Welcome to the

Turkey River
Watershed Restoration
and Management Plan

Plan Début

We'll be starting our evening together at 5:00.

Technical issues? **Please call or email:**

UMWA@MerrimackRiver.org

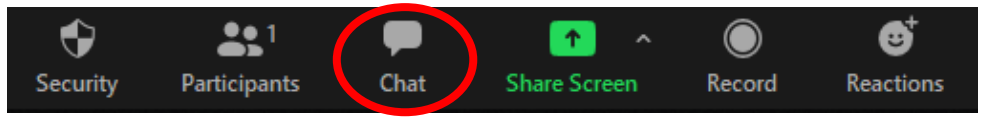
603.796.2615

UPPER MERRIMACK WATERSHED ASSOCIATION

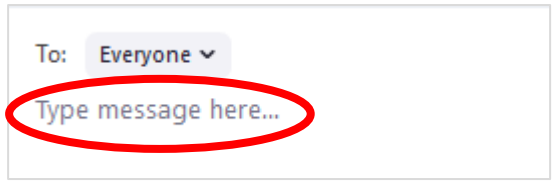
PO Box 3019
Penacook NH 03303
MerrimackRiver.org

Housekeeping

1. **Click “Chat” on banner at bottom screen**



2. **Type name and organization**
   (chat box at lower right corner of screen)



3. **Use chat to ask questions during intro presentation…group discussion at end of presentation**

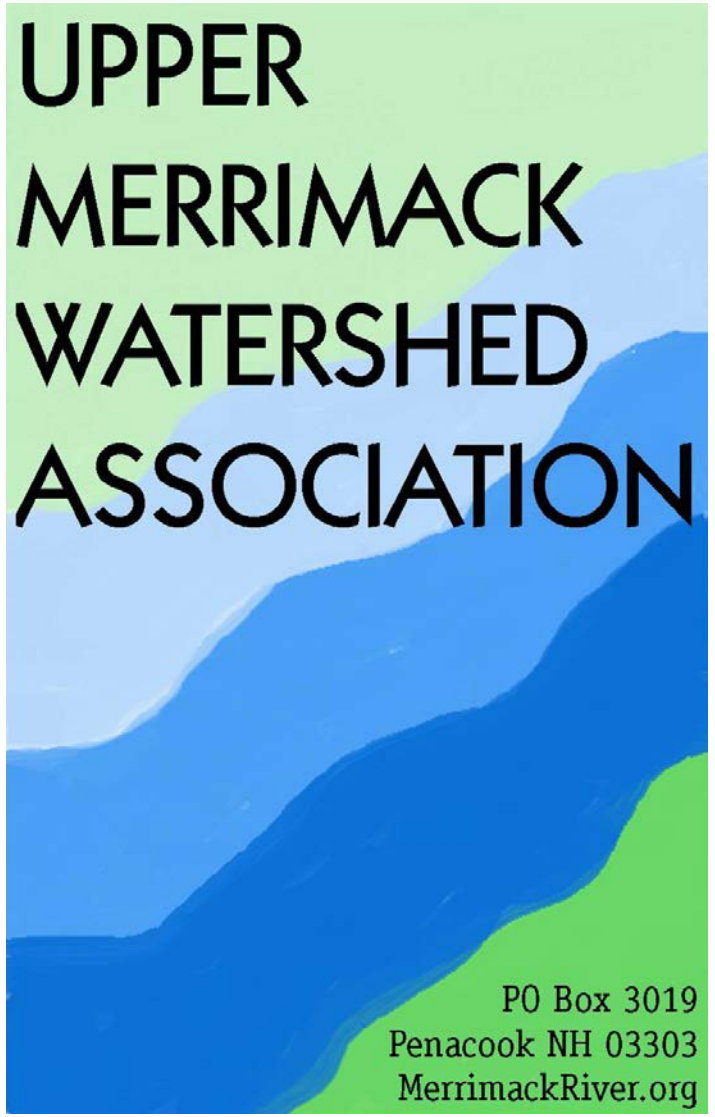
In case of Zoom problems: UMWA@MerrimackRiver.org or 603.796.2615

Agenda

1. **Welcome** *(Michele L. Tremblay, UMWA President)*
2. **Who is UMWA, how is this project supported, why a *Turkey River Watershed Restoration and Management Plan*?** *(Michele Tremblay)*
3. **Project Team Introductions** *(Michele Tremblay)*
4. **What is Watershed-Based Plan?** *(Jeff Marcoux, Watershed Supervisor, Watershed Management Bureau, NHDES)*
5. **Turkey River Watershed Restoration and Management Plan: A Guided Tour** *(Bob Hartzel, CEI)*
6. **Next Steps** *(Michele Tremblay)*
7. **Comments and questions** *(Everyone)*

UMWA?

