New York City Watershed Forest Management Plan

2017 WATERSHED FOREST MANAGEMENT PLAN UPDATE

Lands Acquired 2009-2016 and Programmatic Enhancements

Sand Hill Forest Management Project, Ashokan Reservoir

Prepared by:

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1. INTRODUCTION

The forested lands in the New York City watershed are vital to the protection of the high quality of the water within the NYC Water Supply. The New York City Department of Environmental Protection (DEP) developed a Watershed Forest Management Plan (WFMP) in 2011 to guide protection of forests on City-owned lands in the watershed. The goals of the WFMP are to diversify the forest in terms of tree age and species composition to promote nutrient assimilation, guarantee successor tree generations and to mitigate against disturbances. Increases in the number and acreage of forest management projects (such as timber harvests, forest regeneration projects, etc.) will be required to meet DEP's WFMP implementation goals.

The WFMP, prepared by the US Forest Service, includes guiding principles, goals, and objectives for the management of City forestlands, existing and desired conditions, management needs, opportunities and strategies and an implementation strategy. The appendices are comprised of map sets, priorities, and conservation practices that guide management of recommended activities.

The 2010 Water Supply Permit (WSP) requires DEP to update the 2011 Watershed Forest Management Plan by December 2017. The WFMP was designed to guide management over a 20-year period (2012-2032), that is revised/revisited every 10 years per the WSP. Since the goals, objectives, strategies, and management recommendations and guidelines were recently established; this update will address any changes made to the document since 2011, a delineation of lands acquired since 2009, and any supplemental work conducted since then. The WFMP will be revised in March 2027 as per the 2017 FAD.

In this 2017 update, DEP is including 1) new guidance adopted for the **Conservation Practices** section which defines the process for forest management project planning and implementation and sets the standards for the protection of natural resources and human resources, such as archeological and historic resources; 2) the results of a **stand delineation** of all lands acquired since 2009-2016 through remote sensing utilizing GIS and aerial photo interpretation; 3) the contract specifications for a **forest inventory** for these lands and status of the contract; and 4) an update on **staffing and other resources** that have changed since 2011.

The current WFMP is based on the composition of City lands acquired prior to, and through the fall of 2009. Since fall 2009, DEP acquired approximately 30,000 acres through the end of 2016, and expects to continue to acquire additional acres during the term of the current WSP. Table 1 is a summary of lands acquired during the update period. Table 2 summarizes all land ownership in the watershed through December 31, 2016.

Table 1. Basin ownership in acres acquired since 2011 WFMP forest inventory through December 31, 2016

Basin	Fee Land Acquisition Period	City-Owned Fee Land [1]	City-Owned Easements [2]
East of Hudson			
Amawalk (includes Kirk Lake)	9/15/09 – 12/31/16	6	0
Bog Brook	9/15/09 – 12/31/16	0	0
Boyd Corners	9/15/09 – 12/31/16	80	0
Cross River	9/15/09 – 12/31/16	0	0
Croton Falls	9/15/09 – 12/31/16	0	0
Diverting	9/15/09 – 12/31/16	0	0
East Branch	9/15/09 – 12/31/16	0	0
Kensico	5/09/09 – 12/31/16	13	116
Lake Gilead	9/15/09 – 12/31/16	0	0
Lake Gleneida	9/15/09 – 12/31/16	0	0
Middle Branch	9/15/09 – 12/31/16	120	0
Muscoot	9/15/09 – 12/31/16	0	0
New Croton	9/15/09 – 12/31/16	12	0
Titicus	9/15/09 – 12/31/16	0	0
West Branch	9/15/09 – 12/31/16	81	418
EOH Subtotal		**313**	**534**
West of Hudson			
Ashokan	5/09/09 – 12/31/16	2,081	198
Cannonsville	9/15/09 – 12/31/16	9,216	2,949
Neversink	8/20/09 – 12/31/16	259	227
Pepacton	8/20/09 – 12/31/16	8,605	5,294
Rondout	8/20/09 – 12/31/16	1,159	403
Schoharie	9/15/09 – 12/31/16	8,018	3,318
WOH Subtotal		**29,337**	**12,389**
Grand Total		**29,650**	**12,923**

1 - Includes closed deals as of 12/31/16. Excludes NYC land under contract.

2 – CEs covers the period 5/09/2009 – 12/31/2016 for all closed CEs. Excludes WAC farm easements.

Table 2. Total basin ownership in acres as of December 31, 2016

Basin	City-Owned Fee Land [1]	City-Owned Easements [2]	New York State	Private and Other [3]	Basin Subtotal
East of Hudson					
Amawalk (includes Kirk Lake)	1,259	0	755	10,472	12,487
Bog Brook	579	0	132	1,721	2,431
Boyd Corners	4,729	505	1,444	7,598	14,276
Cross River	1,440	91	40	17,522	19,093
Croton Falls	2,510	0	0	7,842	10,351
Diverting	469	0	0	4,407	4,876
East Branch	1,148	0	2,100	44,748	47,996
Kensico	4,195	198	0	4,027	8,420
Lake Gilead	196	0	0	228	424
Lake Gleneida	222	0	0	186	409
Middle Branch	654	0	333	12,269	13,256
Muscoot	3,815	89	900	44,592	49,397
New Croton	5,009	239	368	31,280	36,896
Titicus	952	0	0	14,132	15,085
West Branch	4,899	538	1,171	6,088	12,697
EOH Subtotal	**32,076**	**1,660**	**7,243**	**207,113**	**248,093**
West of Hudson					
Ashokan	23,171	2,501	84,606	52,921	163,198
Cannonsville	38,816	4,774	5,780	241,642	291,013
Neversink	7,487	1,940	25,667	24,146	59,240
Pepacton	32,595	8,853	33,145	162,752	237,345
Rondout	9,922	867	20,082	29,942	60,813
Schoharie	23,209	5,276	37,701	135,472	201,658
WOH Subtotal	**135,201**	**24,210**	**206,981**	**646,876**	**1,013,268**
Grand Total	**167,277**	**25,870**	**214,224**	**853,989**	**1,261,361**

1 - Includes Reservoirs, Non-LAP and LAP fee, under-contract and closed deals as of 12/31/16. Excludes NYC land below reservoir dams (and therefore outside reservoir drainage basins/watersheds).

2 - Excludes WAC farm easements.

3 - In addition to private land, this includes non-NYC or non-NYS protected lands, such as WAC Conservation Easements, county/municipal open space, parks, and land trusts.

Source: DEP GIS, T. Spies September 2017

To this end, forest stand delineations of lands acquired between fall 2009 and December 31, 2016, have been completed and this update will include the methodology used and findings of the work.

DEP has contracted for a supplemental forest inventory of the forested stands of these lands, which will be incorporated into the City's Forest Management Plan via a supplemental memo upon completion. The forest inventory data will include sample plots (approximately 1 plot for every 8 acres) that records information on forest density, tree species, size, condition, forest types , understory composition, and regeneration, as well as damage impacts (deer and invasives). The forest data is scheduled to be developed during the 2018 field season.

2. CONSERVATION PRACTICES UPDATE

The 2011 Conservation Practices (CPs) are the foundation for DEP's implementation of the WFMP and have been employed on all forest management projects (FMP) since the completion of the WFMP in November 2011. The CPs include the implementation of the Forestry Interdisciplinary Technical Team (FITT) concept, bringing together DEP professionals from a variety of natural resources disciplines (forestry, wetlands, wildlife, stormwater, streams, etc.) to provide expertise in the development of FMPs to meet the goals of the WFMP, and manage sensitive resources. The CPs also specify the protections to be utilized in/or near co-occurring resources (such as wetlands, vernal pools, streams, etc.), creates exclusion zones (EZs) for critical habitats, and establishes forest practices to be utilized in special management zones (SMZ) around the protected resources.

The 2011 CPs were re-examined in 2013 following two years of implementation. The goal of the re-examination was to assess the effectiveness of the 2011 practices, make appropriate adjustments, and incorporate additional practices where appropriate.

Procedural practices were revised. The current CPs set concise time frames and well-defined deliverables for the various aspects of the forest management project workflow. They also include clarification and improvements on expedited procedures, when forest practices must be expedited for events such as weather impacts (blowdowns, hurricanes, etc.), insect outbreaks, etc.

Procedural practices were also revised to address changes in regulatory reviews for the protection of threatened and endangered (T&E) species and for the protection of cultural resources. The revised US Fish & Wildlife Service (USFWS) procedures for T&E species utilizing the USFWS Information for Planning and Consultation (IPaC) for project planning were incorporated into the CPs as well as the new procedures for the NYS Historic Preservation Office (SHPO) assessment of project areas for historic and archeological resources. These items provide the FITT with better guidance on these resources.

Field procedures were updated for exclusion zones (EZ) and special management zones (SMZ). The reservoir 50 foot EZ was replaced with a 150 foot SMZ to permit careful forest management along reservoir shorelines to promote species and structural diversity in the reservoir buffer zone. This also allows for response to insect outbreaks, such as the 2011 emerald ash borer (EAB) outbreak at Ashokan Reservoir, where ash trees, the EAB host trees, commonly occupy riparian zones such as found along the reservoir shorelines.

Wetland SMZs were re-assessed. It was determined that some small, commonly human-created wetlands, may not require a 100 foot SMZ. Therefore, wetlands of less than 0.1 acres may have a less restrictive SMZ as determined by DEP wetland scientists on a case-by-case basis. A 100-foot SMZ was retained for all wetlands greater than 0.1 acres.

Finally, a new section on invasive species management was added to the CPs. The new section defines procedures for addressing invasive plants during the planning and implementation phases of a FMP, managing the existing invasive species and minimizing the introduction of other invasive plants.

The revised CPs are attached in Appendix 1. The revised CPs were incorporated into the planning and implementation of FMPs starting in January 2014.

3. STAND DELINEATION

For effective forest management, large tracts of forestland need to be characterized into smaller, more manageable units referred to as "forest stands." "A forest stand is a contiguous group of trees sufficiently uniform in age-class distribution, composition and structure to be a distinguishable unit," (*The Dictionary of Forestry*, Society of American Foresters, 1998.) The forests are evaluated at the stand level through forest inventories and remote sensing assessments for a variety of parameters. Forest stand prescriptions are developed and implemented based on analyzing stand conditions against desired forest conditions.

In 2016, DEP contracted with a consulting forestry company, F&W Forestry Services, for stand delineation services on 28,040 acres acquired between 2009 and December 31, 2015. Stands were identified and delineated based on consistency in crown closure, size class, species combination, and tree density over contiguous geographic areas that were 5 acres in size or larger, except for conifer plantations and areas of non-forest land cover type, as defined below, which were identified and delineated over contiguous geographic areas that were 1 acre in size or larger.

Stand delineations were based on other physical and political features as follows:

1. Stands were divided by reservoir and controlled lake drainage basin boundaries;
2. Stands were divided by public roads;
3. Stands were not divided along town lines;
4. Stands were not divided along sub-basin boundaries.

The following attribute fields were created and populated for all delineated stands:

1. Stand ID: A unique, consecutive 5-digit number starting with the digit "2";
2. Basin: The name of the reservoir or controlled lake drainage basin in which each stand was located;
3. Acres: As calculated by ArcGIS;
4. Land Cover: See below;
5. Delineation Year: 2016 for all stands;
6. Staff: name or initials, or a number assigned to each staff member performing delineation.

Land cover types were assigned based on Anderson, J.R.; Hardy, E.; Roach, J.; Witmer, R. 1976. **A land use and land cover classification system for use with remote sensor data**. Professional Paper 964. Washington, DC: U.S. Department of the Interior, U.S. Geological Survey. 40 p. The following types were used:

1. Broadleaf forest
2. Coniferous forest
3. Mixed Coniferous/Broadleaf forest
4. Orchards
5. Forested wetland
6. Scrub-Shrub wetland*
7. Emergent wetland*
8. Transitional*
9. Herbaceous*
10. Cropland and pasture*
11. Transportation, Communication and Utilities*
12. Bare/Exposed rock*
13. Strip mines, Quarries and Gravel pits*
14. Reservoirs (and other artificial water surfaces)*
15. Lakes and ponds*
16. Rivers, canals and other waterways*
17. Other urban or built-up land*

*Indicates a non-forest land cover type

A total of 1,901 stands were delineated in the 2016 project. The breakdown by reservoir basin is summarized in Table 3.

Table 3. Summary of forest stands delineated in 2016 for lands acquired between 2009 and December 31, 2015

Basin	Number of Forest Stands	Acres
East of Hudson		
Amawalk	1	6
Boyd Corners	9	80
Kensico	3	7
Middle Branch	7	120
New Croton	1	12
West Branch	14	81
EOH Subtotal	**35**	**300**
West of Hudson		
Ashokan	114	2,074
Cannonsville	560	8,549
Neversink	11	176
Pepacton	490	8,161
Rondout	88	1,060
Schoharie	603	7,712
WOH Subtotal	**1,866**	**27,733**
Grand Total	**1,901**	**28,033**

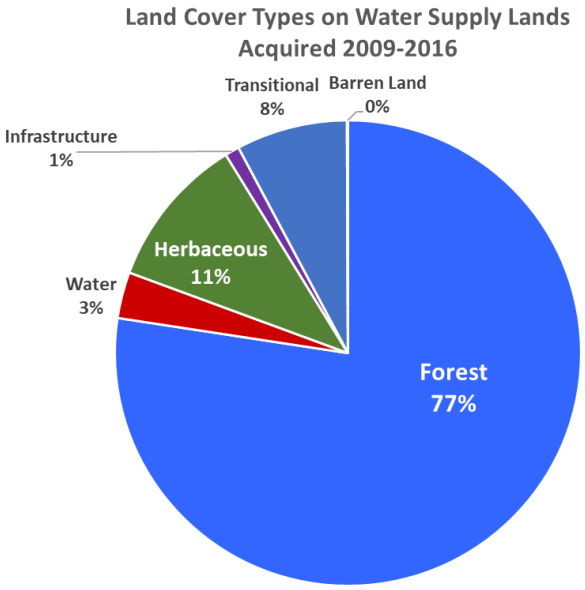
Stand delineation was accomplished through orthoimagery interpretation. Field verification of delineation was performed on approximately 10% of the delineated area to ensure the accuracy standard of 95% for delineation and land cover typing was met.

In 2017, using the same methods and field verification required of F&W Forestry Services in 2016, DEP Forestry staff delineated 106 new stands on all 1,607 acres acquired in calendar year 2016. Stands were further classified based on age class and species composition and recorded in the notes column of the ArcGIS tables. Non-forested acres that will move into an herbaceous or transitional cover type following the scheduled demolition of structures on the property were noted as such. The breakdown by reservoir basin for the 2017 project is summarized in Table 4.

Table 4. Summary of forest stands delineated in 2017 for lands acquired between January 1, 2016 and December 31, 2016

Basin	Number of Forest Stands	Acre
East of Hudson		
Kensico	3	6
EOH Subtotal	**3**	**6**
West of Hudson		
Ashokan	8	16
Cannonsville	32	665
Neversink	3	82
Pepacton	40	444
Rondout	4	98
Schoharie	16	297
WOH Subtotal	**103**	**1,602**
Grand Total	**106**	**1,608**

The forest stand delineation data for land acquired from fall 2009 through December 2016 was analyzed based on the land cover types. The breakdown of basins by land cover types are detailed in Table 5, and by forest cover types in Table 6.



Source: Forest Stand Delineation 2016 & 2017

Table 5. Land cover types for 2009-16 delineated forest stands on City water supply lands (acres and percent by basin)

	Forest		Herbaceous		Infrastructure		Transitional		Water		Barren Land		Grand Total
	acres	%	acres	%	acres	%	acres	%	acres	%	acres	%	acres
East of Hudson													
Boyd Corners/ West Branch	131	81	0	0	1	1	17	11	12	7	0	0	161
Croton System	121	88	0	0	0	0	11	8	5	4	0	0	137
Kensico	8	60	4	33	0	3	1	4	0	0	0	0	13
EOH Totals	**260**	**83**	**4**	**1**	**1**	**0**	**29**	**9**	**17**	**6**	**0**	**0**	**311**
West of Hudson													
Ashokan	1,935	93	27	1	2	0	47	2	70	3	0	0	2,081
Cannonsville	5,955	65	1,711	19	98	1	1,150	12	293	3	8	0	9,215
Neversink	243	94	13	5	0	0	0	0	2	1	0	0	258
Pepacton	6,793	79	807	9	43	1	756	9	203	2	4	0	8,606
Rondout	1,045	90	86	7	2	0	6	1	20	2	0	0	1,159
Schoharie	6,817	85	507	6	25	0	309	4	350	4	9	0	8,017
WOH Totals	**22,788**	**77**	**3,151**	**11**	**170**	**1**	**2,268**	**8**	**938**	**3**	**21**	**0**	**29,336**
Grand Total	23,048	77	3,155	11	171	1	2,297	8	955	3	21	0	29,647

Source: Forest Stand Delineation 2009-2016 (delineations conducted in 2016 & 2017)

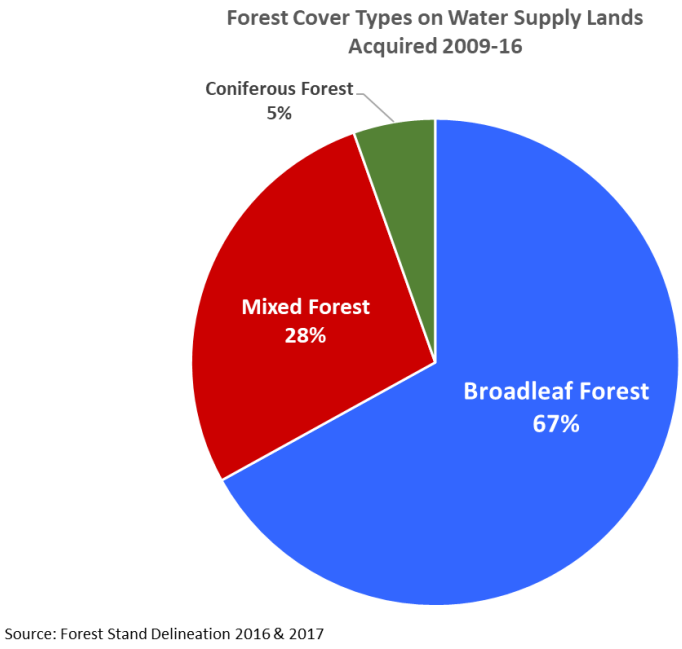


Table 6. Forest land cover types for 2009-16 delineated forest stands on City water supply (acres and percent by basin)

	Broadleaf forest		Mixed forest		Coniferous forest		Grand Total acres
	acres	%	acres	%	acres	%	
East of Hudson							
Boyd Corners/West Branch	118	90	13	10	0	0	131
Croton System	118	98	0	0	3	2	121
Kensico	8	100	0	0	0	0	8
EOH Totals	**244**	**94**	**13**	**5**	**3**	**1**	**260**
West of Hudson							
Ashokan	1,110	57	758	39	67	4	1,935
Cannonsville	5,168	87	583	10	204	3	5,955
Neversink	150	62	80	33	13	5	243
Pepacton	5,385	79	1,114	17	294	4	6,793
Rondout	611	59	377	36	57	5	1,045
Schoharie	2,766	41	3,440	50	611	9	6,817
WOH Totals	**15,190**	**67**	**6,352**	**28**	**1,246**	**5**	**22,788**
Grand Total	15,434	67	6,365	28	1,249	5	23,048

Source: Forest Stand Delineation 2009-2016 (delineations conducted in 2016 & 2017)

4. FOREST INVENTORY STATUS

The WFMP defines the desired forest conditions for the City-owned watershed forest lands. The desired forest conditions are the optimum forest condition for watershed forests and sustainable forests. Forest inventory provides the critical data for assessing the current forest conditions against the desired forest conditions. Forests are analyzed at the forest stand level that provides manageable land units. The 2016 and 2017 stand delineation projects described in section 2 provide the basis for the forest inventory.

The planning for a forest inventory project for lands acquired between fall 2009 and December 2016 was initiated in 2014 under DEP Contract CAT-467, *Watershed Forest Inventory and Analysis for NYC Water Supply Lands*. The inventory procedures and data collected will be similar to the forest inventory conducted in 2009-2010 by the US Forest Service, TEAMS Enterprise, for the 2011 WFMP. As of December 2017, the contract is in the process of award,

with contract registration expected in early 2018. Forest inventory field data collection is expected to occur during the 2018 field season.

The forest inventory will focus on stands identified as forests during the stand delineation projects. Stands with land cover of open lands such as herbaceous, infrastructure, etc. will not be inventoried.

The forest inventory will consist of approximately 3,000 nested forest inventory plots distributed at approximately 1 plot per 8 acres. The nested plot system includes 3 plots over the same inventory plot including (1) a forest stand level assessment on deer impacts, (2) a 1/100th acre plot for understory data, and (3) a 10 basal area factor (BAF) prism plot for overstory data, The parameter of the forest inventory will be the same as the 2009-10 forest inventory for data and analysis consistency. This will include overstory, sapling, seedling, and ground cover assessments. The key parameters will include tree species, diameter at breast height, crown class, health assessment, sapling and seedling counts, invasive plants and interfering plant assessments, and deer browse assessments. The analysis of the inventory data will determine the stand forest types, tree densities (both trees per acre and basal area), regeneration potential assessment, effective stand age overall deer impact assessments on the current and future forest.

The 2017 Filtration Avoidance Determination (FAD) directs forest inventories to be accomplished on a rolling basis in the future. Therefore, following the 2009-2016 inventory, DEP will be inventorying lands as they are acquired on an annual basis.

5. CONTINUOUS FOREST INVENTORY PROGRAM

Since 2002, the Forest Science Program unit of DEP's Ecological Research and Assessment section has been establishing and measuring permanent forest inventory plots across the New York City water supply lands to collect data for deepening our understanding of forest health, diversity and productivity and changes that occur over time. This data contributes to development of data summaries, formulae and models that:

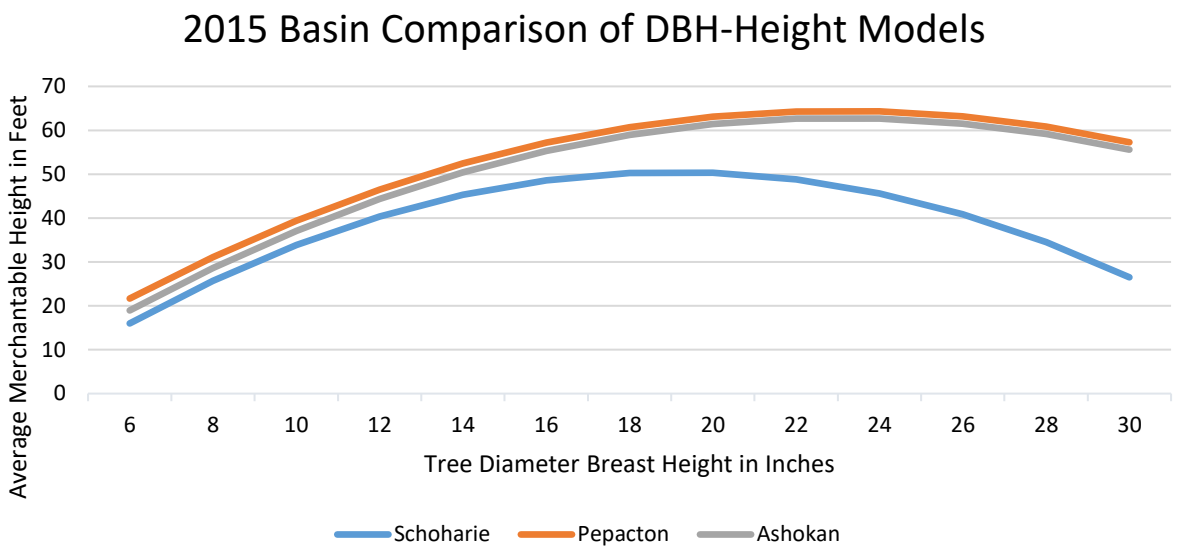
- Enable prediction of forest growth, mortality and recruitment of new seedlings into the forest over time
- Allow estimation of merchantable tree heights or timber volumes from diameter measurements
- Improve generation of acceptable construction project seed mixes and plant palettes that are based on regional vegetation patterns
- Increase understanding of forest-habitat relationships
- Verify whether applied silviculture techniques are contributing to achieving goals of increasing diversity in and among stands related to species, size classes, ages, etc.

