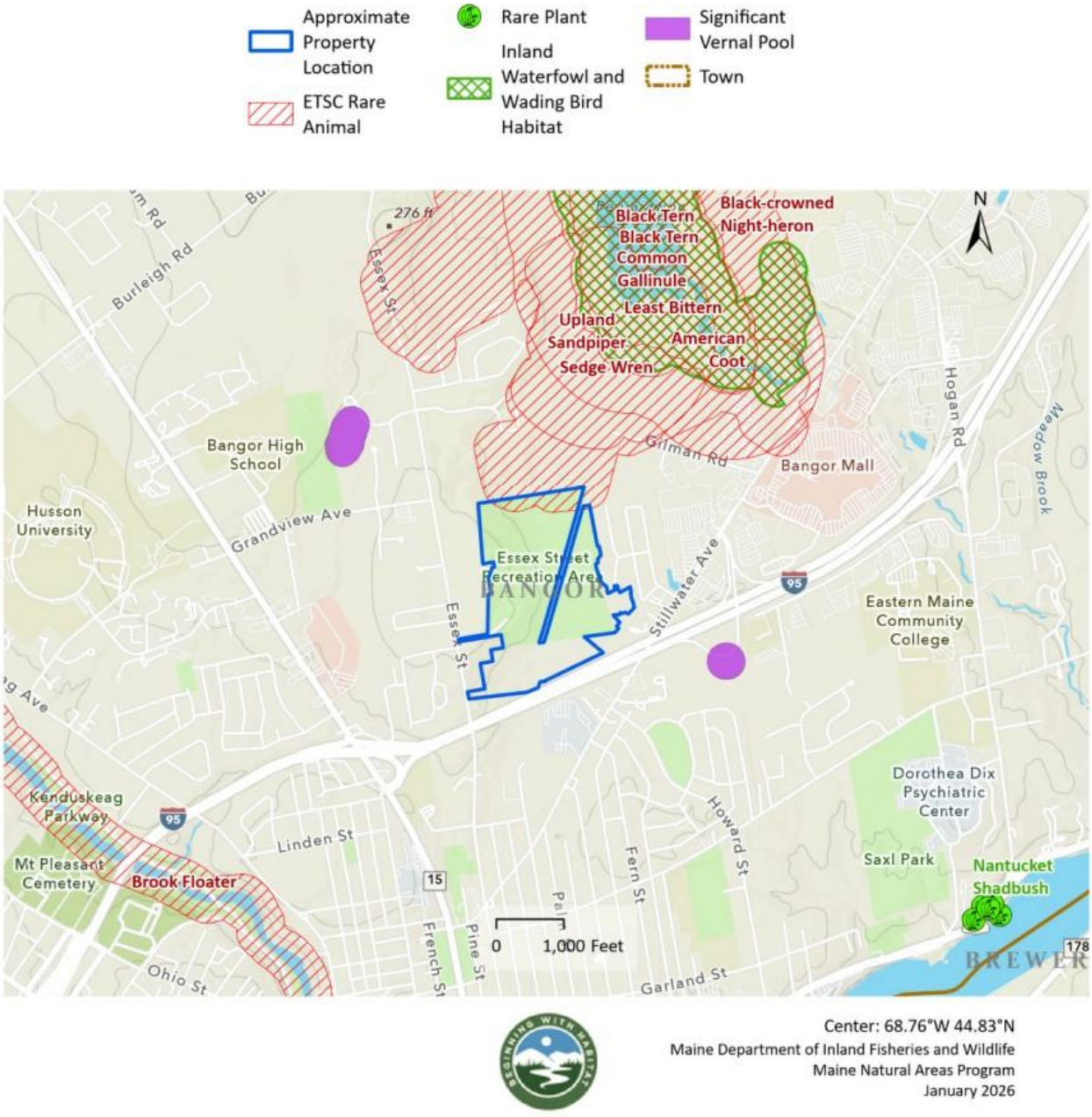
JANET T. MILLS
GOVERNOR

JUDITH CAMUSO
COMMISSIONER

Forest Management Plan

Essex Woods **Forester:** **, ME**

Sophia Cameron,



Center: 68.76°W 44.83°N
Maine Department of Inland Fisheries and Wildlife
Maine Natural Areas Program
January 2026

Appendix C: Glossary of Common Forestry Terms

The following glossary was taken from the Forest Management Plan for Essex Woods from 2003.

GLOSSARY OF COMMON FORESTRY TERMS

Acre A unit of land measurement of 43,560 square feet; a square parcel of land approximately 208.5 feet on each side. A parcel of land ¼ mile on each side contains 40 acres.

All-aged A stand of trees theoretically including all ages from seedling to overmature.

Aspect Direction towards which a slope faces; orientation of a slope face.

Available Water Capacity The capacity of a soil to hold water in a form available to plants.

Basal Area Area in square feet of the cross section of a tree trunk at breast height most commonly used as an indicator of stand density and expressed as square feet per acre. A tree with a 14" diameter has a basal area of just over one square foot.

Basal Area Factor 10 (20) Prism An instrument used by foresters to determine the stocking of the forest.

Best Management Practices (BMPs) Guidelines for the reduction of erosion and sedimentation of water bodies (streams, ponds, lakes, rivers, etc.) from logging activities. A practice or combination of practices determined to be the most effective and practicable means of preventing negative impacts of silvicultural activities. Usually associated with erosion control measures and water quality practices.

Blaze To remove a spot of bark from a tree, usually with an axe, to make a semi-permanent mark. Commonly painted to indicate boundary lines.

Blowdown Any area on which (many of) the trees have been thrown or broken by the wind.

Board Foot A unit of measure 1 foot long, 1 foot wide, and 1 inch thick. Usually used for sawlog material only. A common symbol is MBF, which designates one thousand board feet. The average conversion commonly used is 2 cords = one thousand board feet.

Breast Height 4.5 feet above ground level. The diameter of a tree is usually determined at this height.

Browse Leaves, buds, and woody stems used as food by woodland mammals such as deer, moose, and snowshoe hare.

Buffer Strip Vegetation left along a stream, lake, or wetland to protect aquatic life and water quality. Buffer strips filter sediment, provide food, maintain cool water temperatures, and may increase diversity within a landscape.

Bumper Tree Poor quality, low value tree that grows in close proximity to higher value trees. Skid roads should be located next to bumper trees in order to protect residual trees from damage during a logging operation.

Canopy The cover of branches and foliage formed by the tree crown. The size varies from species to species and covers a much larger area of the forest floor than basal area.

Clearcut A forest harvesting practice in which most or all trees are removed from a site. Clearcuts are used for immediate commercial purposes and for regeneration of future forests. Clearcuts are defined by Maine State Statute as "any timber harvesting on a forested site greater than 5 acres in size that results in a residual basal area of trees over 4 ½ inches in diameter measured at 4 ½ feet above the ground of less than 30 square feet per acre, unless, after harvesting, the site has a well-distributed stand of acceptable growing stock, as defined by rule, of at least 3 feet in height for softwood trees and 5 feet in height for hardwood trees that meets the regeneration standards defined under section 8869, subsection 1."

GLOSSARY OF COMMON FORESTRY TERMS

Climax Forest The final stage of a succession of forest tree species which continue to occupy an area as long as climate and soil conditions remain unchanged.

Co-dominant Trees with crowns forming the general level of the canopy which receive full light from above but comparatively little from the sides, usually with medium-sized crowns which are crowded on all sides.

Coniferous Commonly called softwoods or evergreens. Although there are exceptions, most coniferous trees have cones and keep their needles through the winter.

Commercial Thinning Harvests which are aimed primarily at controlling the growth of stands through adjustment in stand density. Trees removed are useful and of value for some purpose. Income from the sale or use of products produced exceeds ALL costs associated with harvesting and removing timber.

Cord A unit of volume used in measuring wood products. A standard cord occupies 128 cubic feet of space and contains approximately 85 cubic feet of wood. It is commonly described as a close piled stack of wood 4 feet high, 8 feet long, with sticks 4 feet in length.

Crop Tree Those trees in a stand destined to form the final crop, usually the highest quality and value of all the trees in a stand. Crop trees may be selected from an immature stand and carried through until the final harvest.

Crown Upper portion of a tree which includes the limbs, branches, buds, and leaves.

Crown Closure Usually expressed as the percent occupied, crown closure represents the percentage of the forest area occupied by tree crowns. This is a stocking measurement.

Cruise An organized survey of forest land to locate timber and estimate quantity by species, products, or other information; the estimate obtained in such a survey.

Deciduous Commonly referred to as hardwoods or broadleaved trees. In most cases they lose their leaves in the fall.

Den Tree A tree with a cavity or cavities used by wildlife.

Density A measurement of a stand in terms of square feet of basal area, number of trees, or volume per acres. It reflects the degree of crowding of the stems within the stand. Expressed as basal area, it is a measure of the portion of an area occupied by trees. Expressed as a percentage of crown closure, it is an estimate of the extent the site is occupied.

Diameter Breast Height (DBH) The diameter of a tree (outside bark) at a point 4 ½ feet above the ground.

Dominant Trees with crowns extending above the general level of the crown cover and receiving full light from above and partly from the side. Dominant trees are generally larger than average trees in the stand, with crowns well developed and partially crowded on the sides.

Duff Forest litter of organic debris (in various stages of decomposition) on top of the mineral soil.

Epicormic Branching The sprouting of dormant buds on the stem of a hardwood tree which can reduce the value of sawlogs from that tree.

GLOSSARY OF COMMON FORESTRY TERMS

Even-aged Management Managing a forest or forest stand to product a forest of trees of the same relative age. Even-aged management techniques include intermediate treatments, clearcuts, patch clearcuts and shelterwood cuts.

Even-aged Stand A stand of trees in which relatively small age differences exist. A stand is considered even-aged if the difference in age between the oldest and the youngest trees do not exceed twenty percent of the length of the rotation. Stands stocked with two distinct age classes are considered even-aged.

Forest Ecosystem All the plants, animals, and chemical and physical processes which interact to sustain the forest. Trees and other organisms interact with each other and with the chemical and physical environment in complex ways.