- Created in 2016 as a nonprofit
- Manages the Upper Merrimack Monitoring Program
- Works closely with the Upper Merrimack River Local Advisory formed in 1990
- UMMP data catalyzed the Turkey River Watershed Restoration and Management Plan project with funding from DES, communities, and members



Turkey River
Watershed Restoration and Management Plan

Plan Début:
August 25, 2021

Funding for this project was provided by the Upper Merrimack Watershed Association and a Watershed Assistance Grant from the NH Department of Environmental Services with Clean Water Act Section 319 funds from the U.S. Environmental Protection Agency.

UPPER MERRIMACK WATERSHED ASSOCIATION

COMPREHENSIVE ENVIRONMENTAL INC

CNHRPC

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

What is a Watershed Based Plan?

- ✓ **Identify and quantify pollutant sources**
- ✓ **Determine potential solutions**
- ✓ **Develop plan to implement**
- ✓ **Develop plan to reassess**

A "9-element plan" is required by EPA for all s.319-funded watershed projects

The 9 Elements

Element A:

Identify ***causes and sources*** that need to be controlled to achieve necessary pollutant load reductions.

The 9 Elements

Element B:

Determine ***pollutant load reductions*** needed to meet water quality goals

The 9 Elements

Element C:

Develop ***management measures*** to achieve water quality goals.

BMPs = Best Management Practices

Structural

Non-structural

Public Education

The 9 Elements

Element D:
Estimate the ***technical and financial assistance*** needed to implement the plan.

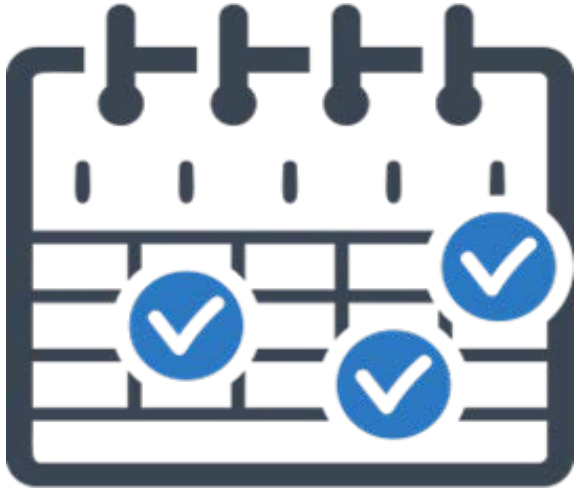
The 9 Elements

Element E:
Public Information and Education

The 9 Elements

Element F: Implementation Schedule

Element G: Interim Measureable Milestones



The 9 Elements

Element H: Criteria to measure progress

Element I: Monitoring

Why are we here?