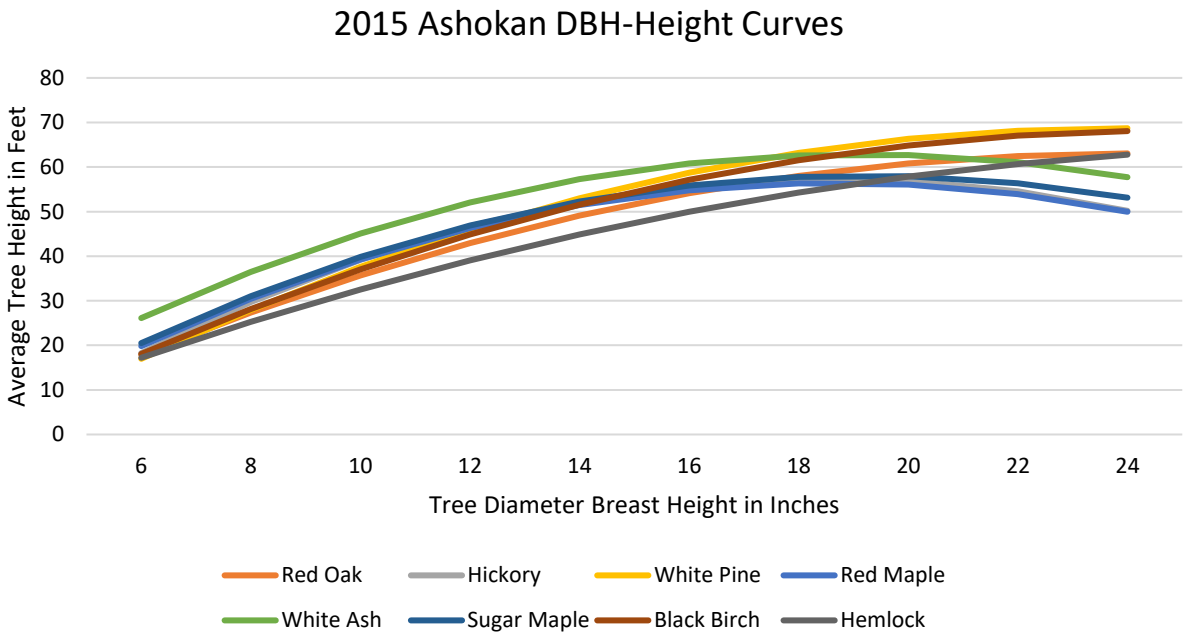
Such long-term ecological assessment studies are necessary to guide decisions that will ultimately lead to healthy, managed, resilient, diverse forests that best protect water quality.

Initially, permanent forest inventory plots were established in the immediate vicinity of reservoirs from 2002-2011. Most plots were established on a half-mile grid across the watershed, with each circular 1/5th acre plot representing 160 acres. Observations and measurements are taken of all plant life on the plots along with physical characteristics, wildlife habitat features, streams/wetlands, and so on. Information gathered is rich with specific tree measurements taken at a precision that will allow observation of changes over time. Beginning in 2012, the process of re-measuring these plots was begun along with development of formulae to predict merchantable tree heights and board foot volumes from diameter breast height for each basin, both in total and by species (see example charts below, comparing formulae for 3 basins and various species at Ashokan). In 2015, DEP began the process of adding plots on lands acquired as part of DEP's Land Acquisition Program.

At present, over 325 permanent plots have been established watershed-wide, with all plot locations GPSed and each tree on every plot documented with numbered tags. Plot establishment on newly-acquired lands in the Schoharie, Pepacton and Cannonsville basins remain to be completed over the next few years. With two measurements at different points in time available on over 100 plots and varying ages available across the watershed, work will soon begin on developing growth, mortality and recruitment models. These models can be further developed into management models to forecast results of different applied strategies in the years to come.

The data provided by the CFI plots have been used to develop basin specific tree height curves, with tree height in relationship to diameter at breast height (DBH). Previously, DBH-height curves did not exist for the Catskill region. This will aide DEP's forest management planning efforts and should benefit the DEP water quality forest modeling efforts in the future by providing accurate ground-based data.





6. IMPLEMENTATION RESOURCES

Staffing

The WFMP included an Implementation section (Section 8, p. 112) which was further refined in February of 2012 in a separate memorandum. The strategy document considers the

recommendations outlined in the WFMP, staff and financial resources, agency and program priorities and on-the-ground realities (access, local ordinances, deer impacts, etc.). The primary goal of the Implementation Strategy is to focus management activities and prioritize the treatment of stands across the watershed and to provide additional detail on the types of projects that will be undertaken.

At the start of 2017, the Forest Management Program was comprised of a supervising forester and five regional foresters. Generally, foresters work within their assigned basins and plan projects accordingly. The foresters work under a detailed and comprehensive DEP internal review process utilizing the Forestry Interdisciplinary Technical Team defined by the Conservation Practices and manage the extensive permitting required by federal, State and local agencies for individual projects, while ensuring best management practices are employed to protect the water supply. Over the last ten years, the job tasks of these foresters have increased significantly in complexity as endangered species designations have expanded and regulatory compliance has taken significantly more time than in the early years of the program. Foresters also handle reviews of land use permits, conservation easement permissions, timber theft, invasive forest pests, and consulting with the Bureau of Water Supply (BWS) Operations on hazard tree assessments. These necessary tasks distract from keeping forest management projects on track and adding staff was proposed in 2016 to enable BWS to handle the growing needs pertaining to forest management and meet the implementation goals of the WFMP.

The staffing proposal was to establish one senior (supervisor) forester and at least one additional forester in each region with one program coordinator and an environmental planner. Prior to the recent addition of staff, DEP was staffed with an average of 1 forester/31,000 acres whereas the public water supply average is 1 forester /12-15,000 acres for forest management[1]. The goals and objectives of this staffing plan were to:

- increase output of forest management projects to meet the target metrics in the implementation plan
- develop a personnel succession structure for sustaining an ongoing forest management program
- add a stewardship contracting mechanism for treating forested areas where commercial harvesting is either impractical (much of EOH) and/or not economically feasible (low grade wood). Improvements such as deer fencing, access roads, invasives removal, vine control, etc. would be accomplished via a contract mechanism with a dedicated budget allocation

[1] Based on a telephone survey of nearby water utilities including Boston, Hartford, New Haven, and Providence.

- use revenue from timber sales to cover all or portion of site improvements and best management practices
- be better able and available to assist Operations tree crews, incorporate them into an overall effort, while keeping forest management goals on track
- develop and implement a community firewood program which will reflect further progress on implementation goals
- increase capacity to manage forest inventory data, provide GIS support, and handle safety and procurement needs within the work unit

In 2016, the Forestry section added one forester for the Delaware region and added six new forester positions in 2017 to increase staff resources for the long term. The hiring process has commenced, all positions were posted, and candidates have been selected. This will add one additional forester each for Ashokan/Schoharie and Rondout/Neversink and two foresters each for Delaware and EOH. One of the foresters EOH will be dedicated to managing a forest stewardship contract, which was awarded $500,000 each year for three years. An Environmental Planner, reporting to the Program Coordinator, is also in the process of being hired. See Appendix 2: Forest Management revised organization chart.

Notably, the four (4) foresters that have been with the program since 2001 were all promoted to supervisors.

7. UPDDATE ON FUTURE FOREST MANAGEMENT PLAN RECOMMENDATIONS (WFMP, Section 11)

WFMP, Section 11, functioned as a placeholder for known issues and directions that would be important to consider as the program developed. Since advances have been made in just about each of the recommendation areas, the following is an update for each in this updated WFMP.

Land Acquisition Policy (refer to WFMP, section 11.1.1, p. 117)
The Land Acquisition Policy was unchanged.

An assessment protocol for forest condition and forestry best management practices (BMPs) was developed through a collaborative approach between BWS Forestry and Land Acquisition. This protocol is being utilized to assess harvesting closures prior to real estate closing on new acquisitions, improving the forest condition that DEP is acquiring.

Implementation Schedule (WFMP, section 11.1.2, p. 117)
The Forestry Program developed an Implementation Strategy to direct the implementation of the WFMP. The Implementation Strategy further assessed key forest data parameters to identify the most critical forest stands for management activities. The Implementation Strategy is included in Appendix 3.

The Forestry Program also uses an annual work plan to list desired activities and tasks for each calendar year. This includes timber projects to be initiated, planned, harvested and closed out. The annual work plan items follow a 5-year plan created by each supervising forester that is based on prioritization by stand and emerging reactive issues such as pest infestations, storm damage or other opportunities.

Stand-level Inventories (WFMP, section 11.2.1, p. 117)
No update.

Stand Delineation Revision (WFMP, section 11.2.1.1, p. 117)
Refer to Section 3, Stand Delineation.

Non-forested Lands (WFMP, section 11.2.1.1.1, p. 118)
No update.

Activities and Accomplishment Tracking (WFMP, section 11.2.1.1.2, p. 118)
The DEP Forestry Program continues to rely on the Watershed Land Information System (WaLIS) to document all projects. In addition, since 2012, the Program also tracks all project accomplishments in a metrics system, assessing accomplishments against goals established in the WFMP and the Implementation Strategy.

Invasive Species Inventories (WFMP, section 11.2.1.2, p. 118)
In December 2016, DEP produced an Invasive Species Strategy that outlines strategic activities to protect the water supply from the negative impacts of invasive species. The Strategy's goals are 1) Prevention; 2) Detection of new infestations; 3) Control and Management; 4) Mitigation; and 5) Restoration. The Strategy specifically addresses forest management projects as follows:

> "As part of the process outlined in the DEP Forest Conservation Practices, an assessment of potential impacts from invasive species on the success of forest regeneration and the potential for spread outside the project area is done for each forest management project. Control work is undertaken prior to the start of many forest management projects to minimize both of these potential outcomes once the canopy is opened, increasing light levels and soil disturbance.

> Some of the species that have been controlled to prevent negative impacts from forest management projects include multiflora rose, Japanese barberry, Japanese knotweed, common buckthorn, and Oriental bittersweet. Species controlled to improve success of reforestation projects include Japanese angelica tree (*Aralia elata*), mile-a-minute vine, and porcelain berry. Control work on these projects often includes a variety of strategies including manual or mechanical control, chemical control and biological control."

In addition, certain forest invasive species have taken hold or expanded in the watershed and have begun to affect the forest resources on City lands. These are, most notably, the Emerald Ash Borer (EAB) has taken hold and the Hemlock Woolly Adelgid (HWA) continues to expand. DEP has altered its project priorities, especially in the Ashokan basin, to accelerate the harvest of ash trees as the infestation overtakes ash stands. DEP has worked closely with the NYS Department of Environmental Protection and the U.S. Forest Service, Forest Health Unit, in the monitoring of EAB within the watershed and has coordinated response protocols in conjunction with both agencies.

In regards to eastern hemlock, DEP has partnered with NYS, Cornell University and the regional PRISMs to pursue biological control of HWA. DEP has worked with the partners in the release of approved HWA biological controls on City lands.

As noted in the section on Conservation Practices, DEP added new provisions for housekeeping practices to try to prevent the introduction of invasives to DEP lands.

Deer Impact Assessments (WFMP, section 11.2.1.3, p. 118)
BWS's City Lands Stewardship (CLS) unit has been implementing a deer management program following a 2005 Deer Impact Management Strategy (DIMS) and the WFMP. CLS is currently developing a contract for deer management services, which will include additional deer impact assessments and the development of a deer management plan.

BWS's Ecological Research & Assessment group in conjunction with the Forestry Program, has also been assessing deer impacts in a partnership with The Nature Conservancy. The study is to determine the relative influence of deer herbivory, invasive plants, and forest canopy cover on the abundance and composition of forest regeneration. This is currently being conducted on two (2) sites in the Ashokan Basin (Sand Hill and Plank Road).

Stream Mapping (WFMP, section 11.2.2, p. 118)
A primary GIS accomplishment in 2013 was implementing watershed-wide data upgrades to the central GIS library for hydrography, reservoir basin boundaries, and topography. Derived from both 1-meter Light Detection and Ranging (LiDAR) and 1-foot orthoimagery, these datasets show significantly more features at a much higher resolution than previous GIS products. This marks the first time DEP has updated hydrography data since the start of the upstate GIS system in the early 1990s. Before this update, the best available hydrography information was 1:24,000 scale United States Geological Survey (USGS) "blue line" data, mainly derived from 1940-1970 aerial photos.

As part of the data implementation process, the GIS Program coordinated activities between the Federal Emergency Management Agency (FEMA), New York State Department of Transportation (NYSDOT), and DEP Operations surveyors to verify that FEMA specifications for source LiDAR accuracy were met, thus ensuring data could be used in subsequent floodplain mapping initiatives. DEP staff performed extensive quality-assurance field checks of the new watershed boundary, and ensured sufficient accuracy for regulatory application. All hydrography-related data dependencies were then updated in GIS and the Watershed Land Information System (WaLIS). Finally, staff created all sub-basin GIS delineations in-house using LiDAR-derived catchments.

Some noteworthy changes in watershed statistics due to the newly mapped features are a 17.8% increase in delineated stream miles (581 miles) for the Catskill/Delaware (Cat/Del) watershed, and a 9.3% increase (74 miles) for the Croton watershed. There is a 51.6% increase in the acreage of non-reservoir lakes and ponds for the Cat/Del watershed and a 14.9% increase for the Croton watershed. While there was no significant change in the overall size of the NYC watershed due to more accurate mapping of the drainage, some individual basins gained significant acreage at the expense of, or lost significant acreage to, their neighboring basins.

These improvements in water feature mapping, especially stream mapping, will greatly improve long-term forest management planning and management of forest management projects.

Wetland Mapping (WFMP, section 11.2.3, p. 118)
Advances in remote sensing technology have provided DEP with watershed-wide high-resolution orthophotography and Light Detection and Ranging (LiDAR)-derived topographic data. These data have significantly increased the accuracy and completeness of hydrographic and landuse/landcover datasets in the watershed. In 2015, DEP completed a pilot study to determine if incorporating these data into advanced automated mapping protocols could similarly improve wetland mapping.

An Object Based Image Analysis (OBIA) mapping protocol that incorporated a LiDAR-derived topographic index and orthophotography among other data was developed for the watershed. The

draft model output was manually edited following federal mapping standards to produce a National Wetlands Inventory (NWI)-compliant product in 15 2,000-acre pilot areas, including eight WOH and seven EOH.

This protocol improved the completeness of wetlands mapping as compared to 2005 NWI, more than doubling the extent of vegetated wetlands mapped in the WOH pilot areas, and increasing those mapped in EOH pilot areas by 74%. Forested wetlands WOH had the largest increase, with a 220% increase in mapped area. Many forested wetlands lack hydrologic signatures on aerial photography and were therefore missed through traditional visual interpretation methods of the NWI. Wetland mapping using the pilot protocol was also more accurate than the 2005 NWI. Feature accuracy improved from 78% for the NWI to 87.5% for the LiDAR product in WOH pilot areas, and from 77% to 93% in the EOH pilot areas.

Given the success of this study, DEP has committed to producing updated wetland mapping for the entire watershed according to protocols developed in the pilot. A more accurate and complete wetland spatial database will increase the efficiency of the Forest Management Program, enabling the identification of site limiting features for project site selection and improving planning schedules for projects with significant wetland areas that will require detailed delineations or special management practices. While all wetlands will continue to be marked as exclusion zones prior to operations, some wetland areas, if already accurately portrayed in spatial database, may only require minor corrections to their boundaries as opposed to full field delineations for project maps.

APPENDIX 1

CONSERVATION PRACTICES – REVISED

INTERNAL GUIDANCE DOCUMENT

Conservation Practices and Process for DEP Forest Management Projects

January 20, 2015

Environmental Protection

Table of Contents

LIST OF ACRONYMS

ACOE	Army Corps of Engineers
BEPA	DEP Bureau of Environmental Planning and Analysis
BMPs	Best Management Practices
BWS	DEP Bureau of Water Supply
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CLS	City Land Stewardship
CRW	Critical Resource Water
DEC	New York State Department of Environmental Conservation
DEP	New York City Department of Environmental Protection
EHS	Environmental Health and Safety
ECL	New York State Environmental Conservation Law
ERA	Ecological Research and Assessment Group
EZ	Exclusion Zone
FITT	Forestry Interdisciplinary Technical Team
GIS	Geographic Information System
GPS	Global Positioning System
IPaC	USFWS Information, Planning, and Conservation System
MSDS	Material Safety Data Sheets
NRCS	National Resource Conservation Service
NRD	Natural Resources Division
NWP	Nationwide Permit
NYCRR	Codes, Rules and Regulations of the State of New York
NHP	New York Natural Heritage Program
REP	Division of Regulatory and Engineering Programs
SEQRA	State Environmental Quality Review Act
SHPO	State Historic Preservation Office
SMZ	Special Management Zone
SOP	Standard Operating Procedure

SWP	Safe Work Plan
WaLIS	Watershed Lands Information System
WLCP	Division of Watershed Lands and Community Planning
WQ	Directorate of Water Quality
WWQO	Division of Watershed Water Quality Operations
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

1. INTRODUCTION

The New York City Department of Environmental Protection (DEP), along with many other water suppliers, has recognized that forest cover is the best land use for large-scale watershed protection. Since maintaining forest cover has significant, demonstrated benefits for water quality protection, typically at reduced expenditure when compared to more conventional options like filtration, many major public water supply managers, including DEP, have committed to acquiring and managing forested land within their watersheds to aid in the production of high-quality drinking water.

Forests contain natural resources in addition to trees that are important not only for potential water quality protection, but also for their own intrinsic value. Some examples include wetlands, vernal pools, springs, riparian areas, and threatened and endangered species. This document contains a framework for conducting forest management projects while managing and/or protecting these co-existing resources.

2. PROCESS

2.1 Introduction

- The process of developing individual DEP forest management projects and when and how other DEP staff are involved is critical to the highest level of protection for the water supply and the watershed.
- This document outlines the internal process for developing a Forest Management Project including coordination with other DEP groups, compliance with regulatory requirements and protection of other natural resources. The project review flowchart and associated time frames are included in Appendix A.

2.2 Forestry Interdisciplinary Technical Team

- The Forestry Interdisciplinary Technical Team (FITT) is modeled after the DEP SEQRA Tech Team and the Interdisciplinary Review teams that the USFS promotes. The FITT will review projects, participate in field assessments and provide a broad array of in-house technical expertise.
- The following groups will be invited to participate in the FITT:
    - Bureau of Water Supply: Forest Management, City Land Stewardship (Ecological Research and Assessment Group, and Recreation Group), Stream Management Group, Wildlife Studies Section, Regulatory and Engineering Programs, and Operations.
    - Bureau of Environmental Planning and Analysis

2.3 Semi-Annual Forestry Meeting

- On a semi-annual basis Forest Management staff and other FITT members will meet to review ongoing and proposed projects. Other DEP staff will be invited as appropriate. These meetings will provide a brief summary and tentative schedule for each proposed project and a status update for active projects. These meetings will serve as a forum in which to resolve any issues with existing project implementation,

project review protocols, and conservation practices, and to provide an introduction to potential upcoming projects. Additional meetings will be arranged as necessary if project-specific issues arise.

2.4 Expedited Procedures

- If forest management is needed on an urgent basis, the process and conservation measures detailed in this document will be followed to the maximum extent possible. Forest management situations that warrant expedited procedures include but are not limited to: responses to forest pest infestations, storm damage events (i.e. blowdowns, tornados, ice storms, etc.) that may threaten public health and safety, or instances where failure to expedite silvicultural treatment could lead to negative water quality impacts. The Project Forester will notify all FITT members by email that a project will require expedited procedures, explaining the need for expedited procedures. All FITT members will expedite reviews and field participation for these cases. Review time frames will be proposed on a case-by-case basis by the Project Forester, depending on the type and severity of the situation. The determination of whether a particular project warrants expedited procedures shall be made by the Assistant Commissioner of Watershed Protection Programs.

2.5 Project Phases

2.5.1 Initiation Phase

The Initiation Phase is the first project phase of a forest management project. During the Initiation Phase, the Project Forester will select the site, develop a Conceptual Project Plan and Maps, and hold a field meeting(s) with the FITT to get initial input on any concerns or fatal flaws with the proposed project. At the end of the Initiation Phase the Project Forester will recommend whether to pursue, modify, postpone or abandon the proposed project. Details of the Initiation Phase include:

- Site Selection: Project site selection will be governed by the priorities set forth in the Forest Management Plan. Once a site has been selected, the Project Forester will develop a Conceptual Project Plan, Concept and Vicinity Maps.
- Conceptual Project Plan: The Conceptual Project Plan will include a brief description of the proposed project, a statement of purpose, and the Concept and Vicinity Maps.
- Concept and Vicinity Maps: Concept and Vicinity Maps will be based on available GIS data. Information to be included in the Concept and Vicinity Maps can be found in Appendix C. Ideally, Conceptual Project Plans and initial Maps will be provided to the FITT during or immediately prior to the semi-annual meeting.
- Wetland determinations may be conducted prior to the field FITT meeting, where feasible, particularly for large project areas (ie. >75 acres) as the extent of wetlands may significantly influence the scope of the project, are required for determining special management zones (SMZs), skid trail locations, landing location(s), and the need for bog turtle habitat evaluations.
- Field Visits: One or more field visits will be conducted during the initiation phase. At least one field visit will be conducted with all available members of the FITT. The

Project Forester will provide a written summary of identified issues or concerns following the field visit(s). FITT members will submit comments to the Project Forester within 2 weeks of the field visit so that concerns can be addressed early in the project planning phase.

Health and Safety Issues: When scheduling the site visit, the Project Forester shall alert potential participants to any site-specific safety concerns such as blow downs, or extreme conditions. The project forester will also advise if any special PPE is required or suggested. During the site visit, the health and safety of FITT participants is of primary importance and it is understood some areas may not be visited due to unsafe conditions such as known hazard tree.