Forest Management The application of sound forestry principles and practices to the operation of the woodlands.

Forest Type A group of trees, occupying a specific area and uniform in composition, species, age arrangement, and condition, as to be distinguished from other adjoining forested areas.

Forester A person who has been professionally educated in forestry and in some states required to possess a license in order to practice. Licensing is required in Maine.

Girdle The removal or killing of a ring of bark around the tree stem so that the flow of carbohydrates from crown to roots is blocked. The roots die and the whole tree is killed. Can be done with an axe. Usually used to create a snag for wildlife habitat or to eliminate the influence of a large tree presence in the canopy without actually felling the tree.

Group Selection Harvesting Method Removal of small groups of trees within a harvest area.

Growing Stock Trees capable of producing at least one 12 foot sawlog now or in the future.

Hardwood Used to designate all broadleaved or deciduous trees as a class. This would include maples, birches, ashes, oaks, aspens, cherries, beech, and other broadleaved trees.

Hardwood Type A forest in which hardwood tree species comprise at least 75% of the stand.

Height Class Used in defining a stand of trees. Height classes are usually divided into trees of less than 35 feet in height, trees from 35 feet to 64 feet, and trees greater than 65 feet in height.

Highgrading Selective removal of the most economically valuable trees without improvements in the remaining forest.

Intermediate Tree A tree shorter than a dominant but extending into the crown cover formed by the dominant and co-dominant trees; receiving some direct sunlight from above but none from the sides.

Ingrowth The volume or number of trees which have grown past an adopted lower limit of measurement during a specified time.

Intolerance The inability of a tree to develop and grow in the shade of and in competition with other trees.

anding A place where logs and pulp are assembled for loading and transportation to a mill

Live Crown Ratio The percentage of the length of a tree with living branches.

GLOSSARY OF COMMON FORESTRY TERMS

Mast Any nut, seed, or fruit produced by woody plants and consumed by wildlife.

Merchantable Refers to forest products which can be harvested and sold; trees of commercial value.

Mixedwood Type Forest stands occupied by a mixture of softwood and hardwood tree species. Neither hardwood nor softwood tree species occupy more than 75% of the tree stocking.

Natural Regeneration Seedlings from natural seeding or sprouts and other plants representing vegetative reproduction.

Overstory That portion of the trees in a forest forming the upper crown.

Overstory Removal Removing overstory trees releasing established regeneration.

Overtopped/Suppressed Tree Trees with crowns entirely below the general level of the crown cover, receiving no direct light either from above or from the sides.

Patch Cut/ Patch Clearcut Removal of all trees within designated small areas in the harvest area. Areas are larger than those cut in a group selection method harvest. An even-aged management technique.

Pole Size A DBH size class representing trees that are usually more than 4 inches in DBH and less than 10 inches DBH; generally over 20 feet in height.

Precommercial Thinning Cuttings which are aimed primarily at controlling the growth of stands through adjustments in stand density. Income from the sale or use of products produced do not exceed costs associated with harvesting and removing timber.

Pruning Removal of a portion of tree limbs, branches, or tops to improve tree form, shape or health and increase quality or growth.

Pulpwood Wood cut primarily for the manufacture of paper, usually the lower quality portions of a tree.

Regeneration Young forest trees usually produced naturally from seed of mature trees but also includes hardwood stump sprouts and planting or seeding by artificial means. Advanced regeneration are seedlings or saplings that are already present in a forest stand.

Residual Stand Those trees remaining uncut (and hopefully undamaged) following a cutting operation.

Release The process by which young stands of desirable trees, not past the sapling stage, are freed from the competition of undesirable trees that threaten to suppress them.

Rotation Age The age at which the timber stand is considered ready for harvesting under the approved plan of management.

Sanitation Cut Removal of diseased, damaged, overmature, or undesirable stems from a stand.

Sample Point A location on a woodlot where tree measurements and other pertinent information is recorded. The measurements taken on each sample point are statistically analyzed to reflect the forest composition on the entire woodlot.

Sapling A young tree less than 4 inches DBH. The minimum size of saplings is usually placed at 1 inch DBH. Saplings are generally 3 to 20 feet tall.

Sawlog/ Sawtimber A log large enough to permit production of lumber or other products by sawing. Size and cull percent permitted must be specified in any contract and will vary with local practice. Usually greater than 10 inches DBH for softwoods and 12 inches DBH for hardwoods.

GLOSSARY OF COMMON FORESTRY TERMS

Scarification The disturbance of the forest floor to expose areas of mineral soil. This is done to prepare a seedbed and encourage establishment of desired species of tree seedlings.

Seed Tree Harvest Removing trees in a mature stand so as to effect permanent opening of its canopy and so provide conditions for securing regeneration from the seed of trees retained for that purpose. An even-aged management technique.

Seedling Trees that are less than 3 feet tall.

Selection Harvest The removal of trees either as single scattered individuals or in small groups, at relatively short intervals repeated indefinitely so that the continuous establishment of regeneration is encouraged and an uneven-aged stand is maintained.

Shelterwood A system of management requiring the removal of the mature timber in a series of cuttings over a period of time which establishes essentially even-aged regeneration under the partial shelter of seed trees.

Silviculture The theory and practice of controlling forest establishment, composition, and growth.

Single Tree Harvesting Method Removal of single trees distributed throughout a harvest area.

Site Index A measure of site quality (productivity) for a given tree species or group of tree species. The site index is the average height of a tree species or group of species at a standard age (usually 50 years).

Slash The tops, branches, and defective/nonmerchantable parts of trees left on the ground after logging, pruning, thinning, or brush cutting.

Snags Dead standing trees, often with tops broken off, which serve as perches, lookouts, foraging, and home sites for wildlife.

Softwood Used to designate all coniferous (cone bearing) species as a class. This would include spruces, pines, balsam fir, hemlock, cedar, larch or hackmatack, and other cone bearing species.

Softwood Type A forest in which softwood tree species comprise at least 75% of the stocking.

Springpole Saplings or smaller trees that are bent over by a larger felled tree. They can be under extreme tension and are dangerous.

Stand See Forest Type

Stocking Density of tree growth in the stand (forest), expressed in terms of trees per acre, basal area per acre, volume per acre, or percent crown closure.

Stumpage Value of standing, uncut trees.

Timber Stand Improvement (TSI) Precommercial or non-commercial activity designed to improve tree and stand quality and/or release the potential crop trees in a stand. May include thinning, weeding, and pruning.

Timber Type See Forest Type

Thinning Removal of some trees in a stand to increase growing space thereby improving growth rate and/or quality in the remaining trees.

Uneven-aged Management Managing a forest or forest stand to produce three or more distinct age classes of trees.

GLOSSARY OF COMMON FORESTRY TERMS

Uneven-aged Stand A forest or stand composed of intermingling trees that differ markedly in age.

Vernal Pool An ephemeral body of water that fills in the spring, holds water for at least 10 days, and dries up by fall some or all years and that does not contain fish.

Weeding The removal of all plants competing with a crop species, regardless of whether their crowns are above, beside, or below those of the desirable trees. Removal of diseased, damaged, and poor quality trees.

Wildlife Habitat Four basic components of habitat are food, water, cover, and space. Specific requirements for each of these components will vary with species, season of year, and the age and sex of the animal.

Windfirm The ability of the root system of a tree to withstand wind pressure and keep the tree upright.

Wolf Tree Usually large in size, limby, and poorly formed with little commercial value. Same function as snags, except the tree is still alive and possibly producing mast.

Appendix D: Common Maine Tree Species Codes

Species Code	Scientific Name	Common Name
BF	*Abies balsamea*	Balsam fir
TA	*Larix laricina*	Tamarack
WS	*Picea glauca*	White spruce
RS	*Picea rubens*	Red spruce
NS	*Picea abies*	Norway spruce
BS	*Picea mariana*	Black spruce
RP	*Pinus resinosa*	Red pine
WP	*Pinus strobus*	Eastern white pine
WC	*Thuja occidentalis*	Northern white cedar
EH	*Tsuga canadensis*	Eastern hemlock
JP	*Pinus banksiana*	Jack pine
OS	*N/A*	Other softwood
RM	*Acer rubrum*	Red maple
SM	*Acer saccharum*	Sugar maple
SV	*Acer saccharinum*	Silver maple
NM	*Acer plantanoides*	Norway maple
YB	*Betula allegheniensis*	Yellow birch
RB	*Betula nigra*	River birch/black birch
PB	*Betula papyrifera*	Paper birch/white birch
GB	*Betula populifolia*	Grey birch
AB	*Fagus grandifolia*	American beech
WA	*Fraxinus americana*	White ash
BA	*Fraxinus nigra*	Black ash
GA	*Fraxinus pennsylvanica*	Green ash
QA	*Populus tremuloides*	Quaking aspen
BP	*Populus balsamifera*	Balsam poplar
BT	*Populus grandidentata*	Bigtooth aspen
BC	*Prunus serotina*	Black cherry
WO	*Quercus alba*	White oak
SW	*Quercus bicolor*	Swamp white oak
BR	*Quercus macrocarpa*	Bur oak
RO	*Quercus rubra*	Northern red oak
OH	*N/A*	Other hardwood

Appendix E: Maine Forest Service Boundary Line Information Sheet

INFORMATION SHEET 4
REVISED: DECEMBER 2022

Boundary Line Information

Maine Forest Service, DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
22 State House Station, Augusta, ME 04333

Robert Frost's observation "***good fences make good neighbors***" is as true today as when he wrote it. As land and timber values increase, good boundaries are even more important today than they were in the past. The following information will help landowners avoid boundary problems:

Establishing boundaries:

1. An "established property line" means a line demarcated by monuments, signs, markings, pins, reference points or other markers that denotes a change in ownership between abutting properties. These established property line markers must have been placed upon mutual agreement of the abutting landowners, based on historical physical evidence of a preexisting boundary line or by a licensed professional land surveyor.