Figure 1-1
Delineated Subwatersheds

Turkey River Watershed

Legend

- Sample Station
- Stream, River
- Lake, Pond, Reservoir
- Town Boundaries

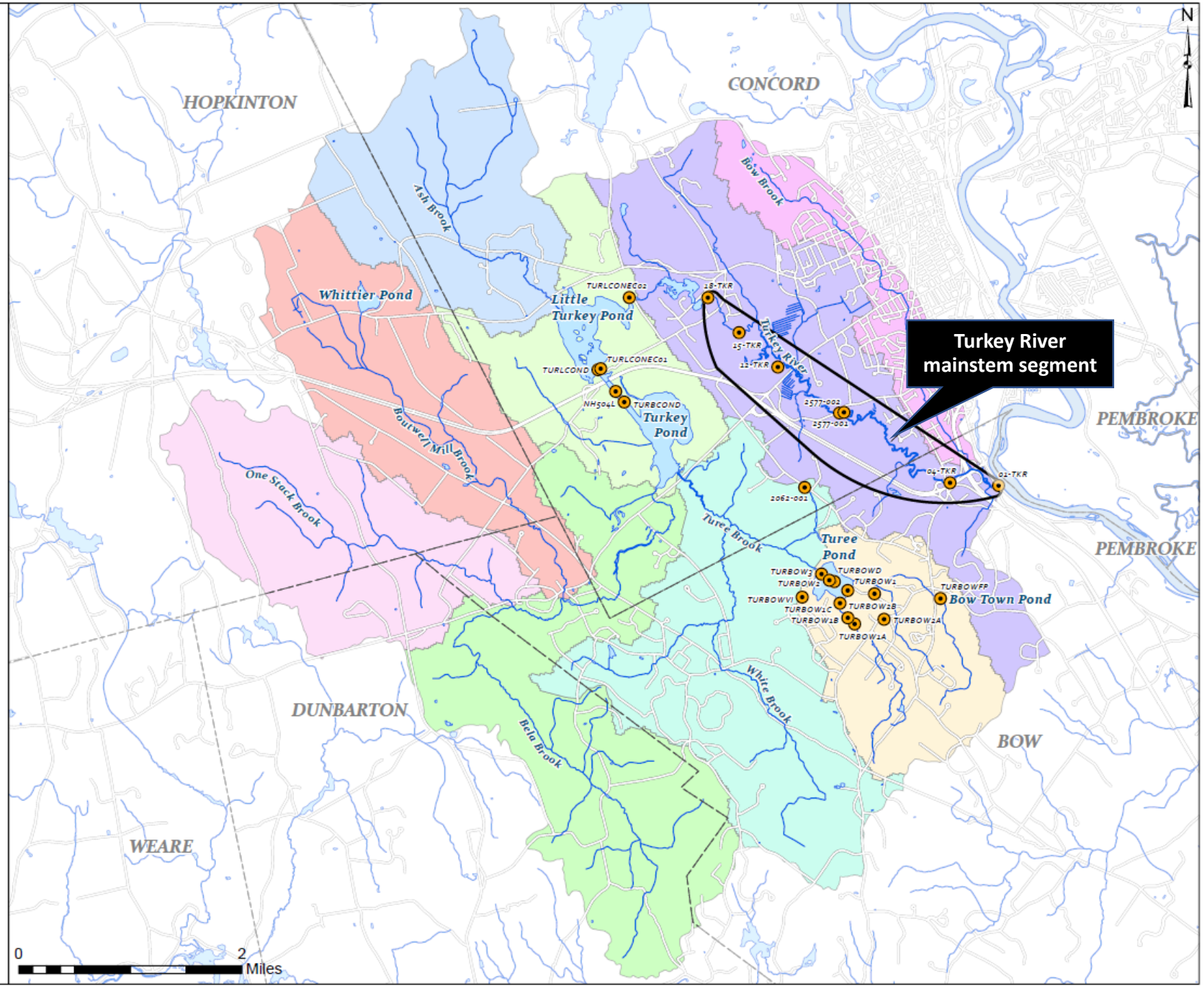
SubWatershed

- Ash Brook
- Bela Brook
- Boutwell Mill Brook