- Site-specific Issues: Site-specific concerns for endangered, threatened species or species of special concern as well as natural, historic and archaeological sensitive areas will be identified through the internet or other resources. Project Forester will submit a request to the NY Natural Heritage Program and the State Historic Preservation Office for project review and referral to other groups within DEC as appropriate.
- The State classification of any stream on site will be identified. Any stream classified with the T (trout) or TS (trout spawning) modifiers will be highlighted in the project plan and special protections may be required to sustain those fisheries.
- At the end of the Initiation Phase the Project Forester will recommend whether to pursue, modify, postpone or abandon the proposed project. This recommendation will consider factors such as the priority of the silvicultural work as identified in the Forest Management Plan, site-specific concerns for other resources in the project area (e.g. wetlands, endangered species or historic resources) and impacts on operational needs. The Chief of the Natural Resources Division will review all recommendations and make a final decision.

2.5.2 Planning Phase

The Planning Phase is the second project phase of a forest management project. During the Planning Phase, the Project Forester will work with the FITT to develop the Draft Project Plan and the Draft Project Map, incorporating FITT comments, and will be distributed to the FITT for final review and acceptance. Following final review, the forester will submit the project to BEPA for SEQRA/CEQR review. Federal, state, or local permitting processes will be initiated as appropriate. Tree marking may occur during the latter stages of the Planning Phase. Details of the Planning Phase include:

- Draft Project Plan: The Draft Project Plan will be a refinement of the Conceptual Project Plan based on FITT feedback, field reconnaissance and project-specific details on applicable regulations and restrictions as well as any unusual potential impacts. It will also include detailed information on current and desired forest conditions, silvicultural prescription(s), information on project closure, road development and/or improvement, and project-specific notification contacts.
- Draft Project Map: The Draft Project Map will be a refinement of the Concept Map, and will include field-delineated features and site-specific information on soils, skid trails, landings, stormwater controls, SHPO sites, threatened or endangered species or

species of special concern, and any other details pertinent to execution of the project. Water features, such as wetlands, within 100 feet of the project area boundaries will also be included to ensure all appropriate Special Management Zones are included. Information to be included in the Draft Project Map can be found in Appendix C.

- Project Closure Plan: A Project Closure Plan will be developed for each forest management project. Items in the Project Closure Plan will be included in the bid documents and will be clearly explained during the contractor orientation. At a minimum it will include the following:
    - Removal of all temporary structures, such as skidder bridges.
    - Restoration, to the extent practicable, of pre-existing drainage patterns.
    - Restoration of disturbed areas such as landings and skid trails including re-grading if deeply rutted (> 6 in. depth) and seeding and mulching as necessary to prevent erosion and/or the establishment of invasive plants.
    - Restoration of any forest road or skid trail that had to be relocated because of interception of groundwater or seeps. The abandoned section will be re-graded, seeded and mulched as necessary to prevent erosion.
    - Restoration of any wetland impacts, including re-grading as necessary and re-vegetation with appropriate native, non-invasive wetland species if required.
- Internal Review: The Draft Project Plan and Draft Project Map will be reviewed by the FITT. FITT members will submit written comments to the Project Forester and the Draft Project Plan and/or Map will be updated as appropriate. The FITT members will adhere to target timeframes for review (see Appendix B). Additional field visits will be scheduled and additional drafts of the Plan and Map will be circulated as necessary. The Project Forester will prepare a single, unified response to comments and circulate this to the FITT.

  FITT members will provide acceptance, for their respective areas of expertise, in writing, by email or memo to the Project Forester. This acceptance will be submitted to BEPA by the Project Forester with the project plan.
- Tree Marking: Tree marking will be initiated once the FITT members provide provisional approval of the Draft Project Plan. If sections of the Draft Project Plan are approved but there are some outstanding issues preventing sign-off, then tree marking may commence in areas where agreement has been reached. Final approval will be provided in writing once the FITT has had the opportunity to review the tree marking.
- SEQRA/CEQR: BEPA will issue a determination that the Project meets the requirements to be covered under the general environmental review for the Forest Management Plan or that it requires an individual review.
- Permitting: The Project Forester will commence any necessary permitting procedures or document that none are required.

2.5.3 Implementation Phase

The Implementation Phase is the third project phase of a forest management project. During the Implementation Phase, the Project Forester will finalize the Project Plan and

Map, complete the SEQRA/CEQR process, secure all necessary permits, put the project out to bid, and oversee the selected contractor's compliance with all aspects of the Project Plan. The Project Forester will also implement any necessary Plan Modifications during the Implementation Phase with input from the FITT as required. Details of the Implementation Phase include:

- Final Project Plan and Map: The Final Project Plan and Map will be used as the basis for the bid documents. There will be further refinements of the Draft Project Plan and Map, updated with FITT comments and any additional field data, including GPS data, collected by the Project Forester or members of the FITT.
- Preparation for Project Commencement: The name of the selected contractor and the start date of the project will be provided to the FITT not less than 10 business days before project commencement. Prior to commencement of work, the Project Forester will confirm that key project features such as exclusion zones, landing areas, and road and skid trail layout are clearly marked in the field. This can involve a combination of tape, flagging, and/or different tree marks.
- Plan Modifications: Plan modifications may be advisable during project implementation and can be made in the following manner:
    - Minor modifications to the Project Plan can be approved onsite by the Project Forester. Minor modifications include but are not limited to: expansions of Special Management and/or Exclusion Zones and relocation of skid trails and haul roads that remain outside of Special Management Zones. Minor modifications should provide a positive or at least neutral benefit to water quality and the environment, and adhere to applicable conservation practices.
    - Major modifications to the Project Plan require a review by the FITT. Major modifications include but are not limited to: any work conducted outside of seasonal restrictions; any modification to a Special Management Zone other than an expansion; modification of treatment within a Special Management Zone; and relocation of landing area(s) or access road(s). Review of major plan modifications by the FITT will be completed in a timely manner, within 2 weeks, so as not to delay the project unnecessarily (Appendix A).

  The process for making plan modifications will be clearly explained in the bid documents and during the contractor orientation.
- DEP Inspections: The Project Forester is responsible for regular site inspections during the Implementation Phase. Three types of inspections will be utilized:
    - Comprehensive Inspections: Comprehensive Inspections will cover all aspects of the project including all active project areas, conservation practices, and contractual obligations.
    - Focused Inspections: Focused Inspections may include an assessment of conservation practices related to stormwater management, general inspection of condition of landing area, haul roads, and skid trails, compliance with contractual obligations, and any other items the Project Forester deems necessary to inspect (e.g. areas of concern). Focused Inspections will be conducted as soon as practicable following significant storm events, prior to

such storm events when feasible, and at any other time deemed necessary by the Project Forester.

- A Final Inspection will be conducted at least 1 week prior to the removal of equipment by the contractor. This inspection will include Regulatory Review staff and will assess the entire project site to determine if site stabilization measures in the Project Plan were correctly implemented, if any additional stabilization measures are necessary, and the efficacy of the BMPs utilized on the project.
- The Project Forester shall notify REP staff at least two weeks in advance of expected project closure to schedule the Final Inspection. The performance deposit shall not be released until the Final Inspection has been performed, all identified deficiencies have been addressed, and REP has provided sign-off to the Project Forester.
- In the event of significant snow cover or other issue that results in a delay in scheduling the Final Inspection, the Assistant Commissioner may approve the release of the performance deposit prior to the Final Inspection. In this instance, REP will conduct the Final Inspection as appropriate when weather and site conditions permit. NRD will address any identified deficiencies as soon as practicable either with the assistance of the Operations Division or via another suitable mechanism.

- Regulatory Review staff will be invited to inspect stormwater-related conservation practices as they are installed so that concerns can be addressed early.
- All inspections will be documented on Timber Harvest Inspection Forms (Appendix D). Inspections will occur at least once a week during active implementation, with a Comprehensive Inspection occurring at least once every two weeks. During times when implementation is temporarily suspended, the Project Forester will conduct Focused Inspections as necessary to ensure all BMPs remain in good working order, at minimum once per month.

2.5.4 Completion Phase

The Completion Phase is the fourth and final project phase of a forest management project. During the Completion Phase, the Project Closure Plan will be implemented and the Final Inspection will take place. Items requiring remedy per the Final Inspection will be addressed, and the FITT will be notified. Details of the Completion Phase include:

- The Project Forester will prepare an As-Built Project Map, showing any changes in the plan that occurred during implementation. The As-Built Project Map will be distributed to the FITT and kept in the project file.
- Final Inspection: The Final Inspection will be conducted as described above. Contractor will not be released until final stabilization is approved.
- An inspection of the project site may be conducted a year after completion to evaluate the effectiveness of the conservation practices. The FITT will be invited and the results discussed during the semi-annual forestry meetings.

2.6 Notification Plan

- Effective and timely communication both within DEP and with local stakeholders is critical to a successful Project. See Appendix D for Notification Guidelines. Draft Project Plans will include project-specific contacts.

2.7 Record Keeping

- Each project will be assigned a unique Project Identification Number by WaLIS. All records pertaining to forest management projects will be kept in a single project file referencing the Project Identification Number housed in the Project Forester's office. Records that lend themselves to electronic filing will be promptly added by the Project Forester to WaLIS.
- All records will be kept for 5 years, after which all paper records other than the Project Plan, the As-Built Project Map, the bid package, and any other information the Project Forester deems important to retain will be destroyed. These paper records and all electronic records will be maintained in perpetuity.

3. REGULATORY COMPLIANCE

DEP is committed to complying with all applicable regulations for forest management projects. Below is a summary of the expected regulatory requirements related to permitting that must be complied with by DEP as well as each DEP contractor. References to such compliance will be included in bid documents.

Other regulatory requirements, concerning waste management or worker safety, are covered separately in the bid documents according to Agency protocols for contractors.

3.1 Federal

3.1.1 ACOE 404 Wetland Permit

- May be required for forest management projects if the project causes any discharge of dredged or fill material into Waters of the United States. Examples of fill include side casting from forest road construction and placement of wood chips or gravel.
- Forest management projects will be designed to keep stormwater discharges, fill and roads away from any wetlands. If site conditions require a wetland crossing or potential discharge of material then the project will be sent to ACOE for a jurisdictional determination.

3.1.2 Exempt activities

- Incidental discharges due to normal silvicultural activities are exempt from 404 Wetland Permits. Practices covered by the exemption include planting, seeding, cultivating, minor drainage and harvesting.
    - Minor drainage does not include the conversion of wetlands to a non-wetland or the construction of any structure that drains or significantly modifies Waters of the United States.

- To qualify for the silvicultural exemption, activities must be part of an "established silviculture operation". Activities which bring an area into silviculture use are not part of an established operation.

- Construction or maintenance of forest roads (permanent roads, temporary roads and skid trails) where such roads are constructed and maintained in accordance with BMPs (33 CFR 323.4.a.6) to assure that flow and circulation patterns and chemical and biological characteristics of waters of the United States are not impaired.
- The forest roads must only be used for forestry activities even after the project is completed and no other silviculture activities occur at the site.
- Incidental discharges associated with silvicultural projects must have a permit if the activity converts a water of the United States to a use to which it was not previously subject, where the flow or circulation of waters of the United States may be impaired or the reach of such waters reduced.

3.1.3 Nationwide Permits (NWP)

- While much work proposed on forest roads would likely fall under the 404 forest road exemption, NWPs for other activities may apply. NWPs that may be relevant to forest management projects include but are not limited to:
  - NWP 3 Maintenance,
  - NWP 13 Bank Stabilization,
  - NWP 14 Linear Transportation Projects,
  - NWP 18 Minor Discharges,
  - NWP 33 Temporary Construction, Access, and Dewatering,
  - NWP 41 Reshaping Existing Drainage Ditches,
  - NWP 45 Repair of Uplands Damaged by Discrete Events, and
  - NWP 46 Discharge in Ditches.
- The text of the current NWPs should be consulted to determine covered activities, acreage limits, and pre-construction notification thresholds. Regional conditions established by the New York District of the ACOE must also be followed.
- As per the regional conditions of the New York District of the ACOE, Waters in the East of Hudson Watershed have been designated as Critical Resource Waters (CRWs). Some NWPs are unavailable in CRWs, thereby requiring an individual permit, while other NWPs may require a preconstruction notification.
- Waters in the West of Hudson Watersheds have not been designated as CRWs. NWPs, as conditioned by the NY District, may apply.

3.2 State

3.2.1 Stormwater SPDES Permit

- Stormwater SPDES permits are unlikely to be required for forest management projects as long as any forestry roads constructed are only used for forestry purposes in the future. Forestry is not listed under CFR 122.26(b)(14) and is therefore not subject to NPDES permitting.

3.2.2 Protection of Waters Permit (ECL Article 15)

- Applies to most activities impacting the bed or banks of streams classified C(T) or higher including stream crossings, culvert replacement and harvesting. http://www.dec.ny.gov/regs/2485.html
- Prohibits work in trout streams between October 1st and April 30th for DEC Region 3 and between October 1st and June 14th for DEC Region 4.
- Exemption: removal of fallen tree limbs or trunks where material can be cabled and pulled from the stream without disruption of the stream bed or banks, using equipment placed on or above the stream bank.

3.2.3 Freshwater Wetland Permit (ECL Article 24)

- Applies to State mapped wetlands and a 100 ft. adjacent area. Exempt activities include selective cutting of trees or constructing winter truck roads less than 5 meters in width.
    - "Selective cutting of trees," as defined by 6 NYCRR 663.2(aa), means "any cutting of trees within the boundaries of a freshwater wetland or its adjacent area that is not "clear-cutting".
- Non-exempt activities that require a permit include: clear-cutting; constructing roads that require moving earth or other aggregate or that alter water flow; filling, grading, and dredging.
    - "Filling," as defined by 6 NYCRR 663.2(o), means depositing any soil, stones, sand, gravel, mud, rubbish, or fill of any kind, including spoil resulting from dredging or draining activities. A permit is required for wetland crossings.
    - "Clear-cutting," as defined by 6 NYCRR 663.2(i), means "any cutting of trees over six inches DBH over any 10-year cutting cycle where the average residual basal area of trees over six inches in DBH remaining after such cutting is less than 30 square feet per acre, similarly measured. Provided, however, that where regeneration is assured by stand conditions such that after such cutting, the average residual basal area of trees at least one inch in DBH is at least 30 square feet per acre, measured within the area harvested, a clear cut will not be deemed to have taken place unless the average residual basal area of trees over six inches in DBH is less than 10 square feet of basal area, similarly measured."

3.2.4 Other

- No soil should be removed or imported during the course of a forest management project. If fill is needed it must meet the requirements of the Unrestricted Use Soil Cleanup Objectives (6 NYCRR 375-6.8) and specifications are available upon request. For the purposes of this subsection, fill includes soil and compost materials.

3.3 New York City Watershed Rules and Regulations

- Silvicultural activities have a general exemption from the Stormwater Pollution Prevention Plan requirements.
- Silvicultural activities are not exempt from the crossing, piping, and diversion permit (CPDP) approval although there are several conditions that must be met in order to trigger the need for a CPDP approval. A stream crossing:
    - Must not be permitted by any other regulatory agency.
    - Must involve an impervious component, such as a concrete abutment for a stream crossing or a culvert for a watercourse diversion. A wooden slatted bridge is not considered impervious.
    - Must be permanent in nature.

  Therefore, if a stream crossing requires a permit from some other agency like DEC, or is temporary, or is pervious – it does not require a CPDP.
- Piping or diversion of a watercourse must also include an impervious component, such as a culvert, in order to require a CPDP approval.

3.4 Local

- Municipalities may have ordinances and regulations that govern some aspects of forest management projects such as hours of operation, wetland ordinances and notification requirements. During development of the draft plan, the Project Forester will contact the municipality to discuss any specific requirements.

3.5 Environmental Review

- The Forest Management Plan will be evaluated under SEQRA/CEQR and individual forest management projects undertaken in conformance with the Forest Management Plan will be covered by that generic environmental review. The conservation practices and guidelines specified in this document will be incorporated into the Forest Management Plan and will form the basis for that environmental review.
- Some projects may require deviations from the guidelines due to site-specific conditions or the need for greater management in specific areas. In that case the FITT will work together to determine the minimum disturbance necessary to meet the management objective while protecting the other resources. Whenever changes from the conservation practices and guidelines are required for a project BEPA will assess whether the deviations require an individual review under SEQRA/CEQR.

4. CONSERVATION PRACTICES

4.1 Introduction

Protection of certain natural resources, such as reservoirs and wetlands, and the protection of human resources, such as recreational and historic resources, largely relies on setting up Exclusion Zones, where no treatment or disturbance will be permitted under normal circumstances, and Special Management Zones, where silvicultural treatments will be modified and equipment use will be minimized. These areas will be clearly marked on the Final Project Map as well as in the field and the restrictions clearly discussed in the Final Project Plan. These restrictions are guidance for DEP projects on City lands – not all are regulatory—and in some instances are more protective than regulatory controls. Where Special Management Zones overlap, or overlap with Exclusion Zones, the more restrictive zone will take precedence.

The following areas will be designated as Exclusion Zones:

- Reservoirs and Controlled Lakes: reservoirs/lakes to the spillway elevation;
- Streams: area between stream banks as measured from top of bank, on either side of channel;
- Wetlands: wetlands, lakes, vernal/woodland pools and a 50 ft. buffer around vernal and woodland pools
- Areas with extremely steep slopes (greater than 1:1).

The following areas will be designated as Special Management Zones:

- Reservoirs and Controlled Lakes: 150 ft. wide area from the reservoir or controlled lake edge as measured from the spillway elevation;
- Streams: 100 ft. wide area as measured from top of bank on either side of channel (area between the stream banks is an Exclusion Zone); and
- Wetlands: 100 ft. wide area around wetlands and lakes, and a 150 ft. wide area around vernal/woodland pools (first 50 ft. around a vernal/woodland pool is an Exclusion Zone).

Conservation practices and modifications for the Special Management Zones are discussed below. Unless otherwise noted, forest management projects conducted by DEP or its contractors will follow the *New York State Forestry Best Management Practices for Water Quality*.

4.2 Special Management Zone for Reservoirs

4.2.1 Conservation Practices

- No tops or slash will be left in reservoirs.
- Basal area reduction will be limited to 50% or less, with minimal disturbance to vegetation.
- Within 50’ of the reservoir edge:
    - Harvesting will occur only during dry or frozen conditions.

- Heavy equipment will be used in a manner that minimizes soil disturbance, compaction and rutting. Soil and ground conditions will be assessed during the FITT planning process to identify any areas where heavy equipment shall not be used. Trees in these areas will be removed by cable and winch.

- Snags and slash will be retained whenever possible to provide habitat value and ground cover.

4.3 Special Management Zones for Wetlands, Vernal/Woodland Pools

4.3.1 Guidelines

- Wetlands (including vernal/woodland pools) will either be delineated in the field by ERA or delineated by the Project Forester and confirmed by ERA. The wetland boundaries will be mapped using GPS after field confirmation.
- For small wetlands (less than 0.1 acre) created by previous disturbances and not regulated by the DEC, the special management zone may be made less restrictive at the discretion of the wetland scientist.
- The type of management zone for linear features that include streams with pockets of wetland vegetation will be based on the extent and connectivity of wetland vegetation at the discretion of the DEP wetland scientist.

4.3.2 Wetland and Non-Controlled Lakes Special Management Zones Conservation Practices

- At least 75% of pre-harvest basal area evenly distributed throughout the managed area will be maintained.
- Harvesting will occur only during dry or frozen conditions.
- Heavy equipment will be used in a manner that minimizes soil disturbance, compaction and rutting. Soil and ground conditions will be assessed during the FITT planning process to identify any areas where heavy equipment shall not be used. Trees in these areas will be removed by cable and winch.Tops and slash that accidentally fall into wetlands may remain as long as they do not cause hydrologic modification.
- Snags and slash will be retained whenever possible to provide habitat value and ground cover.

4.3.3 Vernal/Woodland Pool Special Management Zone Conservation Practices

- At least 75% of pre-harvest basal area evenly distributed throughout the managed area will be maintained. Tree selection will be designed to maintain a high level of crown cover.
- Trees or slash that accidentally lands in vernal/woodland pools shall not be removed during the amphibian breeding season (March 15 through June 30).
- Harvesting will occur only during dry or frozen conditions.

- Felled trees will be removed by cable and winch whenever possible. Heavy equipment will only be utilized when necessary.
- Snags and slash will be retained whenever possible to provide habitat value and ground cover.

4.4 Special Management Zone for Streams

4.4.1 Conservation Practices

- No tops or slash will be left in stream channels.
- Basal area reduction will be limited to 50% or less, with minimal disturbance to vegetation.
- Presence of trout or trout-spawning waters may require additional protections. These additional protections will take into account water temperatures, shade retention, season of activity and the need for more extensive sediment control.
- No work will take place within the bed or banks of streams except as necessary to install crossings approved in the Final Project Plan.

4.5 Stormwater Management

4.5.1 Guidelines

- Best management practices for stormwater control will consist of temporary and permanent measures to ensure that silvicultural activities do not adversely impact water quality during or after implementation. Existing water quality risks such as undersized culverts or unstable roads on City property will be identified and referred to the appropriate contact in Operations, and will be addressed prior to or during the project if practicable.
- Areas with slopes between 1:3 (20 degree slope) and 1:1 (45 degree slope) will be limited to the single-tree selection method or thinning only and in no case will remove more than 50% of the pre-project basal area.

4.5.2 Landing Area Best Management Practices

- Landings will be located on flat or gently sloping, well-drained soils greater than 250 ft. from adjacent dwellings, wetlands, vernal/woodland pools where feasible unless otherwise authorized by ERA and noted in the Project Plan. Where not possible, additional soil protection measures will be implemented as necessary.
- Existing landing sites are preferred over creation of new sites.
- Silt fence may be necessary downslope of landing areas to avoid sediment impacts. The need for silt fence will be determined based on adjacent slopes, soil types and distance to sensitive habitats (e.g. wetlands, trout streams).
- Spoil, stumps and any other material removed for landing construction will be located away from runoff paths.

4.5.3 Haul Road Best Management Practices

- Well drained, usable or repairable, existing roads are preferred over new roads. Roads in poor condition will be repaired prior to use.
- Total length of all roads will be the minimum necessary for the project. The design will minimize the amount of cut and fill.
- New roads will be located at least 250 feet from wetlands and vernal/woodland pools where feasible unless otherwise authorized by ERA and noted in the Project Plan. Where not possible, additional soil protection measures will be implemented as necessary.
- Silt fence may be necessary downslope of roads to avoid sediment impacts. The need for silt fence will be determined based on adjacent slopes, soil types and distance to sensitive habitats (e.g. wetlands, trout streams).
- Road grades of greater than 10% will be avoided. On soils defined as highly erodible by NRCS, road grades of greater than 5% will be avoided.
- Coarse stone will be located a minimum of 50 feet from intersections with public roads to reduce or eliminate the tracking of sediment onto public highways.
- Roads will be outfitted with water bars or broad-based dips as determined necessary during the Planning, Implementation or Completion Phases.
- In general, roads will be permanent forest features that will be stabilized, but not decommissioned. The roads will provide access for future silvicultural activity. In the event that DEP desires to decommission a road, ground cover will be reestablished as necessary by seeding with native seed and mulching, or the road will be stabilized by covering with wood chips or packing with brush/branches. Compacted soils will be loosened prior to seeding if necessary for vegetation establishment.

4.5.4 Skid Trail Best Management Practices

- Existing trails are preferred over new trails when possible as long as their use does not pose unacceptable ecological risk.
- Total length and density of skid trails will be kept to the minimum necessary to provide appropriate site access while minimizing impact to resources.
- Trails will cover less than 10% of total harvest unit area in hilly terrain and less than 5% of total area in flat terrain.
- Trails will be located to maximize distance from water bodies, minimize the number of water crossings and minimize trail slope.
- No new skid trails will be located in Special Management Zones. If operations in Special Management Zones create ruts deeper than 6 inches, equipment use will be suspended and the area will be restored to grade prior to project closure. Equipment will not be allowed back into the Special Management Zone.
- If repeated use of a trail results in the interception of seeps or channelized surface runoff, it may be necessary to relocate it and remediate.