Only a licensed surveyor can establish a property line if there are no existing blazes or monuments. Surveyors are licensed in the state of Maine under 32 M.R.S. §18201 *et seq*. A roster of land surveyors licensed to practice in Maine is available online at:

https://www.pfr.maine.gov/ALMSOnline/ALMSQuery/SearchIndividual.aspx

2. A landowner or licensed forester may maintain a line where some monuments or blazes still exist. If you cannot sight from one blaze to another, you should get the line surveyed by a licensed surveyor. Previously marked lines may be incorrect and will be relocated after an accurate survey.

3. Monuments are relatively permanent features like stone posts, iron bars, etc., that are established by a surveyor. Tree blazes are not monuments, they are an approximate location of where the line lies. A cap listing the surveyor's license number must be placed on the lot's corner posts.

4. Line trees are trees where the actual boundary intersects any part of the tree, such that part of the tree is on either side of the boundary (17 M.R.S. §2511(1)(D). (See Tree A on the back of this sheet.) Because they may be evidence of a line, blazed trees on a property line serve as witness trees and should not be cut. They generally have little timber value as the blaze provides an avenue for bacteria and fungi to invade the tree and cause rot. Line trees may also have fencing tacked to them, which will cause them to be rejected at a sawmill. **Line trees may only be cut with the permission of the abutting landowner** (17 M.R.S. §2511(2)(B).

5. Before permanently marking a boundary by blazing or painting, the line should be walked with the adjoining landowner to ensure its location is mutually agreeable. If there is disagreement about a line, it should be surveyed. Landowners may agree to share the costs; however, this should be agreed to or otherwise determined before proceeding with the survey.

Maintaining boundaries:

1. Boundaries should be painted with high grade, durable paint. Colors such as red, yellow, orange or blue are easily seen and visible for long distances. Paints specifically formulated for marking boundaries are available from forestry supply companies. Paint trees only when the bark is warm and dry.

2. In blazing and painting trees along the boundary line, the following rule is used:

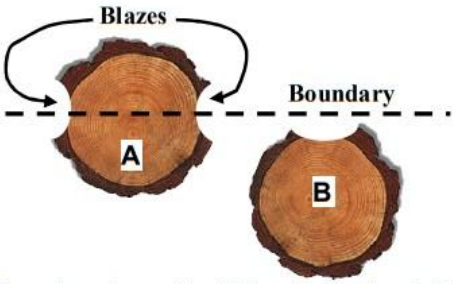
A. If the boundary line passes through the middle of a tree, blaze and paint on both sides of that tree where the line passes through it (Tree A).

B. Where the line passes adjacent to the tree, blaze and paint one point only, immediately adjacent to the line (Tree B).

C. Be sure to paint generously so that lines can be seen from either side. This will help prevent accidental trespass.

3. Avoid blazing well-formed, large, or valuable trees as blazing may degrade their value. Blazes should be over six inches long and located about five feet above the ground. Blaze often enough so that it is possible to see the next blaze easily. When re-blazing a line, blaze above or below the original blaze so that historical evidence is not lost.

Practical advice for your land and trees from the Maine Forest Service



4. Boundary lines should be brushed out for easy traveling and visibility. Prune limbs to head height and cut small trees along the line. Permission is required to cut vegetation on another's property. Check with the adjoining landowner before proceeding.

5. Missing corners should only be placed by a surveyor and be of permanent material, with the adjoining trees (witnesses) marked for easy locating. Deteriorating corner posts may be replaced with cedar or spruce posts, as other species it will quickly decay. Iron pipe is long lasting, easily transported, inexpensive, and easily driven into the ground. Where available, pile small stones around corner posts. Paint the stones and the corner post. Leave existing old posts as evidence.

6. High quality paint, properly applied, should last at least ten years in the woods; axe blazes should last longer. Lines should be checked and maintained annually or periodically. Lines and corners should be shown to family members so they can locate them in the future.

Timber Harvesting and Boundaries:

Maine law protects adjoining landowners from timber trespass and damages that occur during logging or wood harvesting operations. If you are considering harvesting timber, you should know and observe state and local timber harvesting regulations near property lines, trespass, and slash disposal laws.

1. Anyone who authorizes timber harvesting, or harvests timber shall **clearly mark with flagging or other temporary and visible means any established property lines within 200 feet of an area to be harvested**. Property lines must be marked prior to commencing a harvest. Parcels less than five acres are exempt. (17 M.R.S. §2511). Failure to clearly mark property lines may also make the person who authorized the cutting liable for forfeiture damages to an abutter if a timber trespass occurs (17 M.R.S. §2510(2).

2. Slash left from any cutting operations of forest growth must be disposed of according to the following regulations: (12 M.R.S. §9331-9336).

A. Along highways, slash must not be left in the right-of-way or within 50 feet of a public highway.

B. Along railroads and utility lines (pipeline, electric, telephone, telegraph, or cable) slash must be removed from in the right-of-way or within 25 feet of the nearer side of the right-of-way.

C. Slash that might constitute a fire hazard shall not be allowed to remain on the ground within 25 feet of the property line of land belonging to another.

No Trespassing Marking:

A landowner may mark their property with OSHA Safety Purple paint to indicate that access is by permission only. Paint should be a single stripe at least one inch wide and eight inches long and located between three and five feet off the ground (17-A M.R.S. §402). Stripes should be no further than 100 feet apart along the property line and at vehicular entries. This should be in addition to a properly marked and blazed boundary line.

For more information, please contact:
Maine Forest Service
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
22 State House Station
Augusta, ME 04333-0022
(207) 287-2791
forestinfo@maine.gov

Be Woods Wise!
Practical advice for your land and trees from the Maine Forest Service.
www.maineforestservice.gov

Appendix F: 1933 Deed from Ray D. Strickland to the City of Bangor

311

Vol. 1070

STRICKLAND to CITY OF BANGOR

Know All Men By These Presents, That,

I, Ray D. Strickland of Bangor, County of Penobscot and State of Maine,

NOT AN OFFICIAL COPY

in consideration of one dollar and other valuable consideration

paid by the City of Bangor, County of Penobscot and State of Maine,

NOT AN OFFICIAL COPY

the receipt whereof ~~I~~ do hereby acknowledge, do hereby give, grant, bargain, sell and convey unto the said City of Bangor, its successors ~~heirs~~ and assigns forever,

NOT AN OFFICIAL COPY

a certain lot or parcel of land on the easterly side of Essex street in said Bangor bounded and described as follows: Beginning at a point in the easterly line of Essex Street seven hundred twenty-nine and two-tenths (729.2) feet northerly of the northerly line of land now or formerly owned or occupied by Carrie A. Gilbert, measured on said line of Essex street; thence easterly at right angles with said easterly line of Essex street two hundred seventy and two-tenths (270.2) feet to a point; thence S. 30° 28' E. two hundred and two-tenths (200.2) feet to a point; thence S. 73° 53' E. about one hundred four and three-tenths (104.3) feet to a point in the westerly line of land conveyed by Ray D. Strickland to City of Bangor by deed dated April 27, 1929 and recorded in Vol. 1031, page 456, Penobscot Registry of Deeds; thence northerly on said westerly line of land conveyed by Strickland to City of Bangor three hundred eighty (380) feet to a point; thence at right angles westerly two hundred three (203) feet to a point; thence S. 25° 47' W. one hundred seventy-six and one-tenth (176.1) feet to a point; thence westerly on a line which will be at right angles with the easterly line of Essex street two hundred eighty-four (284) feet to a point in said line of Essex street sixty (60) feet northerly of the place of beginning; thence southerly on and by the easterly line of Essex street sixty (60) feet to the point of beginning. Being a part of the same premises conveyed by Arthur B. Haskell to Ray D. Strickland by deed dated January 9, 1921 and recorded in Vol. 933, page 428 of said Registry.

To Have and to Hold, the aforegranted and bargained premises, with all the privileges and appurtenances thereof to the said City of Bangor, its successors ~~heirs~~ and assigns, to its and their use and behoof forever. And I do covenant with the said Grantee its successors ~~heirs~~ and assigns, that I am lawfully seized in fee of the premises; that they are free of all encumbrances; that I have good right to sell and convey the same to the said Grantee to hold as aforesaid; and that I and my heirs shall and will warrant and defend the same to the said Grantee its successors ~~heirs~~ and assigns forever, against the lawful claims and demands of all persons.

In Witness Whereof, I, the said Ray D. Strickland, and I, Maude J. Strickland, wife of the said Ray D. Strickland, in token of my release of all right of dower or title by descent and all other rights in the above described premises,

have hereunto set our hands and seals this seventh day of April in the year of our Lord one thousand nine hundred and thirty-three.

Signed, Sealed and delivered in presence of

Roland Jones — Ray D. Strickland (LS)
Roland Jones — Maude J. Strickland (LS)

STATE OF MAINE
Penobscot ss. April 7, 1933. Personally appeared the above named Ray D. Strickland and acknowledged the above instrument to be his free act and deed.
Before me, Harold H. Colby, Notary Public

Notary Seal

Received April 25, 1933, 1 h 55 m P. M.

Appendix G: Letter from Thaxter R. Trafton to the Maine National Guard

Bangor, the center of Maine--the Gateway to Maine's North Woods and Seashore Resorts

THAXTER R. TRAFTON
PARKS AND RECREATION DIRECTOR

RECREATION DIVISION
DALE W. THERIAULT
RECREATION SUPERINTENDENT
JOHN C. WISE
ASS'T RECREATION SUPERINTENDENT
GEORGE E. SEARWAY
SENIOR CITIZENS' DIRECTOR

City of Bangor, Maine
PARKS AND RECREATION DEPARTMENT

July 7, 1971

Maine National Guard

Att: Major L. K. Feeney

The City of Bangor is developing a winter recreation area on the old Essex Street Dump. The facilities will include a ski lodge, ski slope, sliding area, skating and snowmobile areas. The project will be done in two phases.

This summer an access road to the ski slope has been nearly completed and the brush has been cut off 25% of the ski slope. In order to complete the first phase of the project, the City of Bangor requests assistance from Maine National Guard in hauling 15,000 yards of fill to the ski slope. A front end loader, one bulldozer and several dump trucks will be needed. The bulldozer will be used to level the fill to rough grade on the ski slope. This phase of the project should be completed by December, 1971.