- Bow Brook
- One Stack Brook
- Turee Brook
- Turee Pond
- Turkey Pond/ Little Turkey Pond
- Turkey River

UPPER MERRIMACK WATERSHED ASSOCIATION

Prepared by:

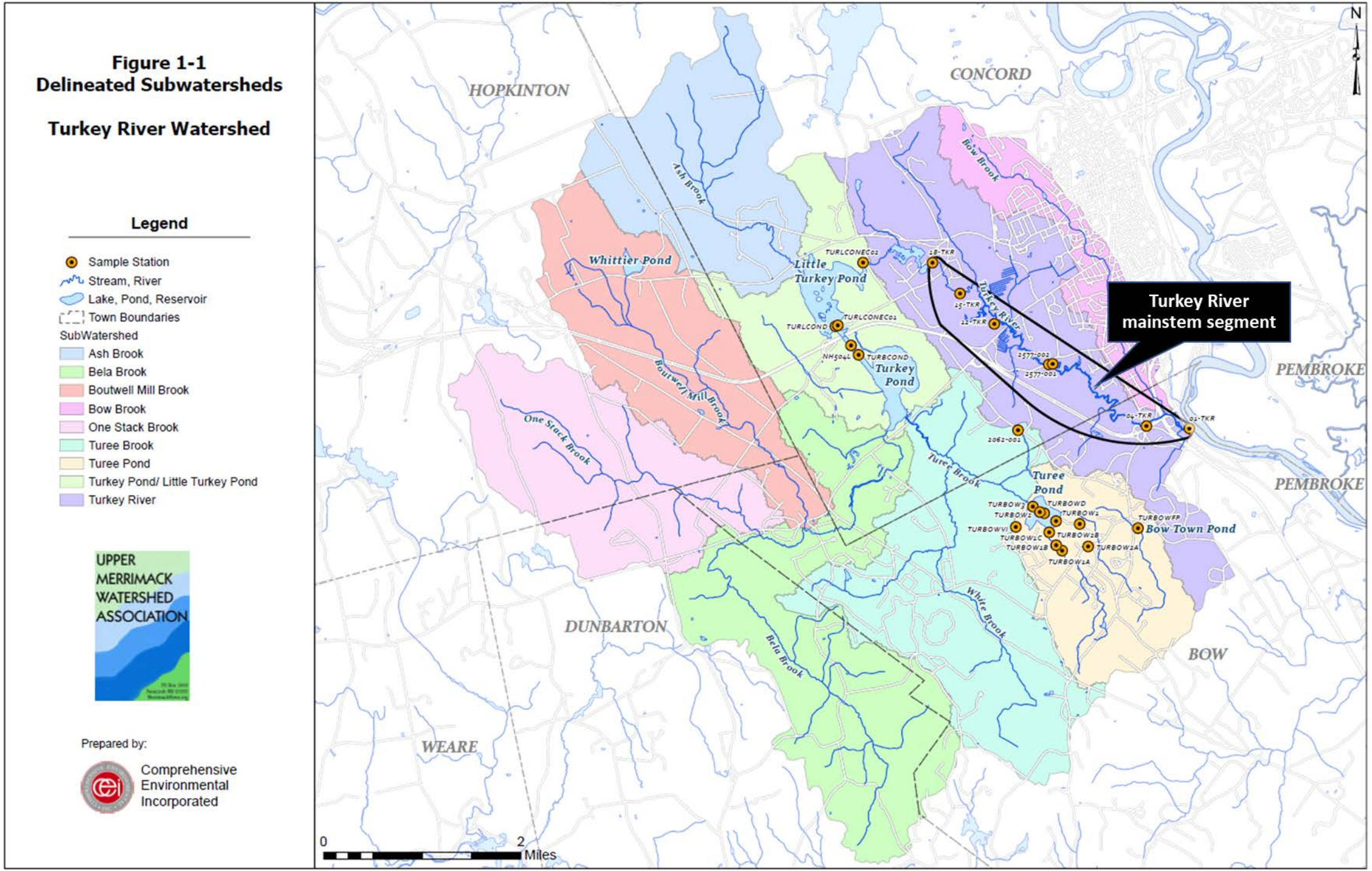
Comprehensive Environmental Incorporated