- Water bars will be located on trails at appropriate locations throughout the harvest area. During the Completion Phase, trails will be stabilized as necessary by seeding with native seed and mulching, covering with wood chips, or packing with brush/branches.

4.5.5 Stream Crossings

- Stream crossings that disturb the stream bed (e.g. culverts) will be installed during low flow or dry conditions, preferably from May-September. DEC-permitted crossings will be installed according to the permit conditions.
- Stream crossings that do not disturb the stream bed (e.g. temporary bridges) will be installed during low-flow conditions whenever possible.
- Existing crossings are preferred over new crossings. Existing crossings that are contributing to water quality impairments will be remediated prior to use. All necessary reviews and permits will be completed prior to remediation.
- Temporary structures are preferred over permanent structures.
- Crossing structures will avoid direct impact to water or channel whenever possible (i.e. bridge or arch preferred to culvert).
- Stream crossings will be installed at right angles to banks, where banks are low and stable, and crossed in riffle areas whenever possible.
- Stream crossings will be designed to avoid obstructing flows up to and including bankfull flows to the extent practicable.
- Fords will only be used during low-water periods. Fords will be located where the stream bottom is made of bedrock or large stone. Average water depth in a ford location will be no more than 1 foot. Fords will not be used on protected or trout streams.
- Stream crossings may trigger additional regulatory requirements such as a Protection of Waters permit (Article 15 Permit).

4.5.6 Wetland Crossings

- Wetland crossings will be avoided to the extent possible. For unavoidable crossings:
    - Skidding will only occur during frozen or dry conditions. Crossing springs, seeps, and areas of water that do not freeze well will be avoided.
    - Crossings will be installed at the narrowest point possible.
    - Temporary crossings such as corduroy, mats, culverts, and skidder bridges will be used to minimize compaction and hydrologic modifications and to maintain hydrologic connectivity. Crossings will be removed and the impacted area returned to original grade and restored at project completion.
- Wetland crossings will trigger additional regulatory requirements such as wetland permits and an individual SEQRA review.

4.6 Protected Species

4.6.1 Guidelines

- During the Planning Phase, the likely presence of any endangered species, threatened species or species of special concern will be ascertained and species-specific measures will be taken to ensure the Project complies with all applicable regulations and is conducted in a manner that minimizes the potential for adverse impacts.
- The areas displayed in the New York State Environmental Resource Mapper show the vicinity around known locations for rare species. The New York State Natural Heritage Program (NHP) guidance says NHP should be contacted "If a project or action is within a location displayed in the rare plant or animal data layer, or close enough to a location that off-site effects are possible, and if the project or action requires a review under SEQRA."
- NHP guidance also states that all species, listed and unlisted by DEC, that appear on the data layer should be addressed in project planning and the environmental review. The NHP lists all rare plants and animals in the state and is more comprehensive than the DEC Protected Plant List and DEC list of Endangered, Threatened and Special Concerns Species. For the purposes of the environmental review for the forest management projects, species that will have to be addressed in the environmental review and project planning are those listed in the DEC Fish and Wildlife Endangered, Threatened and Special Concern Species (ECL § 11-0535; 6 NYCRR Part 182.5) and in the DEC Protected Native Plant List (ECL § 9-1503; 6 NYCRR 193.3). These lists are the official lists of regulated species and are inclusive of all federally listed species in the state through the use of the IPaC (USFWS Information, Planning, and Conservation System) or other sources.
- The Endangered Species Act requires federal agencies to consult with the USFWS if those agencies are permitting a project that may impact a federally listed species (e.g. ACOE issuing a permit for fill in a Water of the US). The USFWS will need to be consulted if a forest management project requires any federal permit (such as ACOE) and/or a federally listed species is located in the county in which the project is located. County lists of federally listed species can be found at www.fws.gov/northeast/nyfo/es/section7.htm

4.6.2 Investigative Procedure

During the Initiation Phase, consult with the NHP the Environmental Resource Mapper to see if the Project may impact a listed species. A positive result is when there are rare species (as defined in section 4.5.1 above) in the vicinity.

- Additional information can be gathered from local and regional experts/environmental organizations regarding the presence of rare or listed species that may not yet have been reported or included in the State or FWS databases.
- If a positive result is returned for a wildlife species, WWQO Wildlife Studies Section will be consulted regarding surveys and appropriate survey methodology. An appropriate and thorough survey of the project area will be done if recommended by

DEC, USFWS or the Wildlife Studies Section to see if the listed species exists in or near in the project area. DEC or the USFWS will be consulted for guidance.

- If the on-site survey finds listed wildlife species being in or near the project area, DEC Regional Office or USFWS will be contacted. The project will be redesigned as necessary based on DEC's, USFWS's and/or Wildlife Studies' recommendations to avoid impacting the species and/or its habitat. If impacts are unavoidable due to the critical need for a project, appropriate permits and/or mitigation will be incorporated into the Project Plan and accepted by DEC or USFWS.
- If a positive result is returned for a plant species, a determination whether appropriate habitat exists on site to support the listed species will be conducted. This determination may require an on-site survey of habitat. If, based on the survey, habitat for the listed plant species is found on-site, an intensive survey for that species will be conducted at the appropriate time of year.
- If the listed plant(s) are found on the project site, the project will be redesigned as necessary to avoid impacting the species. If impacts are unavoidable, mitigation measures, including but not limited to transplanting, will be incorporated into the Project Plan.
- The reviews conducted for protected species will follow any applicable regulatory process established by DEC or USFWS.

4.6.3 Animal Species Special Management Zones

- If a State or Federal listed animal species is found on site of the forest management project, DEC and/or USFWS will be contacted through WWQO's Wildlife Studies Section. Restrictions and guidelines set forth by DEC, USFWS or Wildlife Studies Section, as well as any permit conditions (if applicable), will be followed.

4.6.4 Plant Species Special Management Zones

- Habitat Only: Restrictions and alterations to forest management will be made on a case-by-case basis through consultation between the Forestry Program, ERA and BEPA.
- Occurrence of Listed Plant Species: Special Management Zones around listed plant species will be determined by ERA based on the species and type of plant material found. Practices to reduce or prevent impact will be determined on a case-by-case basis through consultation between the Forestry Program, ERA and BEPA.

4.7 Invasive Species Management

4.7.1 Guidelines

- The goals for managing invasive plants on a forest management project are to (1) minimize the competition of existing invasive plants with current and future forest regeneration, (2) reduce the spread of invasive plants, and (3) avoid the introduction of new invasive plants into the site.
- During the Planning Phase, the presence of invasive plant and/or animal species will be assessed in the field by the Invasive Species Program and/or the Project Forester as

needed current and potential impacts will be evaluated. and management needs will be identified.

4.7.2 Invasive Plant Control Strategies

- Pre-harvest and post-harvest invasive plant species management as identified in 4.6.1 will be conducted by the Invasive Species Program with assistance from the Project Forester,
- The pre-harvest treatment will be conducted (1) to reduce invasive plant populations and potential for spread by equipment (plants and seed), (2) to reduce invasive plant populations to control future seed production and spread prior to increasing light on the forest floor from the harvest, and (3) for control efficiency prior to slash and down woody debris being deposited on the site from the harvest.

4.7.3 Invasive Plant Best Management Practices

- The invasive plants located in the area around the landing pose the largest threat to the on-site movement of invasives since equipment and personnel regularly moves through this zone for the project. Control of invasives in this zone will be prioritized, as applicable.
- To the extent practical, use existing roads, skid trails, and landings to reduce soil disturbance which could promote invasive plant establishment.
- Avoid constructing new roads, skid trails and landings in concentrated areas of invasive plants, if possible, to minimize soil disturbance and limit the unintentional transport of invasives into non-infested areas.
- Sequence the project to harvest non-infested areas before infested areas to reduce the spread of invasive plants, if possible.
- Avoid spreading seeds and other propagules from infested to non-infested areas, and from other lands to City lands through equipment management. Prior to moving equipment onto and off of a project area, soil, debris and vegetation and seeds will be broom-swept and/or scraped off from exterior surfaces of equipment, to the extent possible, to minimize the transport of invasive materials.

4.8 Recreation Resources

- The WALIS database will be queried for existing public uses of the project area and any adjacent parcels. Public access to the project area will be temporarily restricted to protect public safety. Signs will be posted at all major points of access to the project area at least two weeks prior to commencement of the project to warn the public that silvicultural work is taking place and that the area is closed to recreation.
- Forest management projects will be suspended and project areas re-opened to recreation during NYS big game gun season in units open to hunting (http://www.dec.ny.gov/outdoor/10002.html) for contractor safety and to promote management of the deer herd to improve forest regeneration.
- If access to boat storage areas will be impacted or if boats will need to be temporarily relocated, boat owners will be notified directly. Boat owners will be given at least 30

days to move their boats, and will be given an estimated time when their boats may be returned. An alternate means of access will be provided to recreational boaters when necessary. Notification of impacts to boat storage areas will be provided to the local DEP Boating Office.

4.9 Historic and Archeological Resources

4.9.1 Guidelines

- Submit State Historic Preservation Office (SHPO) forms, brief project description and concept map to SHPO for review during the initiation phase for historic and archeological determination. Disturbance is considered if the removal or movement of the soil A horizon will occur.
- If SHPO returns a positive response, submit a detailed project narrative and project map(s) to SHPO for final determination. Coordination with SHPO will be required following a Phase 1 survey which may require further assessments and/or project revisions.
- The general information contained in the State and National Registers of Historic Places web page can provide an early indication of the presence or absence of listed historic properties in or near a project area. The likely need for an archeological survey of a project area can be guided by determining if the project is within a sensitive area on the Archeological Sensitivity Maps (available from the SHPO Archeological Sensitivity GIS database). (http://www.oprhp.state.ny.us/nr/main.asp)
- If, in the course of the Planning or Implementation Phases, a potentially historic or archeological resource is discovered, all effort will be made to avoid adverse impacts.

4.9.2 Cultural Special Management Zone

- If any culturally significant areas are identified by SHPO or DEP in the project area a Special Management Zone may be delineated to avoid or minimize disturbance.
- Foundations/cellar holes found within a project area will not be disturbed by equipment.
- Damage to stone walls will be minimized.
- Stone walls will be crossed through existing bar ways, openings, or disturbed areas whenever possible. If a bar way does not exist or if an existing bar way is in another EZ or SMZ (wetland, riparian, reservoir, etc.), cross the stone wall where the stone wall is most greatly damaged (collapsed, etc.).

4.10 Visual and Aesthetic Resources

4.10.1 Aesthetic Special Management Zone

- Public roads: Within 100 ft. of public highways, tree removal will be limited to 50% of the pre-project basal area and slash height will be limited to 4 ft. or less.
- Neighboring residences: Within portions of the project area visible to a neighboring residence, slash height will be limited to 4 ft. or less.

4.11 Traffic and Noise Resources

- Landings and skid trails will be located to maximize the distance to sensitive receptors to the maximum extent possible while still meeting resource protection requirements and silvicultural objectives.
- Hours of operation will be limited to 7am - 7pm, Monday to Saturday when working within 500ft. of a residence or other sensitive receptor, unless town ordinances further restrict operating hours.

5. CONTRACTOR GUIDELINES

5.1 Introduction

- Many of the conservation practices rely on proper implementation by the contractors conducting the work.

5.2 Safe Work Plan

A Safe Work Plan (SWP) is required for all projects and is reviewed by DEP EH&S staff. It is utilized for site specific tasks that are considered non-routine or hazardous. SWP would incorporate any Safe Entry Plans and Standard Operating Procedures (SOP) as well as reference any applicable facility specific documents such as an EAP. The plan must contain the following:

1. General Site Information
2. List of site contacts (i.e. project management information)
3. Detailed scope of work and work plan (or reference SOP to be used). Pertinent information to be included:
    a. Detailed description of task or operation to be performed
    b. General requirements not covered elsewhere in the SWP including task or operation specific training requirements.
    c. Materials and Equipment needed for task or operation
    d. Step by step procedure for task or operation.
4. Site specific hazard analysis of work (physical, biological, chemical and radiological)
5. Site specific work practices to address hazards (i.e. equipment and PPE, procedures, action levels/alarms, emergency procedures, engineering and administrative controls).
6. Site specific training needed, *if applicable.*
7. Environmental information (i.e. chemical and petroleum transport, storage and containment, waste management, permits, and *spill procedures*).
8. Emergency planning information (emergency contact numbers, what to do in case of a spill, hospital map, etc).
9. Applicable documents. Attach or list documents referenced in the SWP such as:
    a. Safe Entry Plan (SEP) for the site. *(Generally not applicable for these projects.)*
    b. Standard Operating Procedures for tasks to be performed
    c. MSDSs. *(i.e., gasoline, hydraulic oil, etc.)*
    d. DEP EHS Policy and Procedure documentation (attachments or procedures developed or to be used in accordance with DEP policy such as LOTO procedures, confined space evaluations and permit, hotwork permits, etc.). *If applicable*.

5.3 Contract Requirements

There are specific requirements for all contractors performing silvicultural treatments on City lands. Required contract language is provided in Appendix F. The topics covered include but are not limited to: hazardous materials, spills, safe work plan, emergency action plan, communication plan, training, identification of personnel, DEP inspections, and pollution prevention guidelines.

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GLOSSARY

Basal Area – The cross-sectional area of all trees in a stand as measured at breast height (4.5 feet from the ground) and expressed per unit of land area.

Clearcut – A forest treatment that removes virtually all vegetation in one entry, freeing up all growing space for the establishment of new plants.

Crown Cover – The ground area covered by the crowns of trees or woody vegetation as delimited by the vertical projection of crown perimeters and commonly expressed as a percent of total ground area.

Fill material – materials placed in waters of the United States where the material has the effect of 1) replacing any portion of a water of the United States with dry land or 2) changing the bottom elevation of any portion of a water of the United States (ACOE, 33 CFR 323)

Haul Road – A roadway used by on-road equipment (i.e. trucks) to haul materials to and from the project site that connects to a public road.

Landing Area – A cleared area in or near the forest to which logs are yarded or skidded for further processing, sorting, or transport.

Listed Animal Species – All animal species listed by DEC as Endangered, Threatened or Special Concern under ECL § 11- 0535

Listed Plant Species – All plant species listed in the DEC Protected Plant List under ECL § 9-1503

Native Seed – seed from species listed as native in the New York Flora Atlas

Project Forester – DEP staff with project manager responsibilities for a specific forest management project.

Protected Stream – a stream with a classification and standard of C(T) or higher.

Sensitive Receptor – A defined area where human activity may be adversely affected when noise levels exceed predefined thresholds of acceptability or when levels increase by predefined thresholds of change, used for noise analyses. Examples include, but are not limited to, residences, hotels, motels, health care facilities, nursing homes, schools, houses of worship, court houses, public meeting facilities, museums, libraries, parks, outdoor theaters, golf courses, zoos, campgrounds, beaches, etc.

Significant Storm Events – Significant storms are defined as greater than 2 inches of rainfall within a 24 hour period during the growing season or greater than 1 inch of rainfall during saturated or frozen conditions. Forecasts can be obtained from the National Weather Service website (http://www.nws.noaa.gov/).

Silviculture – The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Skid Trail – A temporary, nonstructural pathway over forest soil used to drag or carry felled trees or logs to the landing. Skid trails may be constructed or simply developed due to use depending on the terrain.

Snag – A standing dead tree from which the leaves and most of the branches have fallen.

Slash – The residue, e.g. treetops and branches, left on the ground after logging, or accumulating as a result of storm, fire, girdling or delimbing.

Spring – A permanent feature where water emerges from the ground and flows across the soil surface without defined bed and banks. The limits of the spring are demarked by the extent of surface water. For the purposes of DEP Forest Management Projects, springs will be treated as watercourses.

Stream – A visible path through which surface water travels on a regular basis, including an intermittent stream. A drainage ditch, swale or surface feature that contains water only during and immediately after a rainstorm or a snowmelt is not considered a stream for the purposes of DEP Forest Management Projects.

Stream bank – land area immediately adjacent to and which slopes toward the bed of a watercourse and which is necessary to maintain the integrity of the watercourse. A bank will not be considered to extend more than 50 feet horizontally from the mean high water line; with the following exception: Where a generally uniform slope of 45 degrees (100%) or greater adjoins the bed of a watercourse, the bank is extended to the crest of the slope or the first definable break in slope, either a natural or constructed (road, or railroad grade) feature lying generally parallel to the watercourse (DEC).

Trout stream – A trout stream means any stream with a DEC classification of AA, A, B and C with a trout waters (T) or suitable for trout spawning (TS) standard. Stream classifications can be found in the stream coverage (GIS library) and through the Environmental Mapper website. http://www.dec.ny.gov/regs/2485.html

Vernal Pool – Shallow, seasonally inundated wetlands that occur in depressions and receive water from precipitation, snowmelt, and other runoff. Vernal pools lack perennial inlets and outlets, are inundated in the spring and are typically dry during the summer months. They are normally free of fish and can provide important habitat for aquatic invertebrate species and for many terrestrial or semi-aquatic species such as frogs, salamanders, and turtles. Vernal pools located within forested landscapes are referred to as woodland pools.

Water Bars – A drainage structure used to manage stormwater on haul roads or skid trails. Water bars can be shallow (height ≈ 8 – 12 inches; width perpendicular to the road or trail surface ≈ 6 to 12 feet) or deep (height ≈ 24 – 30 inches; width ≈ 6 to 10 feet). Spacing of water bars depends on slope. Specifications from the USFS can be found at http://www.na.fs.fed.us/spfo/pubs/stewardship/accessroads/construction.htm.

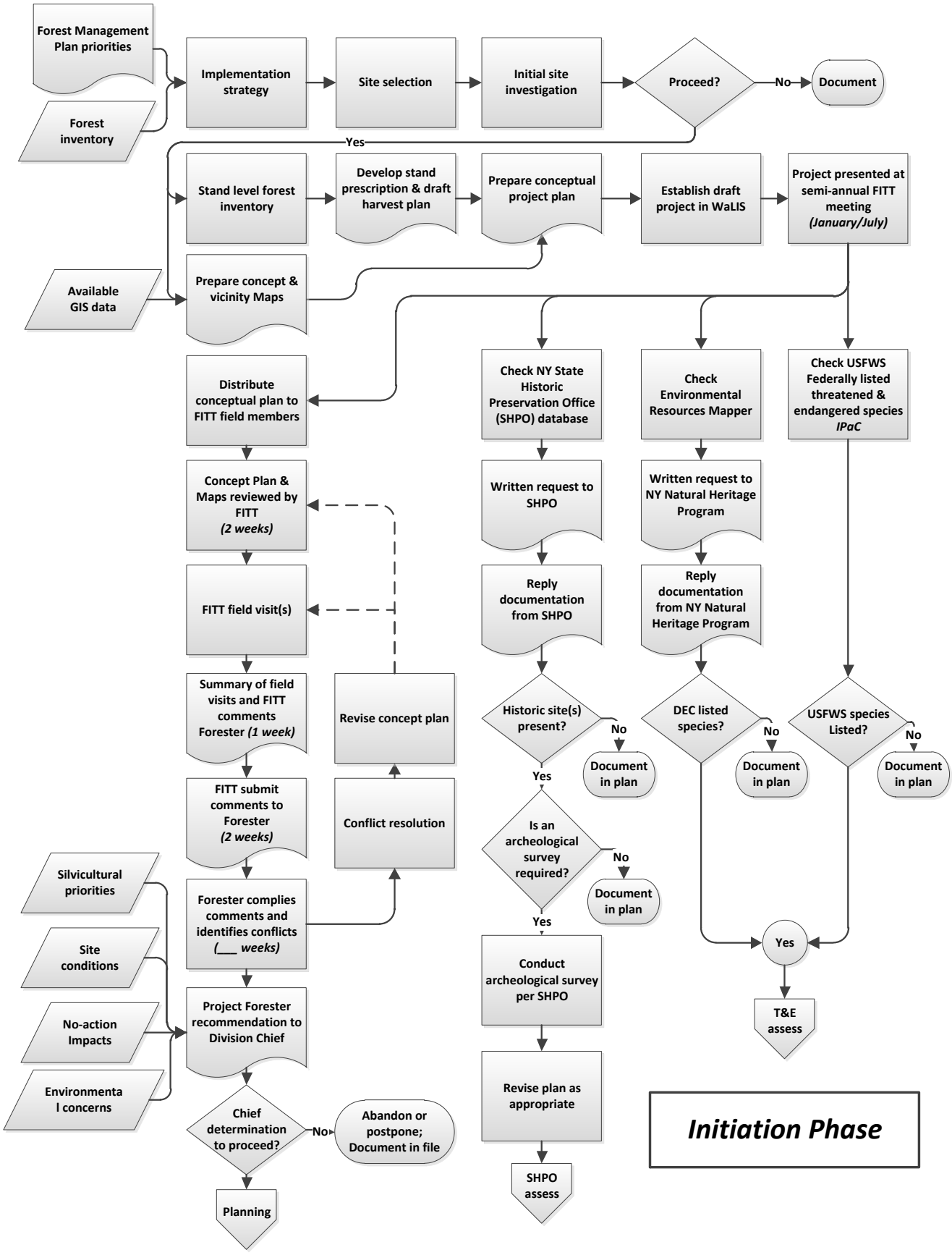
Wetlands – "Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year." (Cowardin et al. 1979). Common wetland types include forested wetlands such as red

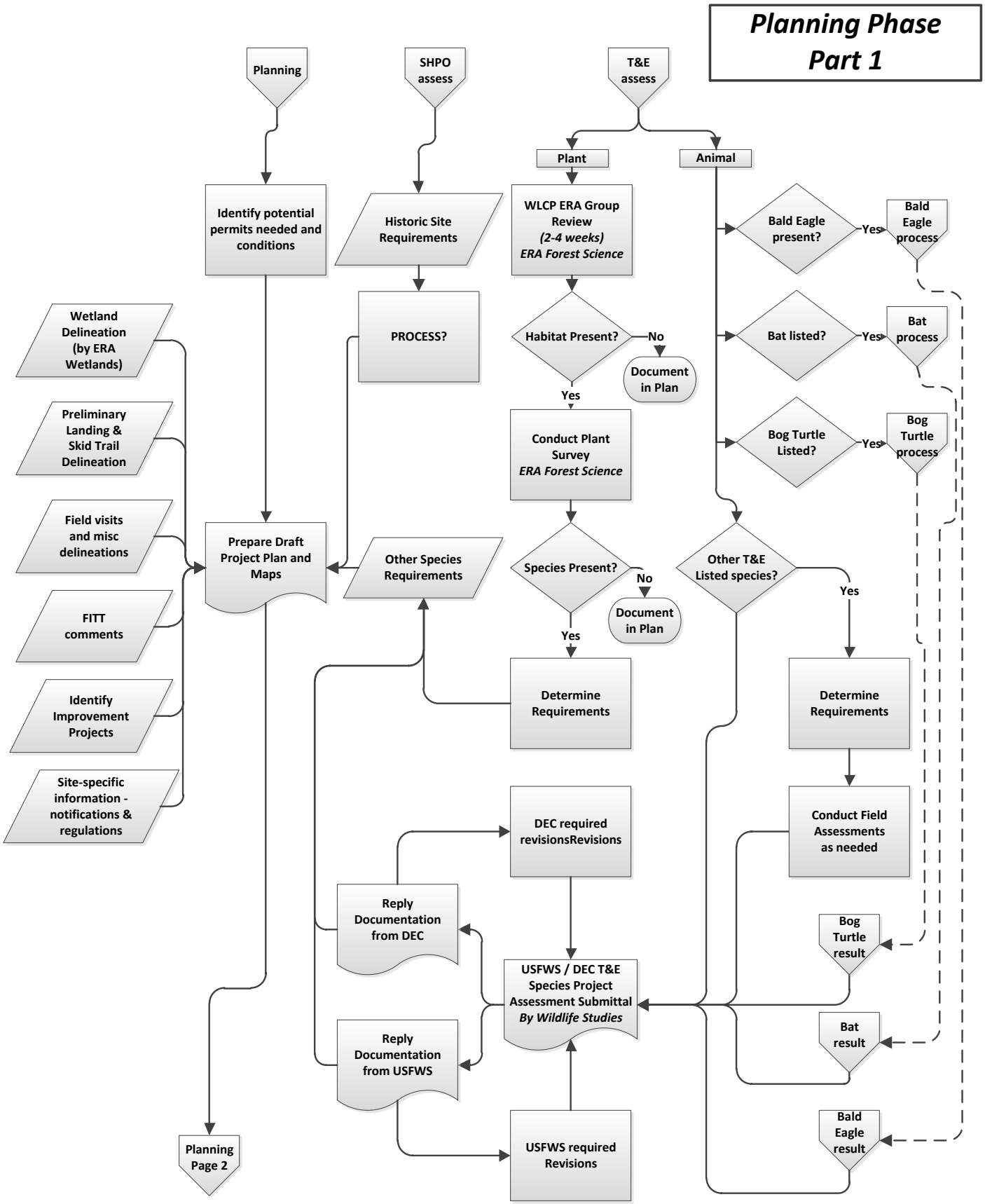
maple and hemlock swamps, scrub-shrub wetlands, emergent marshes, wet meadows, fens, bogs, seeps, vernal pools, and ponds.