The City of Bangor will also seek assistance from the Maine National Guard in the second phase of its project, which should be completed by the fall of 1972. The Guards' involvement during this phase will include construction of the ski lodge and the ski tow facilities. Details on this phase will be submitted shortly.

Respectfully requested,

Thaxter R. Trafton

Thaxter R. Trafton
Parks & Recreation Director

TRT:q

Appendix H: Outdoor Sports Institute (OSI) Trail Plan

A summary of this plan will be added here once it is complete.

Appendix I: Notes from Essex Woods Visit with Mackenize Roeder, Ph. D., Songbird Specialist in the Wildlife Diversity Section of the Maine Department of Inland Fisheries and Wildlife

Red Pine Plantation

- Continued removal and management of invasive plant species will benefit native understory regeneration and improve habitat quality for breeding birds.
- Ongoing efforts to transition portions of the plantation toward more natural forest cover types are encouraged, particularly through retention and promotion of native oak and pine species. Increasing structural and compositional diversity within the stand will likely improve habitat suitability for a broader suite of forest bird species compared to even-aged red pine monocultures.
- Retention of snags, cavity trees, coarse woody debris, and patches of dense understory vegetation, if they exist, where feasible would provide additional nesting and foraging opportunities for birds.
- Mountain biking and recreational trail use were identified as an important use of the property. To minimize additional fragmentation and disturbance impacts to nesting birds, particularly ground- and shrub-nesting species, establishment of new trails within this area is discouraged. Maintenance and use of existing trails is preferable to further trail expansion.
- If trail improvements are pursued, efforts should focus on maintaining the current footprint and avoiding widening, braiding, or creation of new connectors through intact habitat patches. This work should not be done during the following time period: 15 April - 15 September, when possible, to avoid disturbances to migratory and breeding birds. This window is conservative so if it causes any issues touch base with me and we can revisit.

Invasive Species Removal:

- Continued invasive species management targeting knotweed, Norway maple, buckthorn, and other nonnative species is encouraged and will provide substantial long-term benefits to native plant communities and associated wildlife habitat.
- Current treatment methods indicated include foliar herbicide application for knotweed and cut-stump treatments for woody invasive species
    - Because these areas support breeding birds, invasive species treatments should be planned with consideration for seasonal nesting activity where feasible. Conducting higher-disturbance activities outside of peak nesting periods, particularly in areas with dense shrub or ground cover, may help reduce the risk of disturbance to nesting birds. Birds like Gray Catbirds have been found nesting in Knotweed so please restrict activities outside the breeding season (window listed above).
- Herbicide applications should continue to follow label requirements and best management practices to minimize unintended impacts to adjacent native vegetation and habitat structure important for breeding birds and insect communities.
- Retention of some native shrub and understory structure during invasive species removal efforts is encouraged where possible, as dense low vegetation can provide important nesting and foraging habitat for many species.

Scots Pine and Norway Spruce

- In favor of these efforts. Gradually transitioning portions of these stands toward more natural and structurally diverse forest conditions would improve long-term habitat value for native wildlife.
- Removal of large Norway spruce and hazardous or declining trees in areas with regular public use is understandable from both invasive species management and public safety perspectives.
    - Where feasible, tree removal and other high-disturbance forestry activities should be timed outside of the peak bird breeding season to help minimize impacts to nesting birds.
- Retention of standing dead trees (snags), where they do not pose a safety risk, is encouraged. Snags provide important nesting, roosting, and foraging habitat for many bird species, including cavity nesters and insectivorous birds.
- Where complete snag retention is not possible, consideration could be given to retaining select "wildlife trees" or partial snags in lower-use areas to maintain some structural habitat features within the stand.

Mature Softwood stand

- A tucked-back mature softwood stand on the property appeared to provide particularly valuable habitat due to its mature forest structure, abundance of snags, and relatively low levels of anticipated human disturbance. Retention and protection of this area is encouraged, as older softwood stands provide important nesting and foraging habitat for many forest bird species.
- Avoiding new trail development and minimizing intensive management activities within this stand would help maintain its value as a low-disturbance refuge for breeding birds.
- Its proximity to the ROW makes me wonder about versant's herbicide application and its impacts on this section of forest. If there is any way to speak with them and learn when this occurs and what is being applied and how that would be helpful.
- Retention of mature cone-producing conifers where feasible will be especially beneficial for birds that rely on conifer seed resources (older trees = better cone crops).
- Concerns regarding Hemlock Woolly Adelgid are understandable; however, minimizing preemptive removal of healthy hemlock in the absence of confirmed infestation would help preserve important habitat structure and food resources while monitoring efforts continue.

Rail Trail Wetland:

- The wetland complex along the rail trail is fabulous. Appeared to provide excellent bird habitat and supported high levels of breeding bird activity during the site visit (amazing given how early in the season), including multiple counter-singing Swamp Sparrows. Maintaining the hydrology, shrub structure, and overall integrity of this wetland system should remain a priority given its apparent value to marsh- and wetland-associated bird species.

- The area also appears well-suited for birding and wildlife observation and clearly represents an opportunity for low-impact birding-focused recreation and outreach, particularly given existing public access via the rail trail.

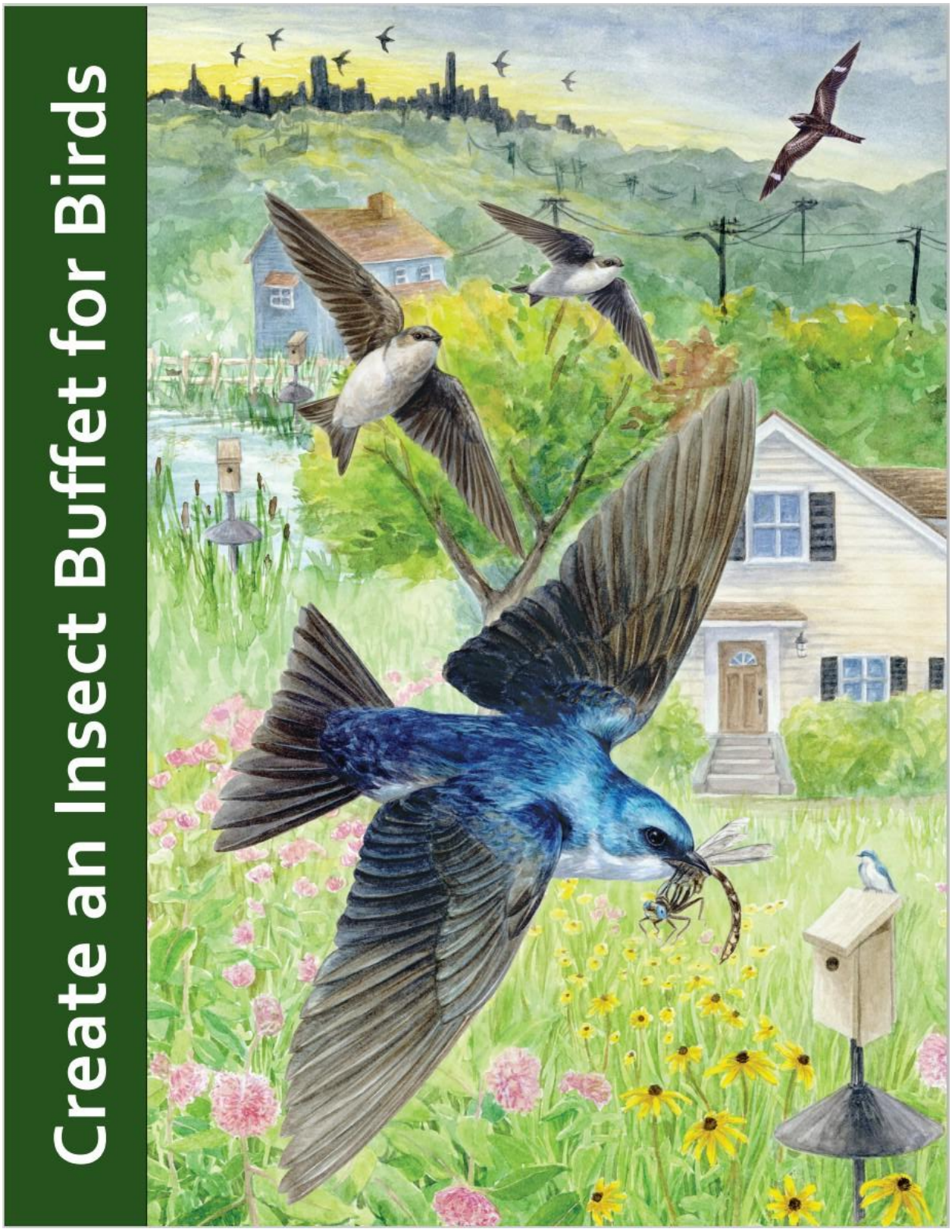
Wetland across from sled hill

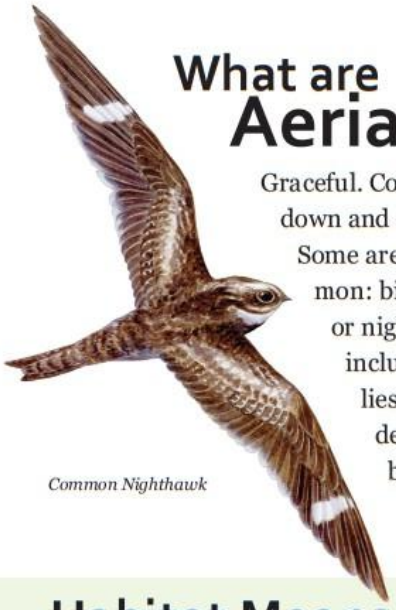
- Along the wetland corridor leading toward the sled hill, the selective cattail removal in portions of the more densely vegetated side that Bob suggested is a good idea.
- The broader open wetland habitat on the opposing side appeared to provide excellent habitat for species like Red-winged Blackbirds, while also likely supporting important insect production and foraging opportunities for aerial insectivores. Tree Swallows were seen foraging, and it was reported that Pied-billed Grebe, Green Heron, and Swamp Sparrows have been found utilizing this habitat. Maintaining the overall open wetland character and hydrology of this system is encouraged.