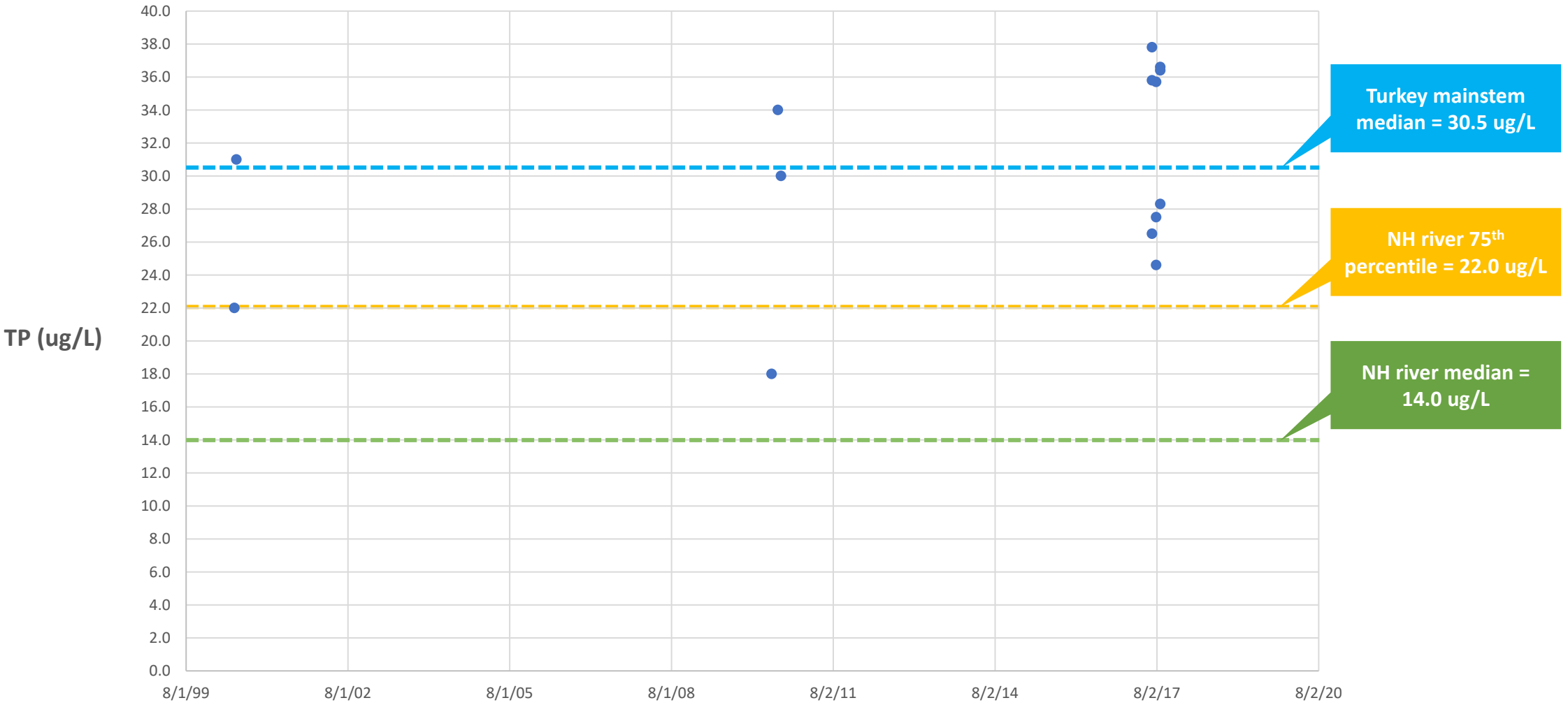
Turkey River Water Quality Data

Figure 1-1
Delineated Subwatersheds

Turkey River Watershed



Turkey River Mainstem Segment, Total Phosphorus (1996-2017)



Water Quality Goal

2 Water Quality Goal

NH Standards

- NH has numeric nutrient criteria for lakes, but not for rivers.
- NHDES is currently in the process of developing numeric nutrient criteria, which is expected to take several years.