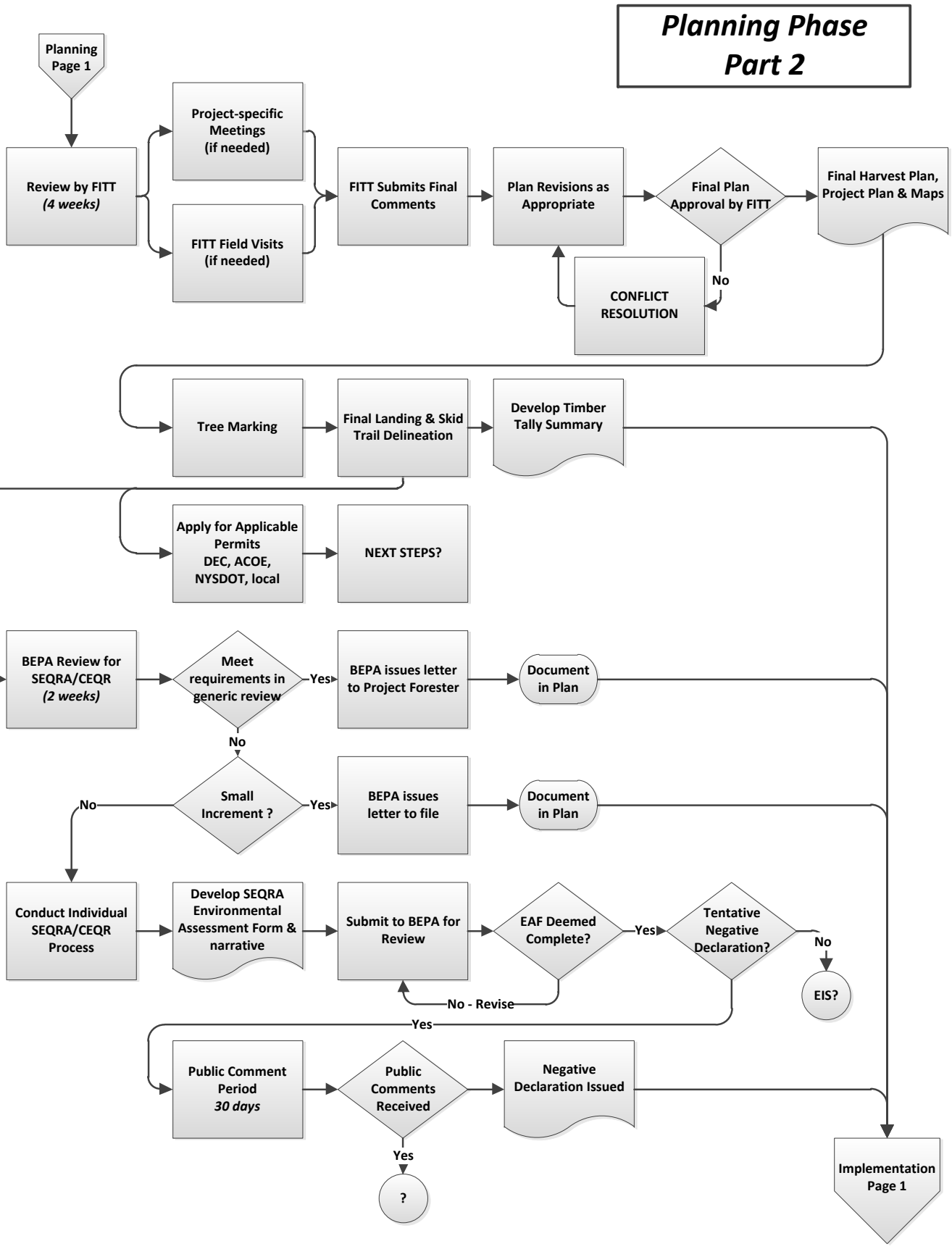
Woodland Pool – See “vernal pool.”

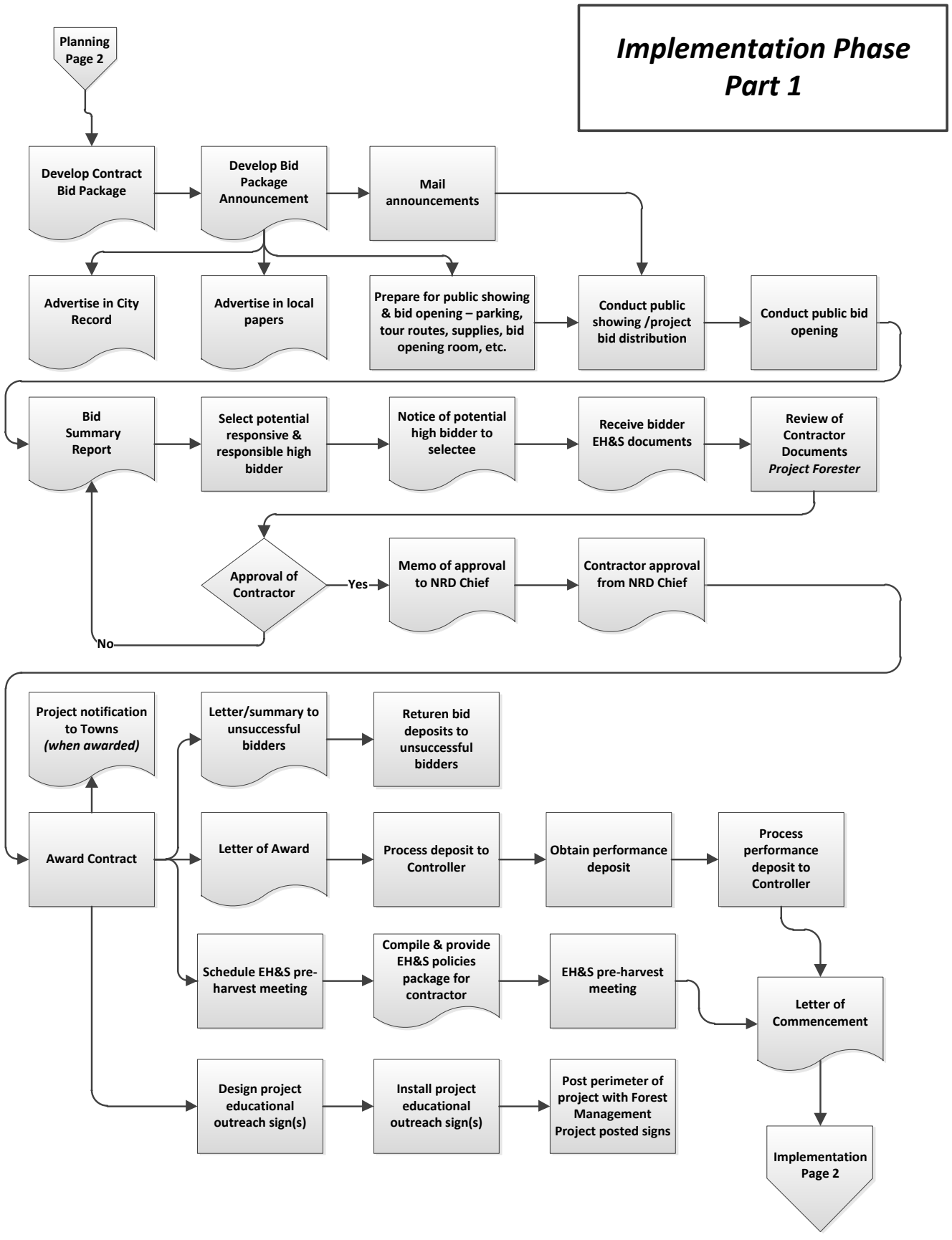
APPENDICES

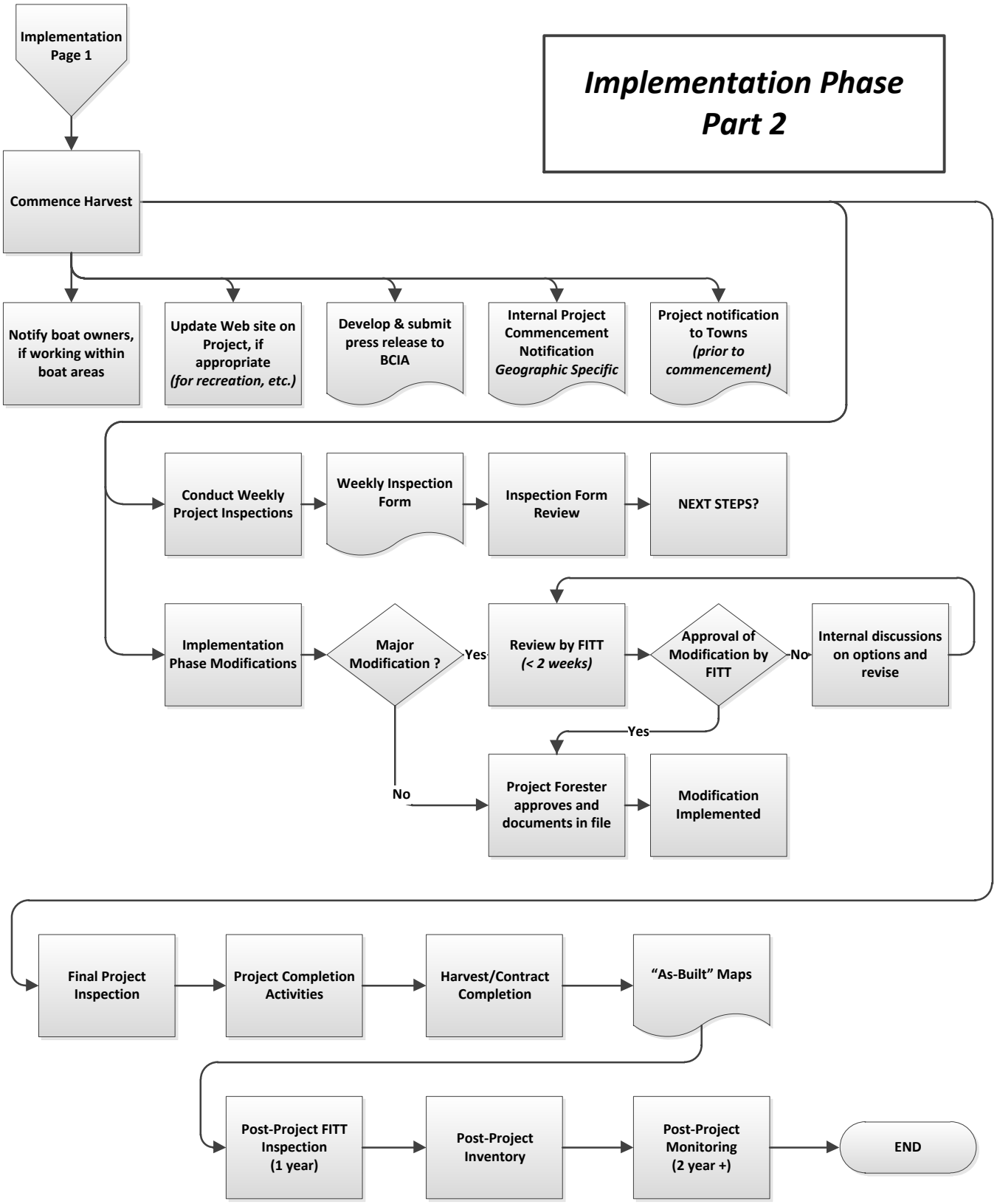
Appendix A: Project Review Flowchart


Forest Management Plan priorities
Forest inventory
Implementation strategy
Site selection
Initial site investigation
Proceed?
No
Document
Yes
Stand level forest inventory
Develop stand prescription & draft harvest plan
Prepare conceptual project plan
Establish draft project in WaLIS
Project presented at semi-annual FITT meeting (January/July)
Available GIS data
Prepare concept & vicinity Maps
Distribute conceptual plan to FITT field members
Check NY State Historic Preservation Office (SHPO) database
Check Environmental Resources Mapper
Check USFWS Federally listed threatened & endangered species IPaC
Concept Plan & Maps reviewed by FITT (2 weeks)
Written request to SHPO
Written request to NY Natural Heritage Program
FITT field visit(s)
Reply documentation from SHPO
Reply documentation from NY Natural Heritage Program
Summary of field visits and FITT comments Forester (1 week)
Revise concept plan
Historic site(s) present?
DEC listed species?
USFWS species Listed?
No
Document in plan
Yes
FITT submit comments to Forester (2 weeks)
Conflict resolution
Is an archeological survey required?
Silvicultural priorities
Site conditions
No-action Impacts
Environmental concerns
Forester complies comments and identifies conflicts (___ weeks)
Conduct archeological survey per SHPO
Project Forester recommendation to Division Chief
Revise plan as appropriate
Chief determination to proceed?
Abandon or postpone; Document in file
SHPO assess
Planning
T&E assess
Initiation Phase


Planning Phase Part 1
Planning
SHPO assess
T&E assess
Plant
Animal
Identify potential permits needed and conditions
Historic Site Requirements
WLCP ERA Group Review (2-4 weeks) ERA Forest Science
Bald Eagle present?
Yes
Bald Eagle process
Wetland Delineation (by ERA Wetlands)
PROCESS?
Habitat Present?
No
Document in Plan
Bat listed?
Yes
Bat process
Preliminary Landing & Skid Trail Delineation
Yes
Conduct Plant Survey ERA Forest Science
Bog Turtle Listed?
Yes
Bog Turtle process
Field visits and misc delineations
Prepare Draft Project Plan and Maps
Other Species Requirements
Species Present?
No
Document in Plan
Other T&E Listed species?
Yes
FITT comments
Yes
Determine Requirements
Determine Requirements
Identify Improvement Projects
DEC required revisionsRevisions
Conduct Field Assessments as needed
Site-specific information - notifications & regulations
Reply Documentation from DEC
Bog Turtle result
USFWS / DEC T&E Species Project Assessment Submittal By Wildlife Studies
Reply Documentation from USFWS
Bat result
Bald Eagle result
Planning Page 2
USFWS required Revisions


Planning Phase Part 2
Planning Page 1
Review by FITT (4 weeks)
Project-specific Meetings (if needed)
FITT Field Visits (if needed)
FITT Submits Final Comments
Plan Revisions as Appropriate
Final Plan Approval by FITT
Final Harvest Plan, Project Plan & Maps
No
CONFLICT RESOLUTION
Tree Marking
Final Landing & Skid Trail Delineation
Develop Timber Tally Summary
Apply for Applicable Permits DEC, ACOE, NYSDOT, local
NEXT STEPS?
BEPA Review for SEQRA/CEQR (2 weeks)
Meet requirements in generic review
Yes
BEPA issues letter to Project Forester
Document in Plan
No
Small Increment ?
No
Yes
BEPA issues letter to file
Document in Plan
Conduct Individual SEQRA/CEQR Process
Develop SEQRA Environmental Assessment Form & narrative
Submit to BEPA for Review
EAF Deemed Complete?
Yes
Tentative Negative Declaration?
No
EIS?
No - Revise
Yes
Public Comment Period 30 days
Public Comments Received
Negative Declaration Issued
Yes
?
Implementation Page 1


Implementation Phase Part 1
Planning Page 2
Develop Contract Bid Package
Develop Bid Package Announcement
Mail announcements
Advertise in City Record
Advertise in local papers
Prepare for public showing & bid opening – parking, tour routes, supplies, bid opening room, etc.
Conduct public showing /project bid distribution
Conduct public bid opening
Bid Summary Report
Select potential responsive & responsible high bidder
Notice of potential high bidder to selectee
Receive bidder EH&S documents
Review of Contractor Documents Project Forester
Approval of Contractor
Yes
No
Memo of approval to NRD Chief
Contractor approval from NRD Chief
Project notification to Towns (when awarded)
Letter/summary to unsuccessful bidders
Returen bid deposits to unsuccessful bidders
Award Contract
Letter of Award
Process deposit to Controller
Obtain performance deposit
Process performance deposit to Controller
Schedule EH&S pre-harvest meeting
Compile & provide EH&S policies package for contractor
EH&S pre-harvest meeting
Letter of Commencement
Design project educational outreach sign(s)
Install project educational outreach sign(s)
Post perimeter of project with Forest Management Project posted signs
Implementation Page 2


Implementation Page 1
Implementation Phase Part 2
Commence Harvest
Notify boat owners, if working within boat areas
Update Web site on Project, if appropriate (for recreation, etc.)
Develop & submit press release to BCIA
Internal Project Commencement Notification Geographic Specific
Project notification to Towns (prior to commencement)
Conduct Weekly Project Inspections
Weekly Inspection Form
Inspection Form Review
NEXT STEPS?
Implementation Phase Modifications
Major Modification ?
Yes
Review by FITT (< 2 weeks)
Approval of Modification by FITT
No
Internal discussions on options and revise
Yes
No
Project Forester approves and documents in file
Modification Implemented
Final Project Inspection
Project Completion Activities
Harvest/Contract Completion
"As-Built" Maps
Post-Project FITT Inspection (1 year)
Post-Project Inventory
Post-Project Monitoring (2 year +)
END

Appendix B: Project Timeframes Table

Conservation Practices Task	Time	Individual
Initiation Phase		
FITT member comments to Project Forester following FITT field meeting	2 weeks	FITT members
Planning Phase – Reviews may occur concurrently		
Review of project for T&E plant species	2-4 weeks	ERA
Review of project for T&E animal species	2-4 weeks	Wildlife Studies
Development of T&E assessment and submission to USFWS & DEC	2-4 weeks	Project Forester / Wildlife Studies
Review of draft plan & maps and submit comments to Project Forester	4 weeks	FITT members
Review of final project plan for SEQRA/CEQR compliance	2 weeks	BEPA
Implementation Phase		
Name of selected contractor & project start date	2 weeks prior to project commencement	Project Forester
Comments to Project Forester following review of major modifications	2 weeks	FITT members
Final inspection of project site to ensure site stabilization	1 week prior to removal of equipment	Regulatory Review staff Project Forester
Regulatory Review notification of expected project closure	2 weeks prior to expected closure	Project Forester
Timber harvest inspection	Weekly during active implementation	Project Forester

Conservation Practices Task	Time	Individual
Comprehensive timber harvest inspection	Every 2 weeks during active implementation	Project Forester
Install signs at all major points of project access for public safety	At least 2 weeks prior to project commencement	Project Forester
Boat owner notification if boats need to be moved	30 days	Project Forester / DEP Boat Office
Notification of DEP groups of project – Ops, Police, REP, WQ, FITT, EH&S and BWS Management	Contract award	Project Forester
Notification of DEP groups of project – Ops, Police, REP, WQ, FITT, EH&S and BWS Management	2 weeks prior to project commencement	Project Forester
Notification of municipal officials _ town supervisor, town highway superintendent, code enforcement officer	Completion of project plan	Project Forester
Notification of municipal officials - town supervisor, town highway superintendent, code enforcement officer	Contract award	Project Forester

Appendix C: Project Maps

Accurate mapping of Forest Management Projects is essential for environmental review, successful project implementation, and project tracking. Maps will be of a scale that allows all displayed information to be easily reviewed on standard-sized paper. Sample maps can be found at the end of this appendix. Sample maps are for representational purposes only and do not depict actual features on any past or future Forest Management Project.