Sled Hill

- We've discussed this, I think the potential for Tree Swallow boxes here, and on the edges of the wetland would be of high value. If the switchback trail goes forward, we can plan accordingly.

Appendix J: Cornell Lab of Ornithology's Aerial Insectivore Information Sheet





Common Nighthawk

What are Aerial Insectivores?

Graceful. Colorful. Helpful. You may have seen them in flight, swooping up and down and all around, on the hunt for their insect prey. Then again, maybe not. Some are nocturnal. Camouflaged. Elusive. But they all have one thing in common: birds which gulp down insects while flying—whether it's dawn, dusk, day or night—are known as "aerial insectivores." In North America, this group includes species in the swallow, swift, martin, nightjar, and flycatcher families. Unfortunately, many aerial insectivore populations have been steeply declining since the 1980s—as have insect populations. How can we help bring these agile fliers back to our yards, farms, cities, and wild spaces? This guide outlines actions we can collectively take to improve habitat for nature's bug-zappers.

Habitat Means Food, Places to Nest, and Safety

Aerial insectivores eat flying insects as their primary food source year-round. If you have a yard, patio, or outdoor space that you manage, the choices you make matter for birds. Here's how to get started:

Bird-friendly mowing

Grasses and wildflowers can provide excellent habitat. If you have a piece of your property that you can control the mowing schedule for, first try to reduce the frequency of mowing and leave the blades three inches tall or higher. This can ensure plants such as clovers retain their flowers, thus continuing to support pollinators.

If you have a large meadow or grassy area that you mow annually, make sure you avoid mowing during nesting season. This United States map will give you a sense of the duration of nesting season in your region. Meadows provide important habitat for insects and safe cover for ground-nesting birds. Finally, try to reduce the overall size of your lawn and leave buffer strips or areas with longer grass along the edges.

Water resources

Insects tend to congregate over bodies of water. These irreplaceable "nutrient hotspots" need protection from disturbances like urbanization, agricultural pesticides, and fertilizers. If you have a backyard or farm pond, don't mow right up to the edge; leave a vegetation buffer around it to provide places for insects to feed, rest, and lay eggs. This will also attract aerial insectivores who may nest nearby.

Native plants

Native plants are those that have been growing in your region for thousands of years. Evidence shows that native plants support more insects than non-native, exotic species. Online tools such as Pollinator Partnership or Lady Bird Johnson Wildflower Center will help you determine which plants are native to your region and which increase your property's value to birds, insects, and other wildlife.

Tree Swallows chasing mayflies

A Place to Nest

Aerial insectivores nest in remarkably diverse locations—in tree hollows and nest boxes, on homes and buildings, on the ground, high on gravel rooftops, in sandy burrows, under bridges, in chimneys, inside caves, and even behind waterfalls! Human tolerance of their sometimes-inconvenient nesting sites is a big factor in helping populations recover. For instance, Chimney Swifts nest in urban masonry chimneys, creating noise that prompts some homeowners to block chimney access. With fewer natural nest sites available, they have come to rely on our chimneys as a replacement for large, hollow trees. Similarly, as many old rural barns fall into disrepair, Barn Swallows are making the switch to nesting on homes and businesses, sometimes leaving a mess below their nest. Simply placing a sheet of newspaper weighted with stones on the ground below the nest, or attaching a small wicker basket to the wall below the nest can make the temporary guests more welcome.

For some aerial insectivores, tolerance may be enough. But for others, actively creating new nest sites is needed. You can provide nest boxes for Tree Swallows and Violet-green Swallows in open areas like yards and fields. Be sure to attach predator guards to free-standing poles. It's also a great idea to leave dead trees standing when possible, as these make desirable natural nest sites. Barn Swallows can be attracted by a nesting shelf placed just underneath the eaves of a home, garage, school, or other building. Purple Martins rely almost entirely upon human-provided nesting sites and active management by those willing to become landlords. To download nest box plans for swallows, martins, and other species, check out NestWatch's Right Bird, Right House tool.

For urban Common Nighthawks, a flat gravel rooftop is a satisfactory place to nest. However, the conversion of gravel rooftops to smooth surfacing makes potential nesting sites unsuitable. Maintaining stone rooftops with pea gravel can support more urban Common Nighthawks. Identifying and protecting existing nest sites is important because the females will return to the same sites year after year.

In order to understand why aerial insectivores are declining, scientists need more data on their nesting biology. You can monitor the nests of any species you find (nest boxes are especially easy to visit) and report on the outcome to NestWatch, a citizen-science nest monitoring program. It's free to participate; **learn more and get certified as a NestWatcher on NestWatch.org.**

Healthy Habitats

Part of a healthy habitat is minimizing everyday threats that birds face. For aerial insectivores, that means ensuring a plentiful supply of insects and a stable climate for both birds and their insect prey. Consider these best practices:

Avoid pesticides

Applying broad-spectrum pesticides can harm birds that eat insects. A less harmful practice to control garden pests is applying soapy water directly to the affected plant. Encourage insects in your spheres of influence: turn off the bug zapper, put down the insecticide sprayer, and use protective clothing and bug spray to keep yourself protected.

Be climate smart

Heat and drought can impair hatching and fledging success of nesting birds. Research shows that aquatic and terrestrial insects are emerging earlier as early spring temperatures get warmer. Some bird species are trying to keep up—that is, nesting earlier to keep pace with the insects—but they can only do so up to a point. Constraints on the other parts of their life cycle (e.g., migration, replenishing energy reserves) limit just how much they can "match" the changing pace of insect activity. Using clean energy, lowering your carbon footprint, and supporting policies that help reduce greenhouse gas emissions may delay climate warming.

Attract an Aerial Insectivore

Tree Swallow

Tachycineta bicolor

Habitat: grassland, lake, marsh, shore
Breeding Range: N. North America
Diet: dragonflies, damselflies, flies, mayflies, caddisflies, true bugs, bees, ants, wasps, beetles, butterflies, moths, spiders.
Nesting period: mid-May to Jul

Download a nest box plan

Violet-green Swallow

Tachycineta thalassina

Habitat: grassland, lake, marsh, shore, mountain, open woodland
Breeding Range: W. North America
Diet: flies, leafhoppers, leafbugs, aphids, flying ants.
Nesting period: mid-May to Aug

Download a nest box plan

Barn Swallow

Hirundo rustica

Habitat: grassland, lake, shore, town
Breeding Range: near-global distribution
Diet: mainly flies, also beetles, bees, wasps, ants, butterflies, moths.
Nesting period: early May to Aug

Download a nest box plan

Purple Martin

Progne subis

Habitat: desert, town, lake
Breeding Range: North America
Diet: beetles, flies, dragonflies, leafhoppers, grasshoppers, crickets, butterflies, moths, wasps, bees, caddisflies, spiders, cicadas, termites, mayflies.
Nesting period: early Apr to Aug

Download a nest box plan

Common Nighthawk

Chordeiles minor

Habitat: grassland, forest, open woodland, town, lake, shore
Breeding Range: North America, parts of Central America
Diet: queen ants, wasps, beetles, caddisflies, moths, mosquitoes, bugs, mayflies, flies, crickets, grasshoppers.
Nesting period: late May to Aug

May nest on the ground or gravel rooftops

Lesser Nighthawk

Chordeiles acutipennis

Habitat: desert, grassland, open woodland, town, lake, shore
Breeding Range: SW North America, parts of Central and South America
Diet: flies, mosquitoes, moths, June bugs, leafhoppers.
Nesting period: mid-Apr to Aug

May nest on the ground or gravel rooftops

TheCornellLab NestWatch

NestWatch is a citizen science program that tracks status and trends in the reproductive biology of birds, including when nesting occurs, number of eggs laid, how many eggs hatch, and how many hatchlings survive. To learn how you can help, visit NestWatch.org.

The Cornell Lab of Ornithology is a nonprofit membership institution whose mission is to interpret and conserve the earth's biological diversity through research, education, and citizen science focused on birds.

This document includes accessibility features for those with visual impairments.

Text by Robyn Bailey, Becca Rodomsky-Bish, and Holly Grant. Illustrations by Vera Ting, 2023 Bartels Science Illustrator; and Holly Grant. Graphic design by Holly Grant.

Appendix K: Recommendation for Essex Woods from Jerry Longcore of the U.S. Geological Survey from the 2003 Forest Management Plan

Potential Management Procedures to Enhance ESSEX WOODS for Public Recreation and Environmental Education

On 17 April 03 accompanied by Chuck Simpson I visited the Essex Woods wetland. I walked the hiking trail from the kiosk at the end of Garden Way to the southernmost corner then northwest along part of the wetland to an ATV trail that extended north to the inlet stream, which was too deep to cross.

First Impression Observations

The area is essentially a palustrine, broad-leaved deciduous, forested wetland (as classified by Cowardin et al. 1979), with abundant dead-standing trees and living trees. Species of trees seem mostly of red maple (*Acer rubrum*), aspen (*Populus* sp.), and birch (*Betula* sp.), but other species are likely present that could not be identified from a distance. Shrub-like trees of willow (*Salix* sp.) and speckled alder (*Alnus incana*) were abundant in patches in the flooded sections and alder and aspen clones were dominant on upland sections along the south side and near the west side along the ATV trail. Much of the dead-standing and decaying timber seems too small (<6-8 in. diameter) to provide nest sites for cavity nesting waterfowl (i.e., wood duck [*Aix sponsa*] and hooded merganser [*Lophodytes cucullata*]), but is suitable for foraging and nesting sites for woodpeckers, and other hole-nesting passerine birds.