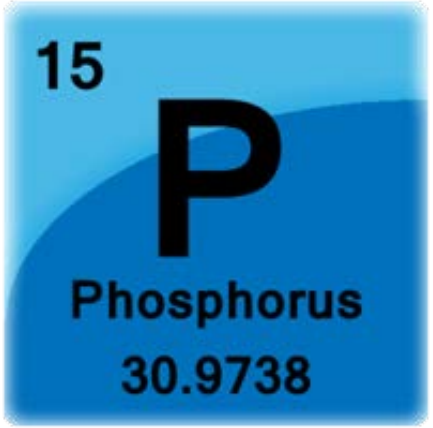
NH Water Quality Standards for Class B Waters:

*"Class B waters shall contain no **phosphorus or nitrogen** in such concentrations that would impair any existing or designated uses, unless naturally occurring."*

2 Water Quality Goal

Water quality goals often focus on the **limiting nutrient…**typically phosphorus in freshwater systems.

- Turkey River water quality goal is based on **total phosphorus (TP)**



Setting Water Quality Targets

The Goldilocks Dilemma

1. **Too Extreme: goal not realistically attainable**
   (e.g., pre-development loading scenario)

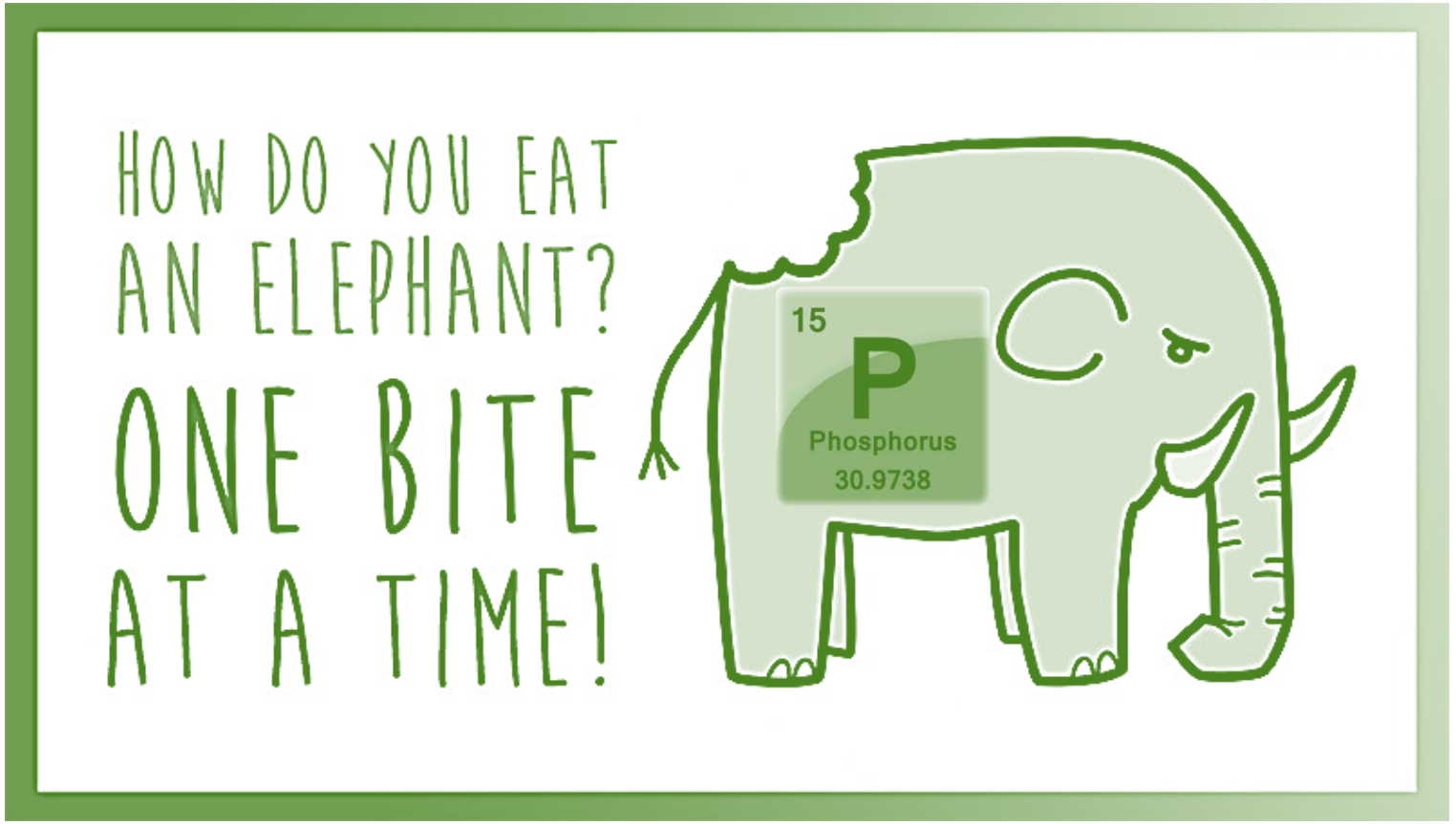
2. **Not Protective Enough: goal is achievable but may not prevent water quality impairments**
   (e.g., algae blooms, habitat impairment)