Concept and Vicinity Maps

The concept and vicinity maps will be created and distributed to the FITT for review during the Initiation Phase after the Project Forester has determined through evaluation of available data regarding forest characteristics, interpretation of any additional forest inventory performed, and preliminary field site assessment that treatment of the site is consistent with bureau goals. The maps will be created with information available in DEP's GIS data library, and will include the following:

Concept Map

- City-owned land
- Water bodies, including reservoirs
- Proposed project area
- Existing forest access roads, if any
- Rivers and streams (with T or TS classification labels as appropriate)
- NRCS soil types with labels
- 20' topographic lines with labels
- Text box reporting any potential Natural Heritage species
- NWI-mapped wetlands
- DEC-mapped wetlands
- Public roads
- Legend
- Locus map
- Scale bar
- North arrow

Vicinity Map

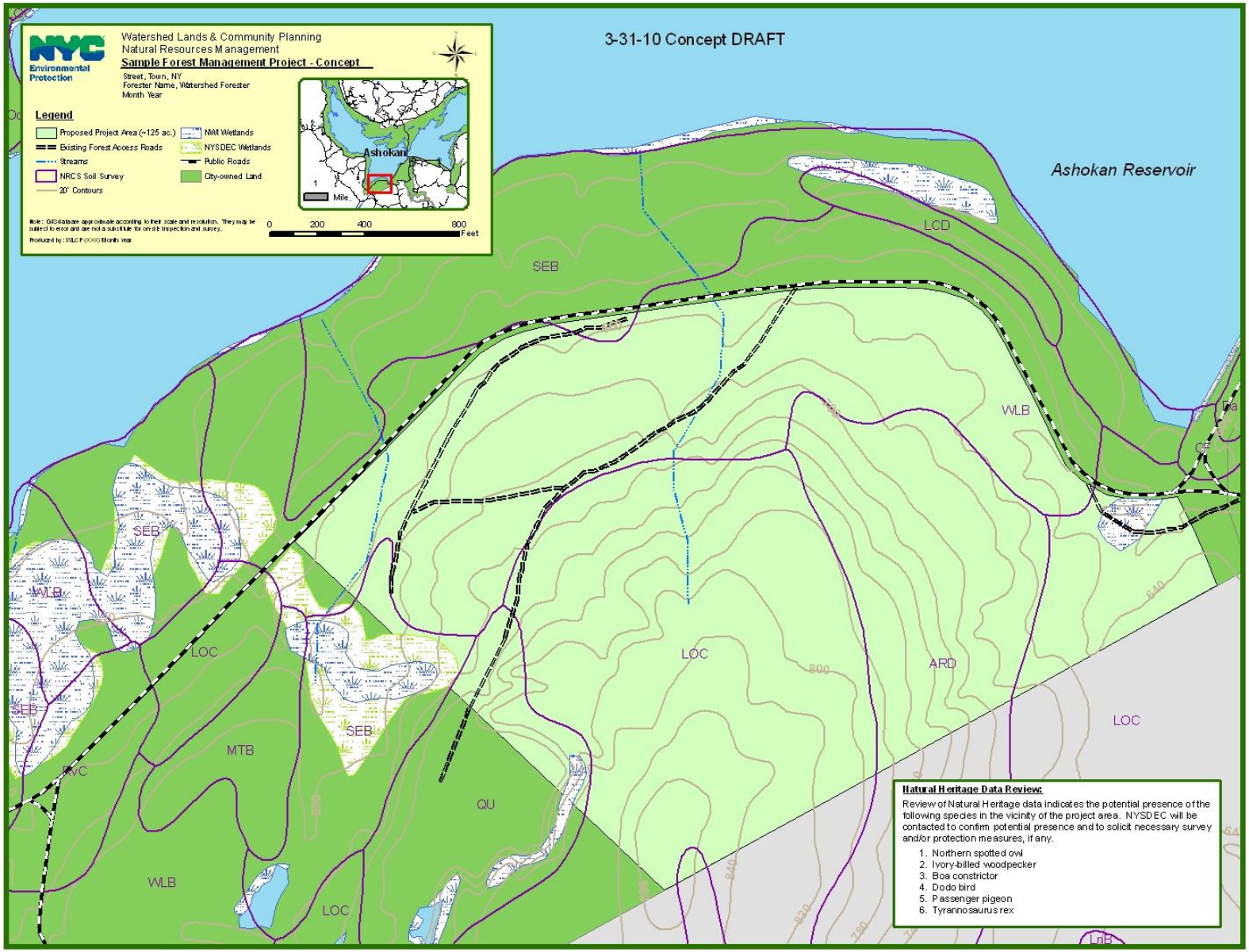
- City-owned land
- Water bodies, including reservoirs
- Proposed project area
- Identification of access points
- 20' topographic lines with labels
- NWI-mapped wetlands
- DEC-mapped wetlands
- Line indicating ½ mile radius around project area
- Planimetrics
- Legend
- Locus map
- Scale bar
- North arrow

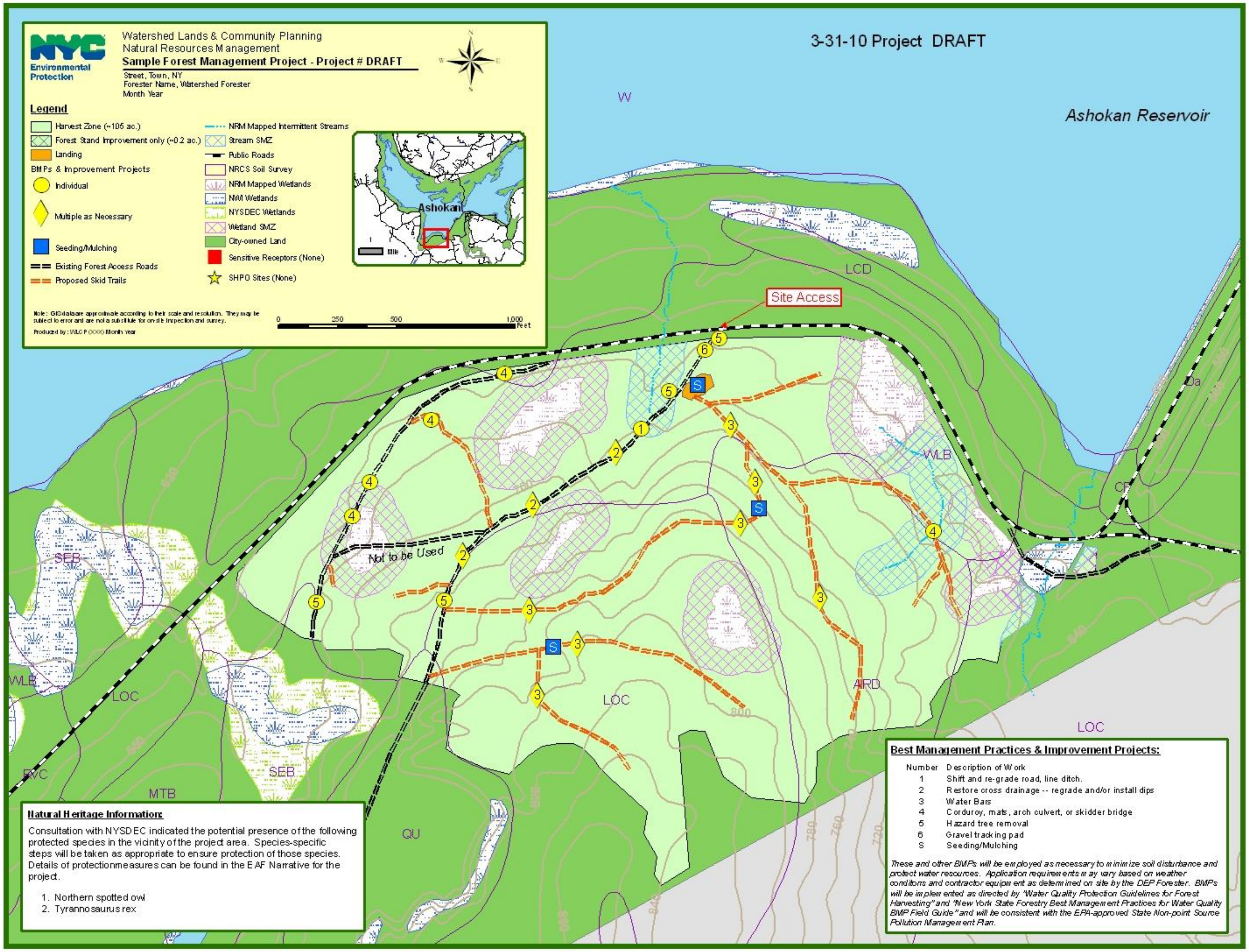
If requested by the FITT, the Project Forester will provide an additional Concept Map for field use that includes aerial photography and enough of the layers listed above to allow for location of relevant features in the field.

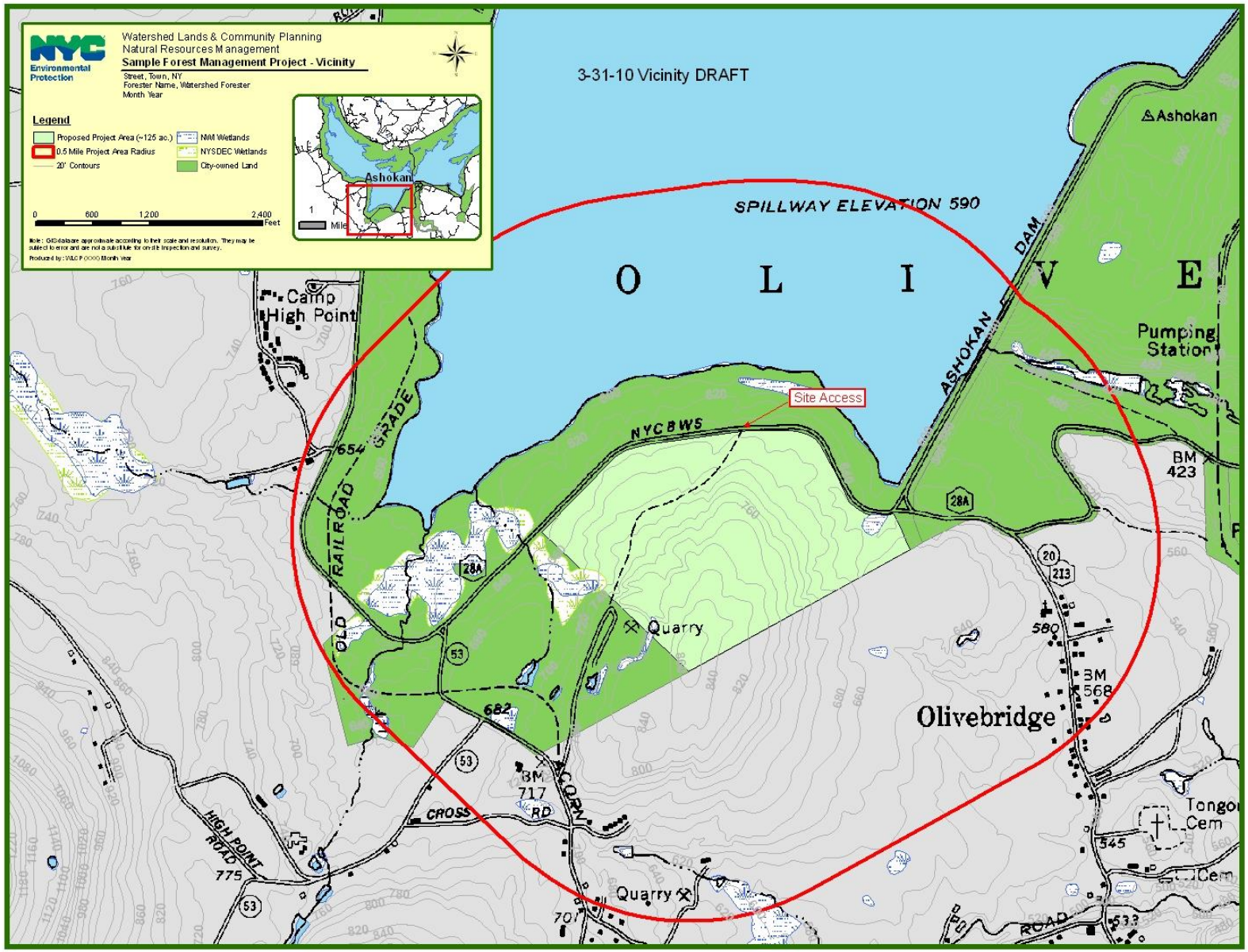
Project Map – Draft and Final

The draft project map will be created and distributed to the FITT for review during the Planning Phase. It will be created both with information available in DEP's GIS library and information gathered by the Project Forester during field-based project planning, and will be of a scale that displays at least 100 feet of area outside the project boundaries. The final project map will be a refinement of the draft project map based on comments received and additional field data collected, including GPS work as appropriate, and will be distributed to the FITT for review prior to completion of the Planning Phase. The project map will include the following:

- City-owned land
- Field-delineated project area or harvest zone
- Existing forest access roads, if any
- Landing areas
- DEC-mapped wetlands
- Rivers and streams, field delineated if necessary (with T or TS classification labels as appropriate)
- 20' topographic lines with labels
- NRCS soil types with labels (draft map only if project is phased)
- SHPO sites
- Text box reporting DEC-confirmed Natural Heritage species
- Legend
- Scale bar
- Water bodies, including reservoirs
- Special management and exclusion zones, if applicable
- Skid trail and haul road layout
- NWI-mapped wetlands
- ERA field-delineated wetlands
- Best Management Practices and improvement projects
- Identification of access points
- Project phasing, if applicable (final map only)
- Sensitive receptors, if applicable
- Any other information relevant to project implementation
- Locus map
- North arrow


3-31-10 Concept DRAFT
NYC Environmental Protection
Watershed Lands & Community Planning
Natural Resources Management
Sample Forest Management Project - Concept
Street, Town, NY
Forester Name, Watershed Forester
Month Year
Legend
Proposed Project Area (~125 ac.)
Existing Forest Access Roads
Streams
NRCS Soil Survey
20' Contours
NWI Wetlands
NYSDEC Wetlands
Public Roads
City-owned Land
Ashokan
1 Mile
Note: GIS data are approximate according to their scale and resolution. They may be subject to error and are not a substitute for on-site inspection and survey.
Produced by: WLCP Month Year
0 200 400 800 Feet
Ashokan Reservoir
LCD
SEB
WLB
LOC
ARD
MTB
RVC
QU
LnB
Natural Heritage Data Review:
Review of Natural Heritage data indicates the potential presence of the following species in the vicinity of the project area. NYSDEC will be contacted to confirm potential presence and to solicit necessary survey and/or protection measures, if any.
1. Northern spotted owl
2. Ivory-billed woodpecker
3. Boa constrictor
4. Dodo bird
5. Passenger pigeon
6. Tyrannosaurus rex


3-31-10 Project DRAFT
Environmental Protection
Watershed Lands & Community Planning
Natural Resources Management
Sample Forest Management Project - Project # DRAFT
Street, Town, NY
Forester Name, Watershed Forester
Month Year
Legend
Harvest Zone (~105 ac.)
Forest Stand Improvement only (~0.2 ac.)
Landing
BMPs & Improvement Projects
Individual
Multiple as Necessary
Seeding/Mulching
Existing Forest Access Roads
Proposed Skid Trails
NRM Mapped Intermittent Streams
Stream SMZ
Public Roads
NRCS Soil Survey
NRM Mapped Wetlands
NWI Wetlands
NYSDEC Wetlands
Wetland SMZ
City-owned Land
Sensitive Receptors (None)
SHPO Sites (None)
Ashokan
Mile
Note: GIS data are approximate according to their scale and resolution. They may be subject to error and are not a substitute for on-site inspection and survey.
Produced by: WLCP (XXX) Month Year
0
250
500
1,000
Feet
Ashokan Reservoir
Site Access
Not to be Used
W
LCD
WLB
SEB
LOC
AIRD
MTB
QU
CF
Best Management Practices & Improvement Projects:
Number Description of Work
1 Shift and re-grade road, line ditch.
2 Restore cross drainage -- regrade and/or install dips
3 Water Bars
4 Corduroy, mats, arch culvert, or skidder bridge
5 Hazard tree removal
6 Gravel tracking pad
S Seeding/Mulching
These and other BMPs will be employed as necessary to minimize soil disturbance and protect water resources. Application requirements may vary based on weather conditions and contractor equipment as determined on site by the DEP Forester. BMPs will be implemented as directed by "Water Quality Protection Guidelines for Forest Harvesting" and "New York State Forestry Best Management Practices for Water Quality BMP Field Guide" and will be consistent with the EPA-approved State Non-point Source Pollution Management Plan.
Natural Heritage Information:
Consultation with NYSDEC indicated the potential presence of the following protected species in the vicinity of the project area. Species-specific steps will be taken as appropriate to ensure protection of those species. Details of protection measures can be found in the EAF Narrative for the project.
1. Northern spotted owl
2. Tyrannosaurus rex


NYC Environmental Protection
Watershed Lands & Community Planning
Natural Resources Management
Sample Forest Management Project - Vicinity
Street, Town, NY
Forester Name, Watershed Forester
Month Year
Legend
Proposed Project Area (~125 ac.)
0.5 Mile Project Area Radius
20' Contours
NWI Wetlands
NYSDEC Wetlands
City-owned Land
0
600
1,200
2,400
Feet
Ashokan
1
Mile
3-31-10 Vicinity DRAFT
SPILLWAY ELEVATION 590
O L I V E
Ashokan
DAM
ASHOKAN
Pumping Station
Camp High Point
Site Access
NYC BWS
654
GRADE
RAILROAD
OLD
28A
53
682
Quarry
BM 423
20
213
580
BM 568
Olivebridge
BM 717
ACORN
RD
CROSS
HIGH POINT ROAD
775
701
Quarry
Tongo Cem
545
Cem
ROAD
533

Appendix D: Project Inspection Form

NYC Environmental Protection

TIMBER HARVEST INSPECTION FORM

Project Name / #: _____

Date of Inspection: _____ Weather conditions: _____

Forester: _____ Logger: _____

Type of inspection: ☐ Focused ☐ Comprehensive ☐ Final

Purpose if focused: ☐ BMPs ☐ Skid Trails/landing ☐ Water Features ☐ Status

☐ Other (specify) _____

Issues noted previously? ☐ No ☐ Yes, Explain: _____

Previous issues resolved? ☐ NA ☐ Yes ☐ No, Explain: _____

_____

_____

Issue(s) Observation(s) ☐ None

_____

_____

_____

_____

_____

_____

Suggested resolution(s) for issues above (if applicable) ☐ None

_____

_____

_____

_____

_____

Suggestions for next inspection: ☐ None

_____

_____

_____

_____

_____

_____

Appendix E: Notification Plan

Organization/Group	Contact	Method	Milestones
DEP			
Operations	See Note 1	internal email or memo	when contract is awarded; 2 weeks prior to commencement
DEP Police	Chief Fusco		
NRD	Ira Stern		
REP	See Note 2		
WQ	See Note 3		
Planning	Todd West		
FITT	all members		
BWS Management			
EH&S	EH&S Liaison		
Municipalities			
Town Supervisor	determine during planning phase	letter	when project plan is final and when contract is awarded
Town Highway Superintendent			
Code Enforcement Officer			
Conservation Board	*if applicable*		
Recreational Stakeholders			
Fisherman	depends on access category	signs at major access points	at least 2 weeks prior to commencement
Hunters			
Hikers			

Note 1:

For West-of-Hudson:

- Chief of Western Operations (JohnVickers)
- Regional Manager and Regional Supervisor

For East-of-Hudson:

- Chief of Eastern Operations (Ralph Marchitelli)
- Regional Manager and Regional Supervisor

Note 2:

- Chief of Regulatory Engineering Programs (Brenda Drake)
- Stormwater Manager (Matthew Giannetta)

Note 3:

- Water Quality Compliance Advisor (Jason Railing)
- Section Chief of Wildlife Studies (Chris Nadareski)

Appendix F: Contract Language

Health and Safety Guidelines

5.1 Scope

The intent of this section is to advise the Contractor of the environmental, health and safety and training requirements for performing work at DEP facilities and lands as well as special procedures applicable to locations where hazardous materials are stored and used. See ATTACHMENTS I and J for further details.

5.2 Notification of Hazardous Materials in Work Area

Hazardous materials may be present in large quantities at DEP facilities or on DEP lands. The Contractor shall, at all times, when working at these facilities or on City-lands, exercise all necessary precautions to avoid interaction with the hazardous materials feeds and/or storage systems and conform to all directions and instructions provided by the DEP.

5.3 Pre-Award Requirements

Within five (5) business days of DEP's request, the successful Bidder shall provide the information specified herein; failure to provide the requested information may result in a rejection of the bid.

5.3.1 The Contractor shall provide a written description of its environmental, health and worker safety (safe work practices) program (and associated training) which will clearly specify the contractor's understanding of all OSHA, EPA, DEC and DEP requirements as well as its commitment to comply with these requirements. An DEP form may be provided to the Contractor for this purpose.

5.3.2 The Contractor shall provide its Worker's Compensation Rating (i.e., Experience Modification Rating or EMR) and a list of all its workers' job related accidents, over the past five (5) years; worker's compensation claims shall be included. In addition, the Contractor shall provide a listing of all regulatory agency (e.g., OSHA, DEC, EPA, DEP, etc.) notices of violations, fines and reportable releases of chemical or petroleum products associated with the contractor's operations over the last 5 years. If the Contractor's EMR exceeds 1.2, the bid shall be rejected. If the environmental, health and safety and training program descriptions indicate that the contractor understands its regulatory requirements; the EMR is below 1.2; there is not a pattern of violations or releases; and the contractor has represented that its programs and training comply with all regulatory requirements; it may be awarded the contract.

5.4 Pre-Construction Orientation

5.4.1 Prior to commencing any work at the facilities indicated in subsection 2, the Contractor shall be required to attend a two-hour orientation. After attending the initial two hour orientation, the Contractor shall, in turn, provide a two hour orientation to any of the contractor's employees assigned to work at the facility. This training must also be provided to subcontractors and lower tier contractors as well as any suppliers, contractor visitors, and field consultants who will work without being accompanied by a trained employee.

5.4.2 The Contractor shall receive and distribute to all workers who are to attend the orientation a hazardous material and safe work practices information package. If possible, it will be distributed at least two days prior to the orientation. The workers shall sign for the packages and indicate that they have reviewed the contents prior to their attending the orientation.

5.4.3 Prior to commencing any work at the facilities indicated in subsection 5.2 above, the Contractor shall provide a written procedure to indicate that the Contractor's supervisor shall ensure that the facility's environmental, health and safety provisions are followed by the Contractor's workers while working at the facilities.

5.4.4 If the Contractor or subcontractor needs to add additional or replacement worker(s) to its crews, the new worker(s) must receive the hazardous materials information package and attend the two-hour orientation for the facilities as described above.

5.5 Requirements During Work

5.5.1 The Contractor, its workers and the subcontractors and all their workers shall, at all times when working at the facilities, be required to wear and/or maintain photo-identification badges. The badges shall be provided by the Contractor and shall only be provided to workers who have received and reviewed the hazardous material and safe work practices information package and have attended the orientation. Personal protective equipment including steel-toed work shoes, hardhat, etc. must be worn or carried by each on-site person at all times.

5.5.2 The Contractor shall, at all times when working at the facilities, exercise all necessary precautions to avoid interaction with the hazardous material feeds and/or storage systems and conform to all directions and instructions provided by the DEP.

5.5.3 Any worker who fails to abide by the safety requirements presented in the hazardous material and safe work practices information package and/or at the orientation shall, at the sole discretion of the DEP, be denied access to the DEP facilities and/or lands and shall be replaced by the Contractor, as directed by the DEP.

5.5.4 The Contractor shall immediately inform the DEP Contracting Supervisor of all chemical or petroleum product spills or releases, of any contract employee OSHA-reportable work place injuries or illnesses, and of any notices of violation resulting from work performed.

5.5.5 DEP will perform periodic evaluations of the contractor's performance to ensure compliance with all DEP and facility environmental and safe work practices. The Contractor must promptly correct problems communicated by DEP concerning non-compliance with any applicable regulations and DEP and facility environmental and safe work practices. Failure to correct the problems in a timely manner or repeated violation of regulations or DEP/facility environmental and safe work practices is *grounds for termination*. Such failures will also be considered when evaluating the contractor's submittals for future work proposals.

Under General Guidelines:

SUCCESSFUL BIDDER will have in place prior to the start of work and maintain throughout the term of this agreement, a communication plan and emergency action plan including a daily "check in/check out" contact and emergency contact chain. Such plans shall be required to be reviewed and accepted by the Agency's Office of Environmental Health and Safety as part of their required review of this project.

Contractor Pollution Prevention Guidelines

6.0 POLLUTION PREVENTION

6.1 Extreme caution must be taken at all times, to prevent environmental pollution. All equipment (e.g., bulldozers, skidders, forwarders, trucks) must not have any leakage of fluid (e.g., lubricating, fuel, hydraulic, coolant) of any amount, onto bare ground or into hydric sites (e.g., wetlands, springs, streams, pools) while on DEP property. If leakage or a spill does occur, it is to be contained immediately by using absorbent pads and / or a filter berm. Simultaneously, a telephone call is to be made by the SUCCESSFUL BIDDER or an employee thereof, to the DEP BWS Police Command Center ("CC") at (914) 245-6694 or 888-H20-SHED and the

information on the Emergency Spill Form (ATTACHMENT H) given to the BWS Police. Also, the DEP FORESTER is to be called when a spill is reported to the BWS Police.