Only one contiguous patch of persistent emergent vegetation seems to exist, that of cattail (*Typha* sp.), which is located in the wetland opposite the "sliding hill". This habitat will provide nesting sites for red-winged blackbirds (*Agelaius phoeniceus*), but is probably to limited in size for other marsh species such as sora rail (*Prozana carolina*) and American bittern (*Botaurus lentiginosus*). The flooded willow and alder, however, is suitable for the uncommon green heron (*Butorides virescens*). Because of the senescence of submergent aquatic plants during winter, not much evidence existed to identify them. The visit was too early in the season (and too cold) for most amphibians to be calling, but one can expect most of the local species of amphibians to be present.

Beaver activity was evident, which can enhance aspects of the wetland but can also substantially affect water regimes, culverts, and the boundary dikes. Along the "sliding hill" side of the wetland several large rubber tires were partly submerged with other smaller bits of trash and debris.

Potential Management Options for Essex Woods

If one assumes that the objectives for managing this area are (a) to perpetuate Essex Woods as a forested wetland for wildlife species, (b) to enhance the opportunity for the public to recreate and view wildlife in an urban setting, and (c) to inform and educate the public about management of wildlife and environmental issues, then the following management options may be considered.

Remove old tires and trash: For aesthetic reasons and to lessen potential sources of contaminants (heavy metals) all old tires should be removed and properly disposed.

Establish control of the water level: Because beaver have influenced water levels before and undoubtedly will again, the outflow culvert along the east side of the wetland needs continued attention to achieve either a stable water level or to allow managers to draw down the water for vegetation management. If water is kept at levels that kill most of the woody vegetation—probably about what they are now—the trees will be killed and the site will convert to an emergent marsh over the long-term. Conversion of some of the flooded timber habitat to an emergent marsh type may provide for more diversity of marsh birds, but the wetland may lose some of the passerine cavity-nesting species. For diversity of habitat and to maintain the life of some or the trees, the water level would need to be such that some trees were only inundated during spring run-off but not so during the growing season. It may take some observation of patches of trees during lower water levels to determine what the optimum water level should be to achieve that goal. To inform the public of the importance of water level management a water gauge and an interpretive sign could be placed near the outlet culvert to explain the management plan.

Establish a nest box program for cavity-nesting waterfowl: Although it is not certain that nesting pairs could be attracted, it may be possible to attract some pairs of wood ducks and hooded mergansers---probably not more than 4 –6 boxes would be needed for the limited area, but these boxes may attract some other cavity-nesting raptors such as eastern screech owls (*Otus asio*) or American kestrel (*Falco sparverius*).

Establish a bluebird nest box program: Eastern bluebird (*Sialia sialis*) nest boxes that have been erected in pairs have been successful in attracting a pair of bluebirds in one box with a tree swallow pair taking of the other box, thus protecting the bluebird pair from other tree swallow competitors. Even if bluebirds do not use the boxes, tree swallow will nest and consume countless numbers of dipterous flying insects (the kind that bite humans), thereby providing a benefit to neighboring residents and good public relations. Spacing and placement of boxes with adequate predator guards is important; that information can be provided later.

Establish 1 Canada goose nesting platform (or tub) : If a Canada goose (*Branta canadensis*) pair were attracted to the wetland---they often are found nesting on a beaver lodge in a flowage---they would be an attraction to the public, especially if a portion of the "sliding hill"area were to be managed to provide a grazing area by tilling and seeding the area with appropriate grass seeds. Canada geese, however, if too plentiful in an area can be a nuisance and foul walkways and even be aggressive toward humans in certain circumstances. Selecting this option should be done only after careful consideration of unintended consequences.

Maintain American woodcock singing ground sites: As part of providing recreation and to educate the public about a unique shorebird species that nests in alder habitats 2 or 3 openings in the alders could be maintained in the vicinity of the ATV trail on the west side. In spring through early summer male woodcock may display on these sites and be easily observed by the public without disturbing the courtship activity.

Build an observation and interpretive station: To clearly inform the public about what the City of Bangor is trying to accomplish and about wildlife in the urban setting build an elevated viewing platform (perhaps covered) in the vicinity of the "sliding hill" on the wetland side. This station could be the focal point of explaining all of the management activities and ecology of the wetland, including a map of the entire wetland. Even a log for turtles to bask on could be anchored in front of the viewing stand.

8) *Acquire the wetland area adjacent to Interstate 95* : If the City of Bangor has an interest in obtaining the property to the east of its property to consolidate the ownership for better management of the entire parcel, they may wish to discuss possibilities on working with the recently formed Bangor Land Trust (Lucy Quimby, President, Bangor Land Trust; telephone: 207 947-0637). They may be able to work with the landowner in conjunction with the City to obtain the land in such a way as to benefit everyone concerned, including the public.

These land management recommendations are based on a single visit to the site and may need to be revised after more intensive inventory and monitoring of the site and its wildlife populations during different times of the year.

Reference:

Cowardin, L. M., V. Carter, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service, FWS/OBS-79-31.

Prepared by: Jerry R. Longcore
17 April 2003

Appendix H: Lower Parking Lot DEP Approval and Plans

CITY OF BANGOR

DEPARTMENT OF ENGINEERING

JOHN THERIAULT PE, PTOE
CITY ENGINEER

October 1, 2020

James Beyer
Eastern Maine Regional Office
Maine Department of Environmental Protection
106 Hogan Road
Bangor, Maine 04401

RE: Stormwater PBR Application for Essex Street Trailhead Parking and Trails

Dear Jim:

The City of Bangor is submitting this Stormwater PBR Application to construct gravel trailhead parking and two trails to access the Essex Street Recreation Area which is a popular walking, biking, and birding area within the City of Bangor.

The project will be constructed making use of some of the excess excavation material from the Davis Brook CSO Storage Tank project that is currently under construction at the Bangor Waterfront. The trailhead parking project will disturb about 2.8 acres and add about 0.74 acres of impervious ground cover.

This project has received a wetland fill permit to alter approximately 11,904 square feet of forested wetland as well as received local Planning Board approval and a favorable finding from the Bangor Marsh/Mall Commission.

The City has applied for a Beneficial Use Permit from DEP to allow for the excavated material from the Bangor Waterfront to be utilized for fill at this Essex Street lot. We are anticipating approval of this permit/license in the very near future.

Because of current favorable weather conditions, the Contractor (S.E. MacMillan) has begun to clear the Essex Street site however no grubbing or filling has been allowed. This is a very important project for the City of Bangor that makes use of excavated material while also developing a much needed recreational amenity and saving the City of Bangor significant money for the disposal of the excess waterfront material. Should you have any questions concerning his project, please do not hesitate to call me at 992-4249.

Sincerely,

John Theriault, PE, PTOE
City Engineer

73 HARLOW STREET, BANGOR, ME 04401
TELEPHONE: (207) 992-4250 FAX: (207) 992-4194
WWW.BANGORMAINE.GOV

STORMWATER PBR APPLICATION FORM

[1] **Name of Applicant:** City of Bangor - John Theriault	[5] **Name of Agent:**
[2] **Applicant's Mailing Address:** 73 Harlow Street Bangor, Maine 04401	[6] **Agent's Mailing Address:**
[3] **Applicant's Daytime Phone:** 207/992-4249	[7] **Agent's Daytime Phone:**
[4] **Applicant's Email Address:** john.theriault@bangormaine.gov	[8] **Agent's Email Address:**
[9] **Location of Project: (Road, Street, Rt.#)** East side of Essex Street, north of I-95 bridge [10] **Town:** Bangor	[11] **County:** Penobscot
[12] **Is this PBR for renewal of an individual stormwater permit? If yes, skip to Block 29 and signature page.**	☐ Yes ☑ No
[13] **Type of Direct Watershed: (Check all that apply.)** ☐ Lake not most at risk ☐ Lake most at risk ☐ Lake most at risk, severely blooming ☑ River, stream or brook ☐ Urban impaired stream ☑ Freshwater wetland ☐ Coastal wetland ☐ Wellhead of public water supply	[14] **Amount of Developed Area:** Total # of 2.8 acres OR Total # of _____ square feet [15] **Amount of Impervious Area:** Total # of 0.74 acres OR Total # of _____ square feet
[16] **Part of a Subdivision?** ☐ Yes ☑ No	[17] **Is this Activity Part of a Larger Project?** ☑ Yes ☐ No
[18] **Name of Waterbody(ies) Drained to:** Kenduskeag Stream	[19] **Name of Impaired Waterbody (if applicable)**
[20] **Brief Project Description:** Construction of Trailhead gravel parking and gravel trails using excavation material from Davis Brook Tank project.	
[21] **Size of Lot or Parcel:** ☐ _____ square feet OR ☑ 11.33 acres	**UTM Northing, if known:** 44.82255 **UTM Easting, if known:** -68.76751
[22] **Deed Reference Numbers:** Book#: 13011 Page#: 130	[23] **Map and Lot Numbers:** Map #: R49 Lot #: 004
[24] **DEP Staff Previously Contacted:** Karen Knuuti	[25] **Project started prior to application?** ☐ Yes ☑ No **If yes, Completed?** ☐ Yes ☐ No
[26] **Resubmission of PBR Application?** ☐ Yes ☑ No **If yes, prior application #:**	**Prior Project Manager:**
[27] **Written Notice of Violation?** ☐ Yes→ ☑ No **If yes, name of DEP enforcement staff involved:**	
[28] **Detailed Directions to the Project Site:** From State Street head north on Essex Street. Project site is locate 400' north of I-95 Bridge on Essex Street.	
[29] **Renewal of individual stormwater permit?** ☐ No ☐ Yes→	DEP Permit No: Project Manager:

[30] **SUBMISSIONS**

■ This form (signed and dated) ■ Fee	■ Dept. of Inland Fisheries and Wildlife Approval (if in Essential Habitat)	■ Photos of Area ■ ESC Plan ■ Location Map ■ Site Plan	**For Renewal of an individual Stormwater permit only:** ☐ This form (signed and dated) ☐ Copy of original stormwater permit ☐ Fee

FEE: Pay by credit card at the Payment Portal. The Stormwater Permit-by-Rule fee may be found here: https://www.maine.gov/dep/feeschedule.pdf.

■ **Attach payment confirmation from the Payment Portal when filing this notification form.**

Does the agent have an interest in this project? If yes, what is the interest?