   - should consider both ***current conditions*** and ***future buildout***

3. **Just Right: goal is both realistically attainable and will achieve WQ objectives**

Potential Total Phosphorus TP) Goals for the Turkey River

TP Goal	% Reduction from Mainstem Median TP (30.5 ug/L)	% Reduction from Predicted Mainstem TP at Buildout (39.3 ug/L)	Discussion
30 ug/L	1.6%	23.7%	This goal would focus on staying below the TP **threshold discussed by NHDES as a potential state standard for rivers**. Requires significant ongoing effort to achieve 23.7% reduction at buildout.
27 ug/L	11.5%	31.3 %	Vermont Class B(2) WWMG standard is a challenging goal – particularly as watershed continues to develop. If achieved, it **would provide 10% AC** if 30 ug/L adopted as New Hampshire river standard.
21 ug/L	31.1%	46.6 %	Vermont Class B(1) WWMG standard is a very aggressive goal. This goal **may be challenging to achieve and maintain**, particularly as the watershed continues to develop.
18 ug/L	41.0%	54.2 %	Vermont Class A(1) WWMG standard is **may be unrealistic** to achieve for the Turkey River mainstem, given current/projected development.


HOW DO YOU EAT AN ELEPHANT?
ONE BITE AT A TIME!
15
P
Phosphorus
30.9738

Nutrient Load Modeling

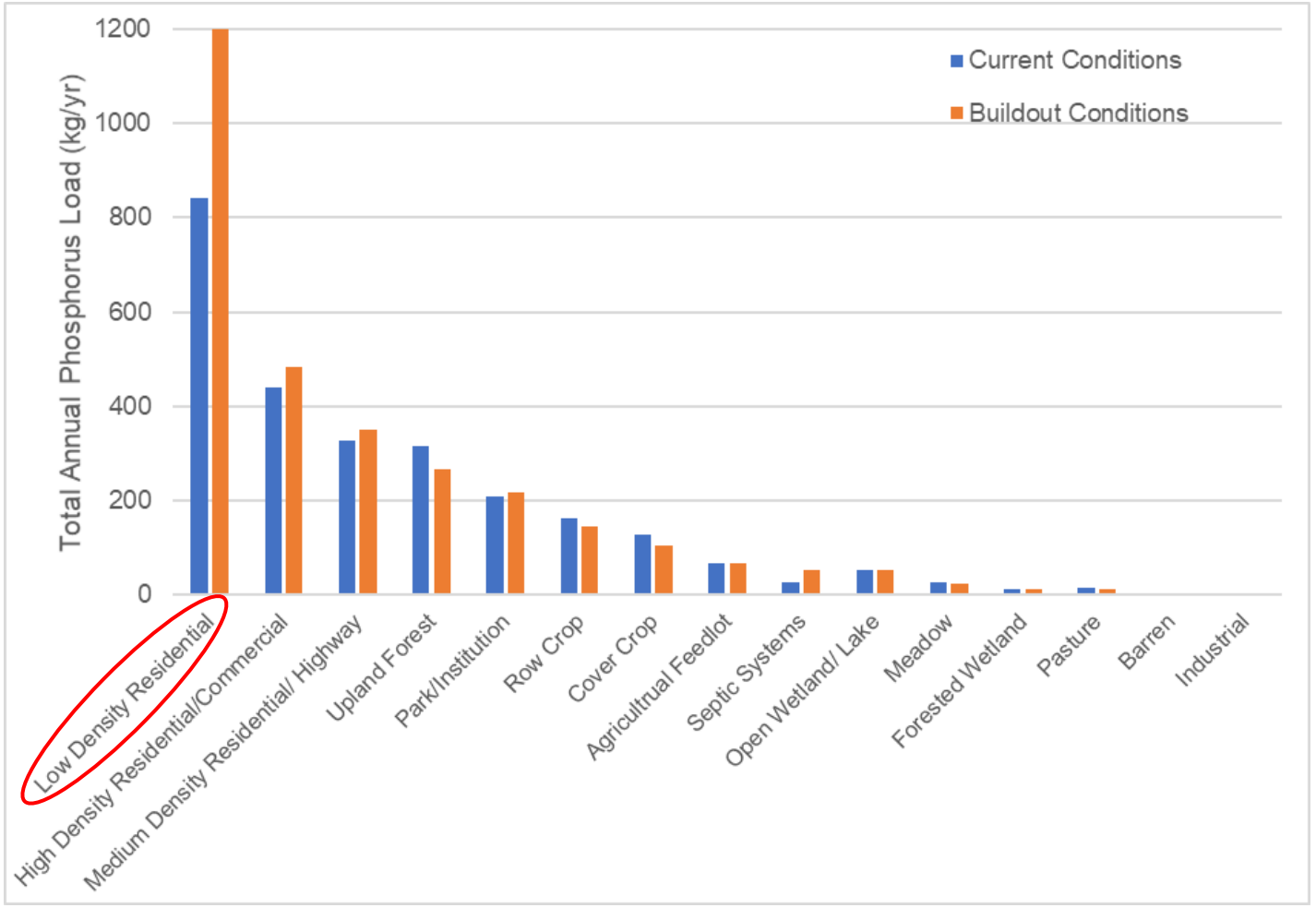


Figure 5. Estimated Total Annual Phosphorus Load from Land Uses

Table 14. Estimated calibrated TP loading by subwatershed (existing conditions and potential buildout conditions)

Subwatershed	Area (ha)	Discharge (hm^3/y)	Existing Conditions			Potential Buildout Conditions			Estimated Percent Increase		
			Urban LU (ha)	TP Load (kg/yr)	TP Conc. (µg/L)	Urban LU (ha)	TP Load (kg/yr)	TP Conc. (µg/L)	Urban LU (ha)	TP Load (%)	TP Conc. (%)
Bow Brook	459.1	0.25	315.2	357.3	143.2	352.9	388.7	157.0	12%	9%	10%
Turee Pond	712.9	0.37	220.7	178.0	47.7	279	213.3	57.5	26%	20%	21%
Turkey River	1580.2	5.24	462.2	1629.4	31.0	598.7	2037.7	39.3	30%	25%	27%
Turee Brook	1462.0	1.17	309.7	366.9	31.5	473.1	473.1	41.1	53%	29%	30%
Turkey Ponds	818.8	4.15	75.4	831.7	20.1	130	1137.3	27.7	72%	37%	38%
Bela Brook	1517.2	1.99	210.5	492.7	24.7	321.3	683.8	34.6	53%	39%	40%
One Stack Brook	1086.0	0.59	104.1	149.5	25.3	228.2	212.9	36.4	119%	42%	44%
Boutwell Mill Brook	1075.4	0.58	182.1	193.7	33.5	348.4	287.1	50.3	91%	48%	50%
Ash Brook	983.5	0.55	94.1	197.6	36.3	255.5	297.0	55.3	172%	50%	53%

Notes:

1. Time period is 2000-2017.
2. Load and concentration predictions include Septic System (27.6 kg/yr) predictions for Total Phosphorus
3. Urban Land Use (LU) is comprised of low density residential, medium density residential/ highway, high density residential/ commercial, industrial and parks/ institutions.
4. Predicted TP Concentration Increase:
   - Lowest (0-29%)
   - Medium (30-40%)
   - Highest (>40%)