6.2 All work areas must be kept clean of oil containers, snapped cable, sandwich wrappers, garbage, and other litter or debris. Equipment lubricants and fuel (e.g., diesel, gasoline, motor oil, hydraulic and transmission fluid, radiator coolant, chainsaw oil) are not to be stored on DEP property. There is to be no leakage of these fluids onto DEP property while they are being transported in containers (e.g., drums, barrels, tanks, cans) and transferred into the SUCCESSFUL BIDDERS equipment. Absorbent pads must be placed underneath equipment when fluids (e.g., diesel, gasoline, motor oil, coolant, hydraulic, transmission) are being added, to catch any spillage that might occur. The "used" absorbent pads are then to be properly disposed of, off-site.

6.3 The SUCCESSFUL BIDDER will at his sole expense provide sanitary facilities necessary for the use of those on the work site to assure that all human waste will be disposed of off site. SUCCESSFUL BIDDER shall make such facilities available when the first employee arrives on site of the project area, shall properly seclude them from public observation, shall maintained them in a satisfactory and sanitary condition at all times during the progress of the work and shall enforce their use. Said sanitary facilities shall be located a minimum of one hundred feet from surface waters or wetlands adequate to prevent contamination of such waters should failure of facility occur. A violation of this sale condition will result in a $250 per day penalty, payable to DEP, and shall entitle DEP, in its discretion, to order the suspension of all work as specified in this bid package.

6.4 All vehicle and equipment fueling and maintenance will be conducted by the SUCCESSFUL BIDDER in designated areas as determined by the DEP FORESTER. These locations will generally be located in the landing areas. No maintenance vehicles will be allowed beyond the landing areas unless specifically approved by the DEP FORESTER. The SUCCESSFUL BIDDER is required to keep the following spill prevention and clean-up materials on-site, at all times: an oil pan; one package (100 count) of eighteen-by-eighteen inch (18"x18") absorbent oil pads, sixteen pounds (16 lbs.); thirty feet of an approved absorbent tube; and two shovels. When fluids are being changed on-site, absorbent pads must be used beneath the equipment and the container being used as a catchment, to capture any spillage. The "used" fluid and absorbent pads are then to be properly transported and disposed of, off-site. Non-compliance with any of the pollution prevention measures in the HARVEST CONDITIONS will result in a penalty of $250 per day, payable to DEP, and shall entitle DEP, in its discretion, to order the suspension of all work until acceptable, corrective action has been taken by the SUCCESSFUL BIDDER.

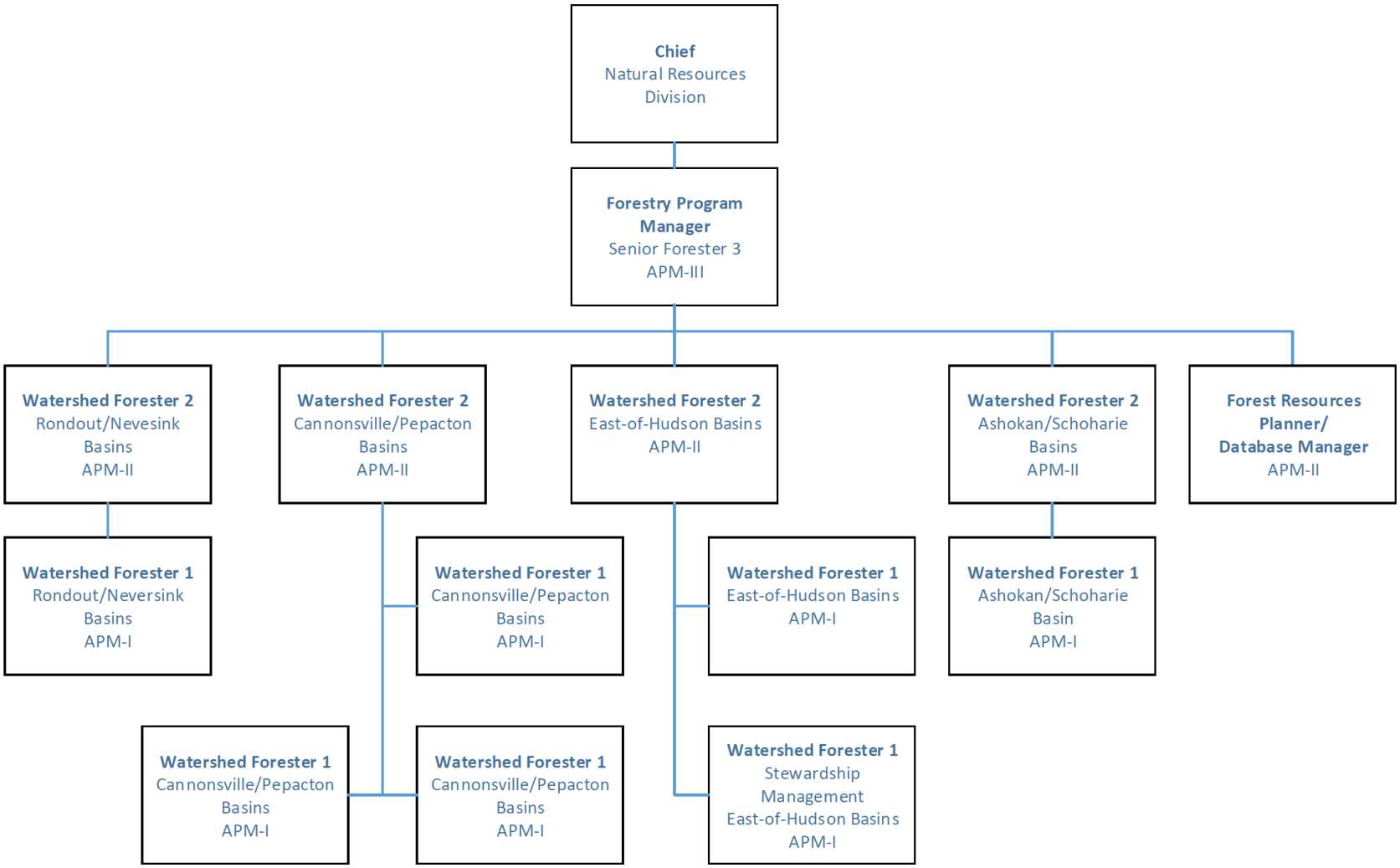
APPENDIX 2

DEP NATURAL RESOURCES DIVISION

FOREST MANAGEMENT

REVISED ORGANIZATION CHART

Natural Resources Division
Forest Management Section



APPENDIX 3

FOREST MANAGEMENT PLAN

IMPLEMENTATION STRATEGY

Forest Management Plan Implementation Strategy
February 1, 2012

1. Introduction

The New York City Department of Environmental Protection (DEP), in conjunction with the USDA Forest Service, recently developed a Forest Management Plan (FMP) that will guide forest management activities on City-owned watershed forest land. The FMP includes the DEP Conservation Practices (CPs) which defines the process for forest management project planning and implementation and sets the standards for the protection of natural and human resources. The FMP recommended silvicultural treatments on approximately 40,000 acres over the next 10 years to help move the forest from the *current condition* to the *desired condition* as outlined in the FMP. The desired condition is one in which forest cover on City land is maximized for long-term water quality protection while the risk of loss of forest cover is minimized.

This Implementation Strategy considers the recommendations outlined in the FMP, staff and financial resources, agency and program priorities and on-the-ground realities (access, local ordinances, deer impacts, etc.). The primary goal of the Implementation Strategy is to focus management activities and prioritize the treatment of stands across the watershed and to provide additional detail on the types of projects that will be undertaken. Other goals include providing guidance to Bureau of Water Supply management, the Forestry Program and Forest Interdisciplinary technical Team (FITT) members on how and why projects will be chosen as well as a general idea on where. This Implementation Strategy provides a planning window for 2012 and 2013 and will be updated every two years to address changing conditions and/or priorities. As stated in the FMP, it is expected that there will be an increase in projects by the Forest Management Program compared to the current management levels. Specific target goals for areas to be treated are provided in the "Basin Considerations" section. This Implementation Strategy is not designed to identify specific locations where forest projects will take place.

Currently, the Forest Management Program is made up of a supervising forester and 4 regional foresters. Generally, foresters work within their assigned basins and plan projects accordingly. However, as projects are developed and planned, it may be necessary for foresters to work outside their assigned basins.

2. Forest Management Treatments

Forest inventory data was analyzed to categorize forest stands, assess current forest conditions and identify forest management treatments, needs or options. Treatments are those silvicultural actions that the DEP Forestry Program will use to move forests from the current condition to the desired condition. Inventory was conducted at a landscape-level and therefore statistical accuracy is variable for individual stand data. For forest management planning at the stand level, additional stand level forest inventories may be required for forest management projects. There are many more factors and site conditions that require ground truthing and the judgment of a professional forester with local experience to evaluate and determine the best treatment for an individual stand.

The various treatments prescribed by the FMP can be divided into two broad categories: commercial and non-commercial. Commercial treatments are those in which the value of the wood products removed more than offsets the cost of the removal, generally resulting in an economically neutral or revenue-producing activity. Thinning, most regeneration treatments and salvage typically fall into this

category. Generally, commercial treatments are considered preferable to non-commercial treatments because they can be larger projects that do not cost the City money to complete. Non-commercial treatments, those that the City will need to pay to implement, include planting or other reforestation activities; thinning or regeneration that does not result in a valuable by-product; treatments that require extraordinary resource protection measures or service-in-kind that negate the value of wood products removed; treatments that are potentially commercial but are performed non-commercially due to particular sensitivity of the site; and treatments that are not logistically appropriate for traditional harvesting systems. Many non-commercial treatments will help establish positive conditions for future commercial viability within the stand.

Potential treatments identified by the FMP and other common treatments that may be implemented are shown below. These lists are not exhaustive; other treatments may be appropriate for use on City lands in some circumstances.

Table 2. Potential Forest Management Treatment Types

Non-Commercial	**Commercial**
Reforestation of open land	Regeneration of mature stands
Reforestation of transitional stands	Regeneration of moderately-stocked stands
Pre-commercial thinning	Thinning
Regeneration of poorly-stocked stands	Uneven-age management
Implementation of regeneration protection	Preemptive salvage

More acreage is identified in the FMP for commercial treatment than non-commercial treatment and significant funding is necessary to conduct non-commercial work; therefore, forest management can be expected to focus primarily on commercial treatment opportunities.

The product value of the trees in a stand determines the ability to conduct treatments commercially. Factors that determine a stand's economic value include: tree sizes (diameter and height); tree quality; difficulty of harvesting operations due to soils, slopes, hazards, etc.; site development required, such as road building, bridge installation, or deer exclusion fencing; work site limitations such as hours of operation, seasonal restrictions, or equipment requirements; market conditions for the species and products present; and, for salvage operations, the rapidity of response.

2.1 Reactive Treatments

Typically, it is relatively easy to evaluate opportunities for management to determine how treatments can be applied to generate desired conditions. However, natural events, such as fire, wind, ice damage or insect outbreaks, collectively known as disturbances, periodically occur in the forest. While expected, these events are not predictable and cannot be planned for in great detail in advance. Disturbance events complicate forest management scheduling which makes it more difficult to determine opportunity costs. Reactive management in response to disturbance is typically referred to as salvage, and must be conducted in an expedited fashion if it is to be accomplished commercially. Economic value is therefore helpful in determining whether a salvage treatment is worth pursuing, though non-

commercial salvage treatments may be pursued in a limited fashion for reasons of sanitation (removal of pest- or pathogen-infested trees to prevent spread), aesthetics, or hazard reduction.

Salvage operations can be planned when mortality occurs over time (months to years), such as due to an insect outbreak, or unplanned when a stand is damaged or destroyed by an acute event, such as a tornado or ice storm. In some cases, salvage may be preemptive where trees that are in imminent danger are removed prior to impact by the damaging agent. Preemptive salvage can be useful in pest or pathogen outbreaks where the management action not only captures value that would be lost, but also may help to slow the spread of the pest or pathogen through isolation of the host population. This technique may be helpful for addressing invasive species, such as emerald ash borer (EAB). Salvage operations can be particularly useful in the case of unplanned acute events where they result in conditions that minimize impacts to remaining trees and promote healthy, stable growth of a replacement forest. They also improve the safety and accessibility of the site so that it is easier to address events that may follow in the wake of disturbance, such as additional mortality or regeneration failure.

Opportunities for pre-emptive and reactive salvage are an important component of forest management on City land and should be considered within the suite of treatments when appropriate. Many of the natural events that could lead to the need for salvage treatments are local or regional in scale. For example, emerald ash borer in Ashokan basin, tornado damage in Kensico and a major blow-down in Neversink. This Implementation Strategy needs to be flexible enough to deal with these issues as they arise. As events occur, the Forest Management Program must assess the value of diverting resources from on-going planned projects to address salvage opportunities. Salvage projects may or may not fall within the acreage identified for treatment in Table 4 and this should not matter for planning purposes. Any salvage treatments that are undertaken would be included in the overall acres treated and reported.

In all cases, the speed of management action is critical to maintaining the commercial potential of salvage operations. Seasonality of a disturbance can be important since wood will hold value better in winter than in summer due to slower decay processes during cold weather; however, salvage by its nature is always time sensitive. It is critical that these salvage projects are expedited or potential revenue opportunities will be lost and any desired treatment would then need to be accomplished non-commercially.

2.2 Non-Commercial Treatments

Non-commercial treatments are those treatments that do not pay for themselves in the present, but reap rewards in the future. Non-commercial treatments can be used not only to achieve desired conditions, but also to help to move non-commercial stands to a point where commercial management will be possible in the future, thus either reducing future expenditures or increasing future revenues. Some examples of non-commercial treatments that DEP may implement include: planting; pre-commercial thinning; installation of deer exclusion fencing; invasive species control; tree quality improvement; site preparation; and restoration or regeneration of degraded stands. The ability to implement non-commercial treatments will depend on adequate funding and establishment of an efficient contracting process for forest stewardship work.

2.2.1 Public Firewood Program and Projects

The opportunity to conduct projects to supply local communities with non-commercial (residential) firewood is important and should be considered when determining treatments for forest management.

Firewood projects present opportunities from a community and good-will stand point and also as a way to conduct small-scale forest improvement projects. At this point it is difficult to say whether firewood projects will fall under commercial or non-commercial treatments (public firewood projects) although the latter is probably more realistic. It is anticipated that some type of firewood project will be included in the annual planning of projects in most WOH basins. Firewood projects may or may not be within the acres identified for treatment in Table 4. Any firewood projects that are undertaken would be included in the overall acres treated and reported. NRM is currently working on developing a firewood program which will be implemented in 2012.

2.2.2 Treatments by Bureau of Water Supply (BWS) Staff

Section 8.1.3 of the FMP indicates that "developing additional capacity within DEP utilizing Operations staff during down periods and off-season can also be used to increase productivity and fully utilize existing staff and personnel. This may be especially useful for small-scale forest stand improvement projects in which staff could be mobilized for shorter periods of time such as during the winter." Discussion will commence with DEP Operations to facilitate this and should be included in the Basin Consideration section. Projects for in-house treatment should fall within the acres identified in Table 4. Any in-house projects that are undertaken would be included in the overall acres treated and reported.

3. Prioritization of Treatment Opportunities

Prioritization of acreage for treatment is based on watershed, basin and stand-level forest conditions. While the link between forested land cover in a watershed and water quality has been extensively documented, direct impacts to water quality of moderate forest cover manipulation, such as is proposed by the DEP Forestry Program, are more subtle and difficult to quantify. The primary benefit of forest cover manipulation is to help to ensure continuous forest cover over the long term. Therefore, forest management will focus on establishing and maintaining the desired condition outlined in the FMP, which, according to current scientific understanding, is the most effective way to ensure continuous forest cover in perpetuity. Since the primary goal will be to establish and maintain the desired condition, forest management work will focus on moving the largest number of acres into the desired condition as possible over the next ten years. In this way, the number of acres not meeting the desired condition across the watershed can be reduced as quickly as possible.

This broad focus on any stand that does not meet the desired condition can be justified by the fact that both functions of forests in the protection of water quality, sediment control and nutrient-load attenuation, may be equally important. While sediment control may be a higher priority in basins such as the Schoharie and Ashokan where total sediment loads are of utmost concern to maintaining filtration avoidance, nutrient attenuation in basins such as the Cannonsville and Pepacton is important to reducing nutrient levels in the reservoir system overall. Therefore, treatment of stands in upstream basins is as important as treatment of stands in downstream basins, however, treatments may be different to address these issues.

Forest conditions were assessed at a broad scale through a coarse inventory conducted across all City land. Inventory plot data was used to develop attributes to describe current forest condition for each stand that could be compared to the attributes of the desired condition to determine if treatment was necessary. Stand attributes can be used at the basin level to determine landscape-level diversity of land holdings and to tailor current management to anticipate and address future conditions. These stands will be assessed in more detail by a forester. Such assessment may include additional inventory to help ensure that prescribed treatments have a high likelihood of achieving the desired result. Stand

attributes were divided into two groups, primary and secondary, to broadly identify areas that might need treatment, and then to further prioritize stands as needed.

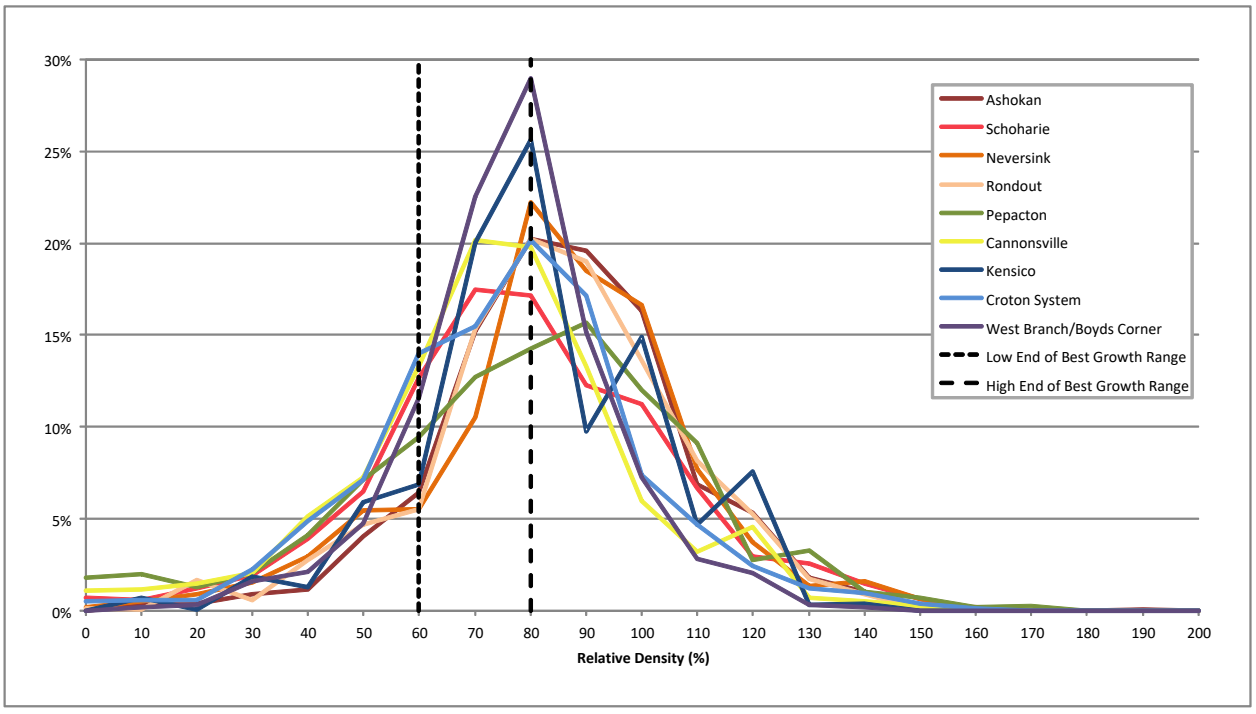
3.1 Primary Stand Attributes

Primary stand attributes describe biological characteristics that can be used to prioritize areas of land that require treatment to bring them in line with the desired condition outlined in the FMP. The two primary attributes used in the FMP are relative density and effective age. These attributes provide a picture of the density and maturity of a stand, which directly relates to the total amount of forest cover on City land and its associated risk of loss. Stands with very low densities indicate opportunities for increasing total forest cover through reforestation. Older, dense stands have an increased susceptibility to disturbance; identification of these stands indicate opportunities for reducing risk of loss of forest cover through thinning or regeneration treatments.

Relative Density

Relative Density is used to determine current site occupation and potential for continued growth. As a stand ages, relative density will increase. As density increases, competitive stress on individual trees increases, causing reduced vigor for the stand as a whole and resulting in mortality of weaker individuals. A stand experiencing this type of reduced vigor and competitive stress is commonly referred to as over-stocked, and will typically have a relative density of 100% or greater.

Chart 1. Relative Density – Percent Acres by Basin



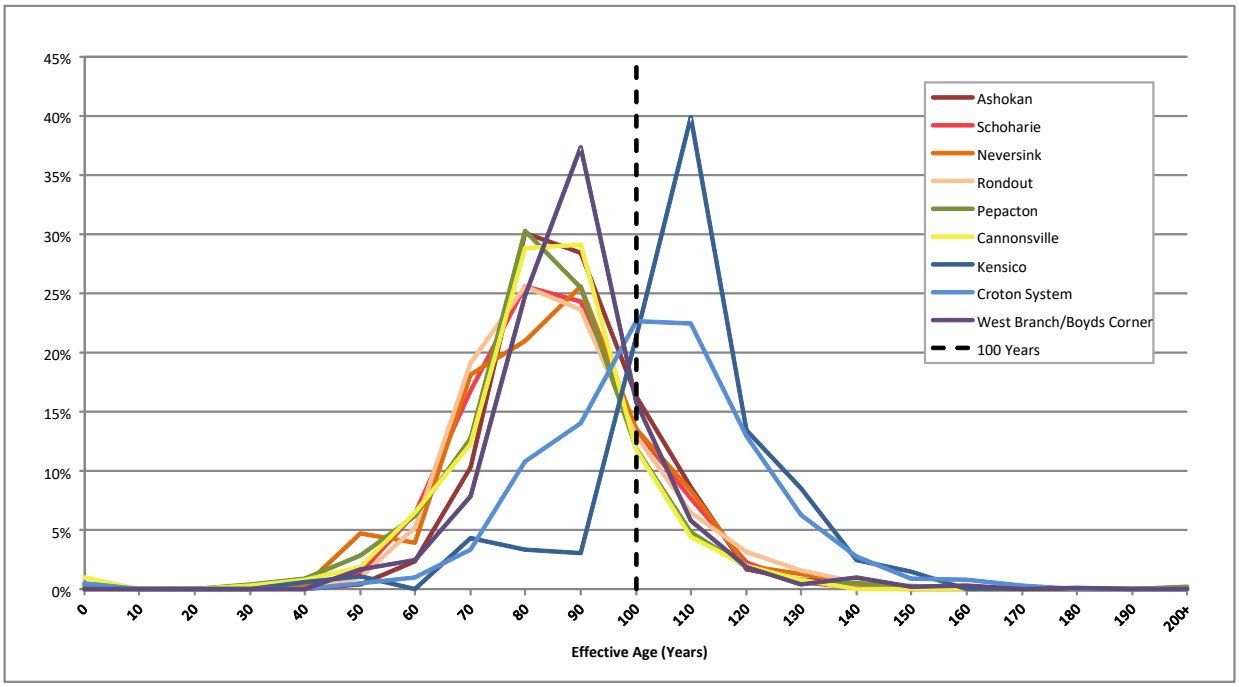
This chart shows the percentage of acres in each basin by relative density. A large proportion of City land has a relative density of 90% or above, and is therefore either in or will soon be in an over-stocked condition. Forest management activities to reduce relative density by thinning or regenerating stands can help to ensure continued vigorous forest growth into the future and to create a more desirable distribution of relative density across the landscape. Ideally, this chart should show the highest

percentage of acres between 60% and 80% because this range correspond to stands that are fully stocked, so forest cover is maximized, without being overcrowded. Overcrowding reduces vigor and increases risk of loss.