City of Bangor owns property.

Rev. 07-01-2020

STORMWATER PBR APPLICATION FORM

CERTIFICATIONS / SIGNATURES

Applicant's Statement:

I am applying for a Stormwater PBR and have attached the required PBR submissions. I have read the requirements herein and I affirm that my project satisfies the applicable stormwater management standards. I authorize staff of State and Federal agencies having jurisdiction over this activity, to access the project site for the purpose of determining compliance with the rules. *If typing your signature below, you are agreeing to and acknowledging the above information is true.*

Signature (may be typed): _____ Date: 10/1/2020

Notice of Intent to Comply with Maine Construction General Permit	With this Stormwater PBR notification form and my signature below, I am filing notice of my intent to carry out work which meets the requirements of the Maine Construction General Permit. I have read and will comply with all of the MCGP standards. In addition, I will file a Notice of Termination (NOT) within 20 days of project completion. If this form is not being signed by the landowner or lessee of the property, attach documentation showing authorization to sign. *If typing your signature below, you are agreeing to and acknowledging the above information is true.* Signature (may be typed): _____ Date: 10/1/2020

Rev. 07-01-2020

PROJECT LOCATION MAP

BANGOR GIS

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO

September 21, 2020

David Moyse
Moyse Environmental Services, Inc.
42 Pleasant View Ave.
Bangor, ME 04401

RE: Information Request – City of Bangor Essex Woods Project, Bangor

Dear David:

Per your request received on September 14, 2020, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *City of Bangor Essex Woods* project in Bangor. For purposes of this review we are assuming tree clearing will be part of your project.

Our Department has not mapped any Essential Habitats or inland fisheries habitats that would be directly affected by your project.

Endangered, Threatened, and Special Concern Species

Bat Species – Of the eight species of bats that occur in Maine, the three *Myotis* species are protected under Maine's Endangered Species Act (MESA) and are afforded special protection under 12 M.R.S §12801 - §12810. The three *Myotis* species include little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are listed as Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence it is likely that several of these species occur within the project area during migration and/or the breeding season. However, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

Significant Wildlife Habitat

Significant Vernal Pools - At this time MDIFW Significant Wildlife Habitat (SWH) maps indicate no known presence of SWHs subject to protection under the Natural Resources Protection Act (NRPA) within the project area, which include Waterfowl and Wading Bird Habitats, Seabird Nesting Islands, Shorebird Areas, and Significant Vernal Pools. However, a comprehensive statewide inventory for Significant Vernal Pools has not been completed. Therefore, we recommend that surveys for vernal pools be conducted within the project boundary by qualified wetland scientists prior to final project design to determine whether there are Significant Vernal Pools present in the area. These surveys should extend up to 250 feet beyond the anticipated project footprint because of potential performance standard requirements for off-site Significant Vernal Pools, assuming such pools are located on land owned or controlled by the applicant. Once surveys are completed, survey forms should be submitted to our

Letter to David Moyse, Moyse Environmental Services, Inc.
Comments RE: City of Bangor Essex Woods, Bangor
September 21, 2020

Agency for review well before the submission of any necessary permits. Our Department will need to review and verify any vernal pool data prior to final determination of significance.

This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program, Maine Department of Marine Resources, and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

Becca Settele
Wildlife Biologist

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

CITY OF BANGOR	) NATURAL RESOURCES PROTECTION ACT
Bangor, Penobscot County	) FRESHWATER WETLAND ALTERATION
ACCESS ROAD AND PARKING	) WATER QUALITY CERTIFICATION
L-28227-TC-A-N (approval)	) FINDINGS OF FACT AND ORDER

Project Description: The applicant proposes to alter 11,904 square feet of forested and scrub shrub wetlands to construct an access road and parking for a municipal recreation area. The road and parking are shown on a plan titled "Overall Impact Sheet," prepared by Moyse Environmental Services, Inc., and dated January 2020. The applicant has avoided and minimized wetland impacts to the greatest extent practicable by utilizing upland when possible and proposing steep side slopes for wetland crossings. According to the Department's Geographic Information System (GIS), there are no mapped essential or significant wildlife habitats associated with the project site. The proposed project is located on Essex Street in the City of Bangor.

Permit for:	[X]	Tier 1
DEP Decision:	[X]	Approved [ ] Denied (see attached letter)
CORPS Action:	[X]	The Corps has been notified of your application. The following are subject to Federal screening: (1) projects with previously authorized or unauthorized work, in combination with a Tier 1 permit for a single and complete project, which total more than 15,000 square feet of altered area; (2) projects with multiple state permits and/or state exemptions which apply to a single and complete project that total more than 15,000 square feet of altered area; and (3) projects that may impact a vernal pool, as determined by the State of Maine or the Corps. If your activity is listed above, *Corps approval is required for your project*. For information regarding the status of your application contact the Corps' Maine Project Office at (207) 623-8367.

Standard Conditions:

1) If construction or operation of the activity is not begun within four (4) years from the date signed, this permit shall lapse and the applicant shall reapply to the Department for a new permit. This permit is transferable only with prior approval from the Department. If the activity is associated with a larger project, starting any aspect of that project constitutes start of construction.
2) The project shall be completed according to the plans in the application. Any change in the project plans must be reviewed and approved by the Department.
3) Properly installed erosion control measures shall be installed prior to beginning the project, and all disturbed soil should be stabilized immediately upon project completion.
4) A copy of this approval will be sent to the City of Bangor. Department approval of your activity does not supersede or substitute the need for any necessary local approvals.

L-28227-TC-A-N 2 of 5

THIS APPROVAL DOES NOT CONSTITUTE OR SUBSTITUTE FOR ANY OTHER REQUIRED STATE, FEDERAL OR LOCAL APPROVALS NOR DOES IT VERIFY COMPLIANCE WITH ANY APPLICABLE SHORELAND ZONING ORDINANCES.

DONE AND DATED IN AUGUSTA, MAINE, THIS 2nd DAY OF March, 2020.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

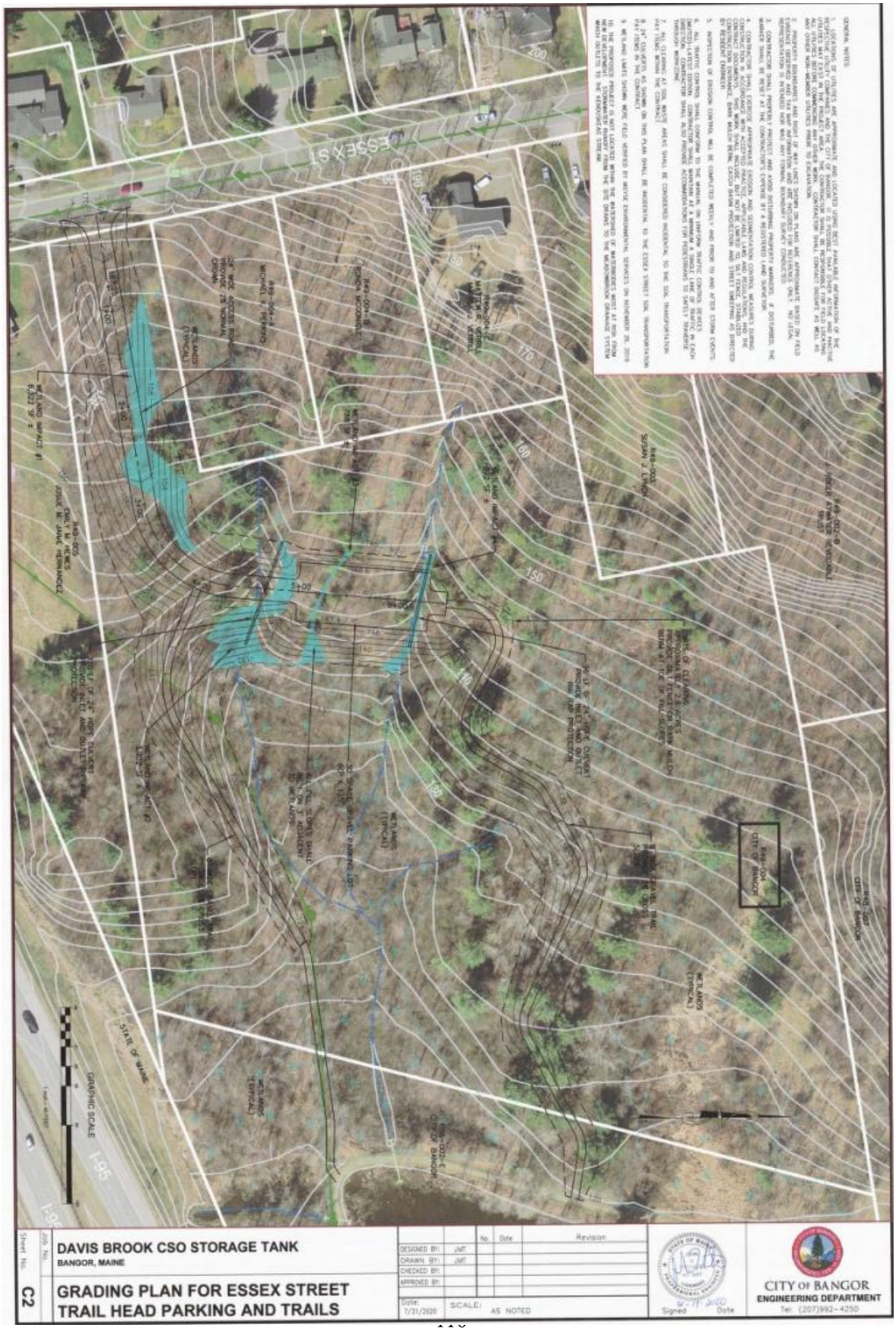
BY: _____
For: Gerald D. Reid, Commissioner