Effective Age

Effective age is used to describe relative maturity of a stand based on the interaction of tree size, density and species present. High effective ages indicate stands that may be losing vigor due to competitive interactions between trees, resulting in reduced nutrient uptake.

Chart 2. Effective Age – Percent Acres by Basin



This chart illustrates that a large proportion of City land is in a similar condition and is older than is ideal for water quality protection. Having a large proportion of the acreage in a similar condition represents a lack of diversity that exposes the forest to an increased risk of large-scale disturbance. Ideally, the effective age chart would be more level, showing a similar percentage of acres in each age class from 0 to 100 years with successively fewer acres in age classes over 100. To achieve a more desirable distribution, those acres represented by the "peaks" in the chart can be treated to move them into younger age classes.

Commercial Management Potential

The potential of a stand to support commercial management can in many cases be determined by its quadratic mean diameter (QMD). Low QMDs, those less than 10 inches, indicate stands that cannot be treated without expenditures in excess of staff time and other resources. A QMD over 10 inches does not guarantee that a stand can be treated commercially because species mix and quality are also important factors in merchantability, but it does show that commercial management may be possible. Because forest management work will focus on commercial treatments for the foreseeable future,

stands with QMDs greater than 10 inches will be higher priority than those with QMDs less than 10 inches.

Application of Primary Stand Attributes

The primary stand attributes can be used together with the commercial management potential to begin to prioritize stands on City land that may be in need of treatment. Dense stands that have high effective ages should be regenerated or thinned to maintain vigor until regeneration is possible; dense stands with lower effective ages should be thinned to promote vigorous growth as the stand matures. Stands can be located that may be appropriate for regeneration or thinning by applying threshold values to both attributes, and then eliminating stands with QMDs less than 10 inches. Based on the guidance provided by the FMP, stands with densities greater than 80% and effective ages greater than 100 years should be considered for regeneration or thinning, and stands with densities greater than 85% and effective age less than 100 years should be considered for thinning. Table 3 below shows the estimated acreage in each basin that meets these criteria.

Table 3. Acres Identified by Primary Attributes for Treatment by Basin

	Ashokan	Cannonsville	East-of-Hudson	Neversink	Pepacton	Rondout	Schoharie	Total
Regeneration	1,500	1,300	3,500	700	1,300	600	700	9,600
Thinning	4,200	4,000	2,700	1,700	4,500	1,800	2,000	20,900
Total	5,700	5,300	6,200	2,400	5,800	2,400	2,700	**30,500**

Table 3 shows that application of the primary stand attributes can be used to select 30,000 of the original 40,000 acres identified by the FMP for further consideration for treatment. Since 30,000 acres is still an ambitious goal for available staff to address in the 10-year timeframe, the selected acreage can be further reduced by focusing on the older and more dense stands within the selection.

Increasing the threshold value for relative density for both regeneration and thinning to 90% and adding a lower end threshold of 80 years to the effective age for thinning results in a further prioritization of the following acreage in each basin as shown in Table 4.

Table 4. Acres Identified for Treatment with Increased Threshold Values by Basin

	Ashokan	Cannonsville	East-of-Hudson	Neversink	Pepacton	Rondout	Schoharie	Total
Regeneration	1,200	900	1,900	500	900	400	400	6,200
Thinning	2,800	2,400	1,700	1,100	3,000	1,100	1,000	13,100
Total	4,000	3,300	3,600	1,600	3,900	1,500	1,400	**19,300**

The approximately 19,000 acres identified are well-distributed across the watershed, indicating a need for forest management actions in all basins. Further prioritization of stands within regions will be accomplished through application of secondary stand attributes and the other considerations described below. Selection of relevant secondary stand attributes and other considerations will be region-specific, based on an assessment by the regional forester of the relative importance of each.

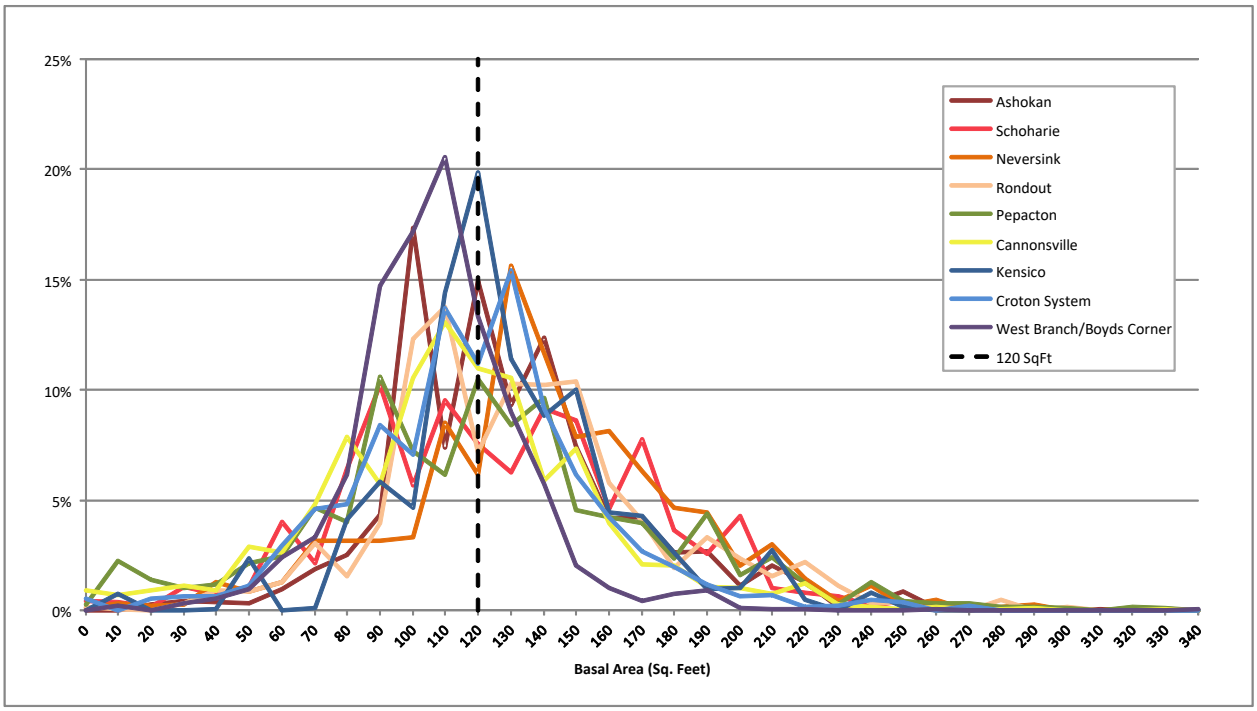
3.2 Secondary Stand Attributes

Secondary stand attributes represent additional biological characteristics that can be applied either in place of or in addition to primary stand attributes to address regional forest conditions or to further refine stand priorities. Two secondary attributes were singled out for presentation because of their conventionally broad application in forestry: basal area and height. A number of other stand attributes were generated from the inventory data and may be appropriate to use to determine treatment need and stand priorities.

Basal Area

Basal area is used to describe the density of trees on a site. High basal areas can indicate stands with reduced vigor. What constitutes high basal area varies based on species composition. Though the amount of basal area that is desirable is strongly influenced by species, in many hardwood stands, basal areas in excess of 120 square feet per acre indicate an over-stocked condition.

Chart 3. Basal Area – Percent Acres by Basin



This chart indicates that a large proportion of City land has a basal area between 100 and 140 sq. ft. which suggests that the forest is either in or approaching an over-stocked condition and could be treated to maintain or improve vigor.

Height

Height can sometimes be used as a proxy for true age to help determine maturity of a stand. Information on height was gathered remotely in 2003, and stands were assigned to one of four height categories (0'-50'; 50'-75'; 75'-100'; and 100'+). Because of the age of the dataset, height information does not exist for all current ownership and therefore is not displayed graphically here. Heights in the 75'-100' and 100'+ categories may indicate older stands where treatment may be desirable.

3.3 Adjacent Stands

Often, stands that are identified by the inventory and/or forester assessment as being in need of treatment may be adjacent to other stands that also need treatment. In such a case, the stands may be grouped together and treated in one forest management project. Sometimes, stands adjacent to an identified stand may have primary attributes close to, but not meeting, the attribute thresholds for treatment but may be treated anyway so that efficiency of work can be maximized.

3.4 Previous Forest Management Projects

DEP has been performing forestry projects for many years including establishment of plantations and salvage work. By virtue of the silvicultural work conducted under these projects, the areas treated may not fall within the acres identified in Table 2. However, many forestry projects must be revisited to build on the silvicultural work of the original project. These project areas should be assessed and included as future project areas as appropriate. Any projects that are undertaken would be included in the overall acres treated and reported.

4. Other Considerations

4.1 Ownership-Wide Considerations

When assessing the acres identified for treatment in Table 2, a number of additional attributes may preclude commercial treatment of otherwise commercially-treatable stands or dictate the way projects are planned and implemented. Some of these stands may be addressed through non-commercial treatment; others may be left untreated. Listed below are some considerations that may impact commercial treatment opportunities.

- Markets: Lack of local markets for some wood products, particularly low-grade products like wood chips and pulp, may limit the ability to commercially treat stands with high proportions of low-grade timber.
- Slope: Slope impacts the ability to manage a stand with traditional forestry equipment. Steep slopes may be more likely to be detrimentally disturbed by forestry equipment.
- Access: Stands that are isolated by private property, have topography or sensitive areas that limit access, whose only access is over a right-of-way on private property, or that do not currently have developed access may be more difficult to manage than other stands.
- Property Configuration: Some properties may not be practical to manage with traditional harvesting methods due to size, shape, presence of facilities or other structures, or the existence of competing uses, such as boat storage.
- Soils: Stands that have soils with weak structure or that are prone to erosion may be more difficult to manage with traditional forestry equipment than stands with better soils. Since soil erosion is a significant concern for a water supply, stands with easily erodible soils may be avoided.
- Deer Impact Level: The level of deer impact on forest regeneration was assessed in the inventory. Because high levels of deer impact may result in regeneration failure unless mitigation measures are implemented, stands identified for regeneration treatments that also have high deer impact levels may be avoided or addressed with modified treatments (e.g. fencing, high slash).
- Invasive/Interfering Species Presence and Density: High densities of invasive and interfering vegetation may result in regeneration failure if mitigation measures are not implemented. Therefore, stands with high levels of invasive or interfering vegetation may be avoided or

addressed with modified treatments (e.g. pre- and post-harvest herbicide application, additional shade retention).

- Threatened, Endangered and Special Concern (TES) Species: Presence of TES species in a project area that significantly increase the regulatory burden or reduce the effectiveness of the intended treatment may eliminate stands from consideration for treatment.
- Legal and Regulatory Environment: On some properties, local laws or deed restrictions relating to forest operations that limit or prohibit application of standard forest management techniques may exclude stands from consideration for treatment.
- Specialized harvesting equipment: There are no restrictions on equipment type that can be used to implement projects that are designed under the FMP; however, during site-specific evaluation and project planning certain restrictions on equipment may be identified to address site-specific concerns. For example, certain types of specialized equipment may be required for projects on difficult sites, such as those with saturated soils.

4.2 Basin Considerations

In discussions with the DEP Water Quality Modeling and Stream Management Program (SMP), specific basins were not identified as needing more attention than others. However, some basins, such as Pepacton and Cannonsville, are impacted by nutrient overload largely due to agricultural runoff while others, like Ashokan and Schoharie, are impacted by sedimentation due to local geology. While the scale of forest management projects can have little direct effect on these basin-wide impacts (particularly in the near-term), they should be considered while planning forestry projects. There may also be some advantages in coordinating with the Stream Management Program and performing work in riparian areas, especially in proximity to current and/or planned stream management projects or along stream reaches that have been identified as needing attention. For example, when reviewing potential projects, priority may be given to those projects that contain the most amounts of streams and riparian areas and these could be included for treatment to help meet stream management objectives.

Though the goals of forest management are the same across the entire watershed, differences in forest conditions and threats to forest cover in each basin will result in some variability in the attributes and considerations taken into account to identify stands for treatment. Below is a brief summary of how stands will be identified in each basin.

Ashokan/Schoharie

The City's pre-MOA lands in the Ashokan basin are among the oldest forest areas in the City's watershed holdings and are therefore most likely to suffer significant, unplanned environmental disturbance which could directly impact water quality or maintenance of long-term forest cover. The watershed-scale information generated from the FMP inventory data confirms that the bulk of Ashokan acreage that would most benefit from forest management (4,000 acres) is directly adjacent to the reservoir. Thinning overstocked stands, regenerating degraded stands, and generally diversifying age structure would improve the outlook for long-term maintenance of forest cover in this important area. Although only about 20% of the City's land holdings in the combined Ashokan and Schoharie basins are located in the immediate Ashokan reservoir area (pre-MOA lands), nearly 1,700 acres, or 60% percent of the stands that have been identified as over-mature or otherwise at high risk of disturbance are located here. Other lands in a similar condition are located throughout the MOA lands in the Ashokan basin (770 acres) and Schoharie basin (640 acres); however, these are generally in scattered locations and of smaller acreage blocks.

Over the past few years, over-mature, stands surrounding the Ashokan Reservoir have been gradually addressed through treatment. Where appropriate, additional treatments will be planned in these areas to build on the previous projects. Management will particularly focus on stands currently damaged or threatened by the recently discovered infestation of emerald ash borer. To a lesser extent, projects will be identified to address impacts from other pests and environmental disturbances such as hemlock wooly adelgid, defoliating insects, drought, and blow-downs. At least one firewood project will be planned and to the extent possible, will be located within the 4,000 acres needing treatment. Unless a major disturbance occurs that warrants a reevaluation of the aforementioned, no projects are planned within the Schoharie basin in the next two years.

Anticipated short-term goals for harvest areas over the next two years in the Ashokan basin will be 200 acres annually.

Cannonsville/Pepacton

The application of the primary stand attributes to the western Delaware basins (Cannonsville and Pepacton) results in a narrowing to approximately 7,200 acres to be treated in the next 10 years, excluding any salvage requirements that develop in the remainder of lands in those basins. Due to the size of the backlog indicated by this prioritization, the intended focus will be exclusively on commercial treatments. Priority will be given to forest management actions on the Pepacton Reservoir pre-MOA lands, building upon previous management work in the basin that was intended to mitigate deer browse impacts on regeneration by treating large total acreages through a series of smaller harvest sites located within a deer herd's home range. Though priority will be given to the Pepacton basin during this period, projects will be initiated in the Cannonsville basin though at a lesser scale.

Securing and protecting regeneration is a key component of the desired condition outlined in the FMP because it is the source of long-term forest cover. The Pepacton areas selected were, for the most part, composed of large contiguous acreages with good existing access on the Pepacton Reservoir pre-MOA lands. This resulting targeted acreage is approximately 1,400 before limiting areas based on slope, exclusion zones, wetlands and endangered species habitats. The determination of how much area may be removed from consideration due to those factors will be conducted in the field and assessed as part of the planning process.

Deviations from this general planning will be considered for major disturbance events that prompt salvage activities. While there may be some means of dealing with small scale minor disturbance such as the broadly dispersed blow-down that resulted from Hurricane Irene (2011), salvage activities will be mostly limited to events that result in more catastrophic loss, like a tornado or microburst would cause. Insect or disease invasions, such as emerald ash borer or chestnut borer, will be evaluated on a case-by-case basis so that management actions can take into account the most current science in the context of the local forests and the City's management goals. At least one firewood project will also be planned and to the extent possible, will be located within the 7,200 acres needing treatment.

Anticipated short-term goals for harvest areas over the next two years will be 200 acres annually.

Neversink/Rondout

Beech bark disease, hemlock woolly adelgid, and maple decline all impact some areas of the Neversink and Rondout Basins and are a major issue in these two basins. In addition, the arrival of emerald ash borer can be reasonably expected within the next five years, if the insect is not already present. In cases

when pest and disease agents such as these create widespread tree mortality, salvage work may take priority over other management opportunities and be outside the acres to be treated in Table 2.

Forest management work in the last 5 years has largely focused on salvage thinning of these impacted areas and will continue in this manner for the foreseeable future. This work provides the City with benefits that include: improved tree vigor, captured value of impacted trees and regeneration planning. The majority of the forest management projects planned in the Neversink and Rondout Basins will feature aspects of this discussion and may be modified to address any new causes of tree mortality.

In addition to salvage needs above, the 3,100 acres identified in Table 2 for the Neversink and Rondout Basins can be further prioritized based on a number of the ownership-wide considerations discussed above. Collectively, considerations such as slope, access, property configuration, and soils help to determine whether a suitable landing location and haul road access for harvested timber is available for any given stand. In situations where constructing access is feasible and consistent with forest management priorities, the access will be established prior to or as part of forest management work. Where commercial management is not possible, non-commercial forest management may occur, but cost and aesthetic considerations (such as an undesirable appearance due to the amount of felled wood that is left lying on the ground) may render stands that are ready for treatment based on an analysis of primary stand attributes not treatable when viewed from the aspects of practical decision-making and labor allocation.

Since the ownership-wide considerations discussed above cannot always be queried from a dataset, in some cases they will remain qualitative judgments that will be made by the DEP forester, in consultation with the Forestry Interdisciplinary Technical Team. Analysis of the stand map produced by application of the discussed thresholds to the primary stand attributes suggests that ownership-wide considerations may eliminate up to 80% of the identified stands from consideration for treatment, primarily due to a current lack of forest management infrastructure. Examples of necessary infrastructure mostly involve construction of level landings and roads and associated water crossings, cut-and-fill grading, and surface amendments.

The process of prioritizing stands in the Neversink and Rondout Basins will involve a two-step stand screening process addressing two major questions: Where are commercially valuable trees dying or likely to die soon? And, can the area be treated without major infrastructure improvement? This process reduces the initial 3,100 acres identified in the basins to approximately 620 acres of readily-accessible stand area in need of treatment. If major forest infrastructure improvement work can be done that creates access to large areas of the high-risk forest conditions identified by the primary stand attributes, those areas can be added to the acreage considered for treatment. Several firewood projects will also be planned and to the extent possible, they will be located within the 3,100 acres needing treatment or in salvage areas. Additionally, at least one pilot project will be chosen and marked for forest stand improvement (FSI) work to be conducted by DEP Operations.

Anticipated short-term goals for harvest areas over the next two years will be 200 acres annually.

East-of-Hudson

In the East-of-Hudson (EOH) watershed, analysis of the primary stand attributes as discussed above identifies approximately 1,900 acres potentially in need of a regeneration treatment and 1,700 acres in need of a thinning treatment. Breaking that acreage down by the EOH management units discussed in the FMP yields the following:

Table 5. East-of-Hudson Acres Identified for Treatment by Treatment Type and Management Unit

	Boyd's/West Branch	Kensico	Croton System
Regeneration	200	500	1,200
Thinning	900	100	700
Total	1,100	600	1,900

Planned commercial management will focus initially (for at least the next 5 years) on land in the Boyd's Corner and West Branch basins. Though other EOH basins, particularly Kensico, have areas of forest that are older and at a higher risk of loss, the highly suburban character of the land in those basins complicates commercial management. Successful implementation of forest management projects in the more rural Boyd's Corner and West Branch basins can ultimately be used as a demonstration of DEP's work for those that may have reservations about forest management on City land. Unanticipated commercial management, i.e. salvage, may be implemented in any EOH basin if a disturbance occurs.

Land in the Boyd's Corner and West Branch basins that are located in the Towns of Carmel and Putnam Valley will be eliminated from consideration at this time due to regulations that severely restrict forest management. Removing those acres reduces the acreage appropriate for treatment to 200 acres of regeneration and 700 acres of thinning.

Non-commercial work under stewardship contracts may be appropriate for many locations EOH, particularly in the Croton system, where narrow, linear blocks of land bounded by a reservoir on one side and a road on the other are common and very difficult to manage commercially. A small pilot project will be implemented in a Croton System basin to assess the ability to efficiently contract for forest improvement services. If successful, a number of stands identified through the primary attribute analysis could be treated non-commercially. Funds for stewardship contracts will be sought for FY 2014.

Once stands have been identified as potentially suitable for treatment, they will be reviewed in GIS for issues that might preclude management such as lack of access, poor soils, significant wetlands presence, steep slopes or high levels of invasive species. Next, a field inspection will be performed, focusing on a qualitative assessment of the accuracy of the attribute values; the ease of accessing the stand with logging equipment; the suitability of the soil and topography for a skid trail network; and any complicating factors such as invasive species presence or wetlands or intermittent streams that are not included in existing GIS coverage. Stands that are not eliminated in the GIS review or field examination will be inventoried at a higher intensity than that which was used in the FMP to verify stand attribute values and determine accurate timber volumes so that potential for commercial management can be confirmed. If commercial potential exists, a prescription tailored to stand conditions can be developed for implementation. If disturbances occur that need to be addressed, efforts may be shifted from planned commercial management to salvage operations.

Anticipated short-term goals for harvest areas over the next two years will be 100 acres annually.

5. Forest Management Project Planning

This implementation strategy establishes a formal process for selecting forest management project locations based on the inventory data collected for the FMP. The development of the *DEP Forest Management Projects and Conservation Practices* document established a revised environmental review

process for forest management through the formation of the FITT with the expectation that the time frames for completing environmental reviews, for those projects falling under the CPs, would be reduced. Fulfillment of this expectation is vital in meeting the goals of increasing the acres to be treated. It will take an ongoing commitment from all those involved for this to be successful. As a result of these new processes, it will take some time to build the institutional familiarity to allow the DEP Forestry Program and FITT to operate at optimal efficiency. As the process matures over time, it is anticipated that annual production in acres and/or number of projects will increase. DEP will strive to initiate eight forest management or stewardship projects each year. Average project size is anticipated to be 50-100 acres. Much larger projects with phased implementation will be explored to increase treated acreage.

Future forest management projects will be identified for, at minimum, a rolling-two year period on an annual basis. While planning is an ongoing process, project planning will generally be centered around presentations at the semi-annual FITT meetings in January and July. An updated Forest Project Timeline detailing the status of current projects and identifying future projects will be maintained. Adjustments may need to be made to the timeline due to unforeseen events such as disturbances that require salvage, changes to review processes that would require significant re-planning of projects or planned reallocation of resources. The use of the Timeline will allow DEP to track events that cause delays to implementation of forest management projects so that steps can be taken, if appropriate, to minimize similar delays in the future.