Filed
MAR 0 2 2020
State of Maine
Board of Environmental Protection

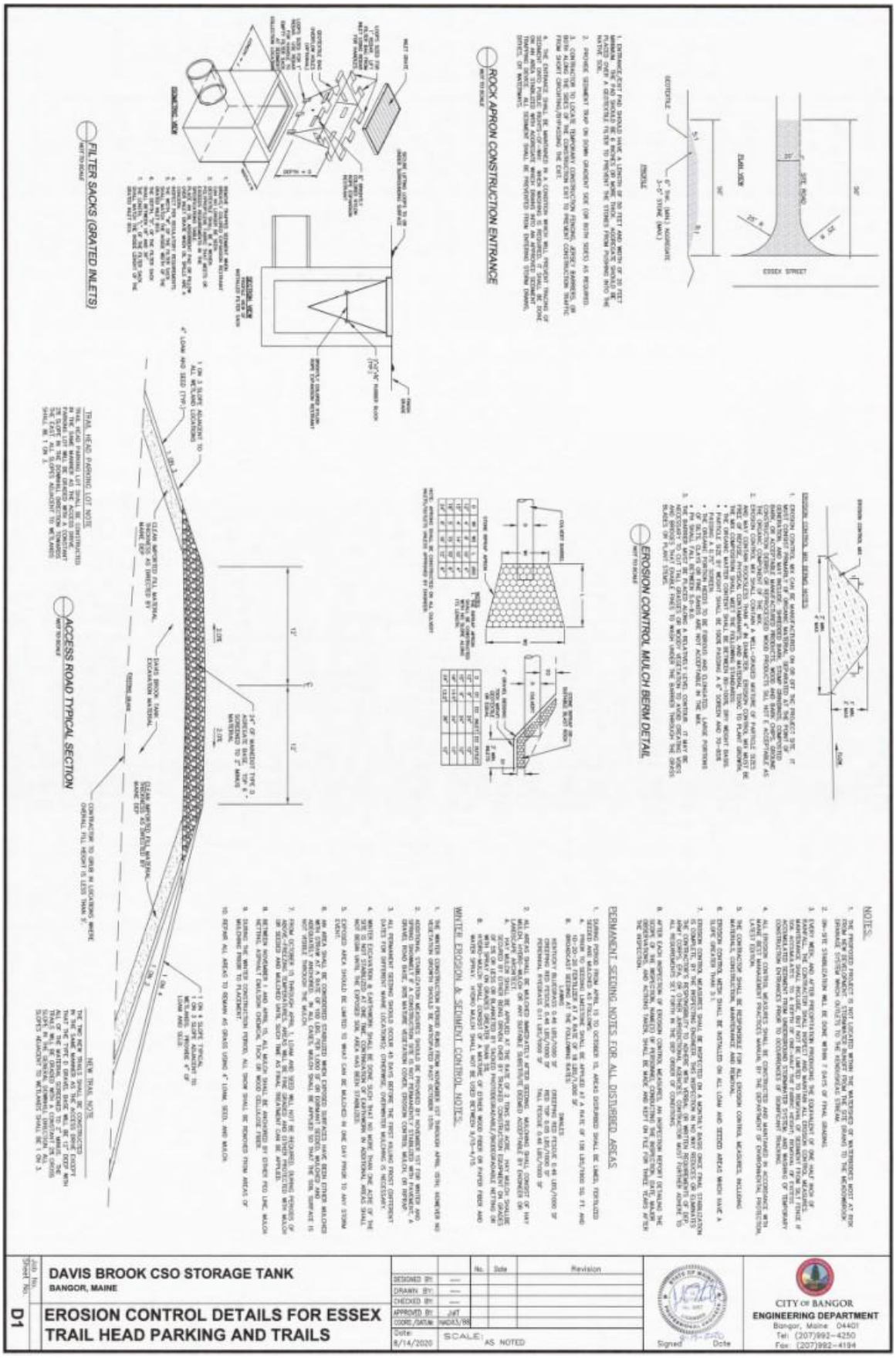
PLEASE NOTE THE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

ME/L28227AN/ATS#85609

CITY OF BANGOR



CITY OF BANGOR



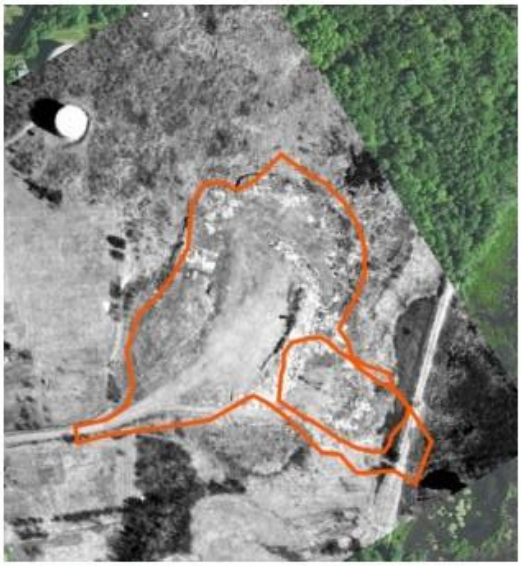
Appendix M: Findings from Essex Woods Visit with Matt Young of the Maine Department of Environmental Protection

Bangor Essex Rd landfill off of Watchmaker.

The Landfill started in the 1930s, and covered in the 1970s. Please see the georeferenced photos below. Outlined on the photos is a rough outline of where the Department understands the waste boundary to be.

2018

1955



Page **1** of **2**

1966

Due to the amount of exposed glass metal and other waste, the Department strongly recommends that the city cover the exposed waste in any area that is not fenced off from recreational activity. The probability for a bicyclist or someone going off trail in this area should be expected, so the Department cannot recommend a safe distance from the trail for waste to be exposed.

The site walk on April 8th showed a good deal of exposed waste off the northern edge of the sledding hill, and continued on for 50 or so yards. There were also multiple trees that had fallen over exposing their rootballs which also created a source for waste to be exposed.

Please have the root balls removed (and disposed of as a controlled waste (I assume that a Construction and Demolition Debris landfill would be willing to take them).

Please let me know if you would like more information on any of these issues.

Best Regards,

Matt Young

Maine DEP

207-215-7841

Page **2** of **2**

Appendix N: Maine Department of Environmental Protection Maintenance Requirements for Closed Municipal Landfills

MAINTENANCE REQUIREMENTS FOR CLOSED MUNICIPAL LANDFILLS

Municipalities are responsible for inspecting and maintaining their closed landfills. Regular inspection and maintenance is vital to ensure the cover system remains effective at reducing the risk of groundwater contamination.

ANNUAL MOWING

Tree growth must be prevented on landfills, as the shallow cover material will not support trees as they mature. Blown over trees will damage the cover and expose waste. Deep roots of trees also provide a pathway for infiltration of water into the waste.

- Mow closed landfills at least once annually.
- Mowing in August or later avoids disturbing nesting birds.
- Mow to the base of the landfill and several feet beyond if possible.
- Cut back encroaching trees & brush at the landfill base and remove trees that have fallen onto the landfill cover.

GAS VENTS

- Inspect gas vents and notify the Department of vents that are damaged or missing.
- Repair or replace them as directed. Avoid flames or sparks when near landfill vents.

ANIMAL BURROWS

Animal burrows provide a direct pathway for water infiltration into the waste.

- If you find a burrow, trap or otherwise remove the occupant and fill in the burrow with loam. Do not use sandy or gravelly soil.

INSPECTION and REPAIR

- Keep an eye on the condition of the landfill cover.
- A walkover inspection should be made at least twice a year. The best times are in the spring following snowmelt and after mowing.
- Check for dead grass, animal burrows, settlement and erosion.
- Prevent ATV-related damage by controlling access as necessary through fencing, gates, barriers or signage. The condition and effectiveness of access control measures should be checked during inspections and enhanced if necessary.

SETTLEMENT

Waste can settle over time, causing depressions in the landfill surface and ponding water.

- Fill depressions with loam to restore positive drainage, then reseed and mulch the area as soon possible to reestablish the grass cover.
- Notify the department if any of the following conditions are encountered: differential (uneven) settlement; cracking of the cover soil; or sloughing of sideslopes. These conditions could indicate a landfill stability problem.

Questions? Contact: Matt Young at (207) 215-7841 or- matthew.r.young@maine.gov

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
www.maine.gov/dep

MAINTENANCE REQUIREMENTS FOR CLOSED MUNICIPAL LANDFILLS

EROSION CONTROL

Unchecked erosion will remove the cover material, eventually exposing the waste. Good grass cover is important to prevent soil erosion.

- Reseed areas of sparse grass growth or amend them with manure, fertilizer or another nutrient source to promote more vigorous growth.
- Continued stressed or dead vegetation may indicate the cover soils are saturated with landfill gas. If this problem persists, contact Department staff for assistance.
- Repair all eroded areas as soon as practical to prevent the problem from worsening.
- "Rill" type erosion—small, concentrated channels on the landfill surface that are no more than a few inches deep—can be repaired by raking out the rills and re-seeding.
- If deeper gullies have formed, contact the department for direction. Structural measures may be needed to repair gullies that have progressed down to the clayey barrier soils underlying the topsoil.

STORMWATER MANAGEMENT

Many municipal landfills have engineered stormwater control features such as plunge pools, ditches, culverts and check dams.

- Check the condition of any such features during regular inspections and after major rainfall events.
- Look for obstructions, tree and shrub growth, erosion, sediment accumulation and displacement of riprap. Conduct any needed cleanout and repairs in a timely manner and remove encroaching trees and shrubs.

LEACHATE BREAKOUTS

Leachate breakouts or "seeps" are common at closed landfills. Leachate is liquid, usually orange or rust-colored, that has been in contact with the landfill waste. Most breakouts occur at the base (or toe) of the landfill and do not usually require corrective action. If the breakout is through the landfill cover, contact the Department to determine if repairs are needed.

Questions? Contact: Matt Young at (207) 215-7841 or matthew.r.young@maine.gov

Maine DEP Regional Offices

Augusta (Central Maine Regional Office)287-7688; 800-452-1942
Bangor (Eastern Maine Regional Office) 941-4570; 888-769-1137
Portland (Southern Maine Regional Office) 822-6300; 888-769-1036
Presque Isle (Northern Maine Regional Office) 764-0477; 888-769-1053

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
www.maine.gov/dep

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