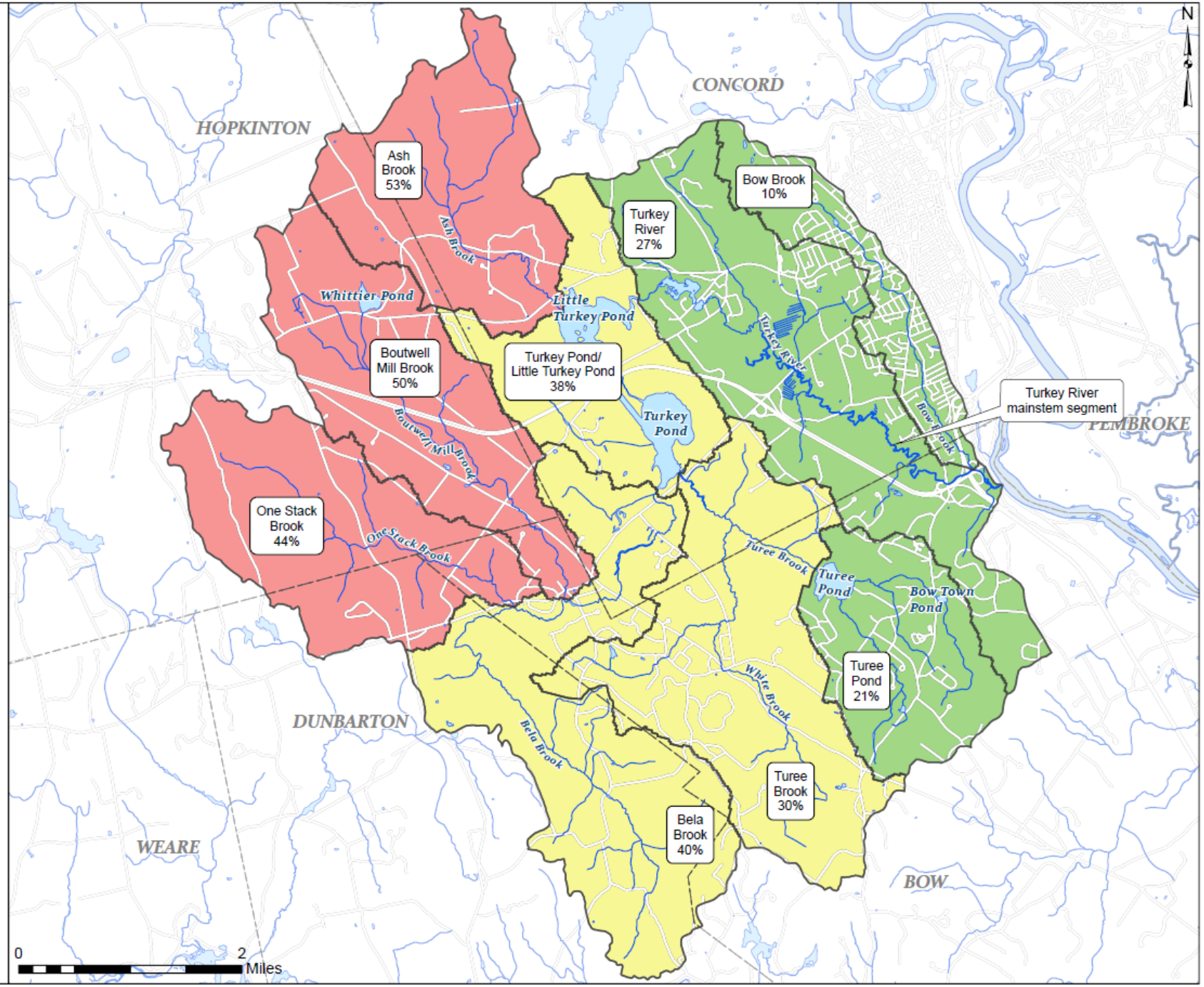
Figure 1-4
Estimated Increase in Annual Average TP Concentration per Subwatershed from Potential Buildout

Turkey River Watershed

Comprehensive Environmental Incorporated

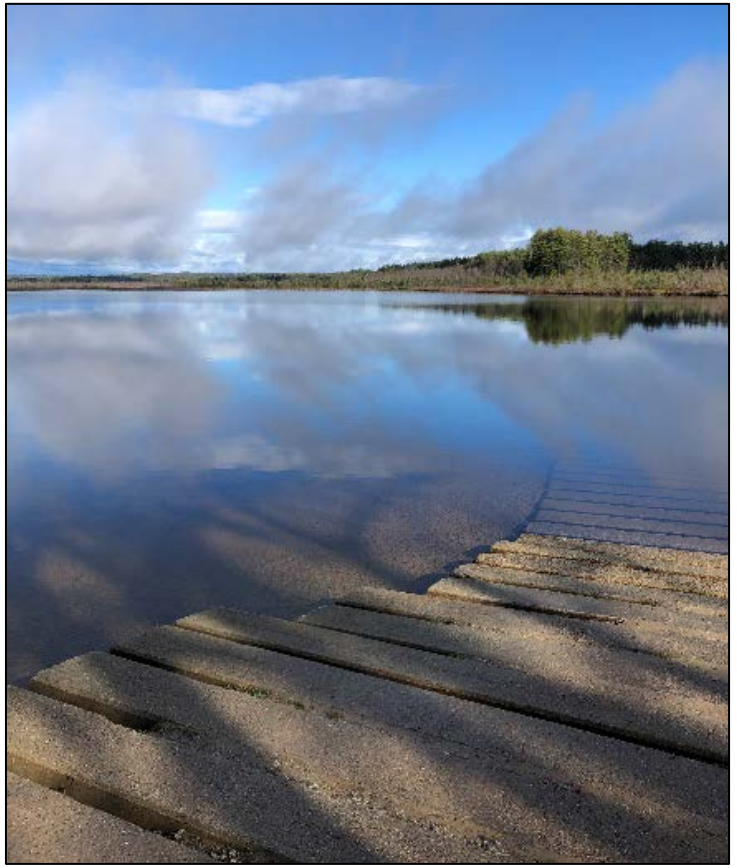
Legend

Predicted P Concentration Increase:
- Lowest (0-29%)
- Medium (30-40%)
- Highest (>40%)
- Subwatershed Boundaries
- Lake, Pond, Reservoir
- Stream, River
- Road



4 Watershed Management

Field Assessment for Structural BMP Concepts



- **Desktop/GIS Evaluation**
- **Preliminary Field Screening**
  - ***Thank you UMWA volunteers and project partners!***
- **Field Investigation** – High Priority Locations

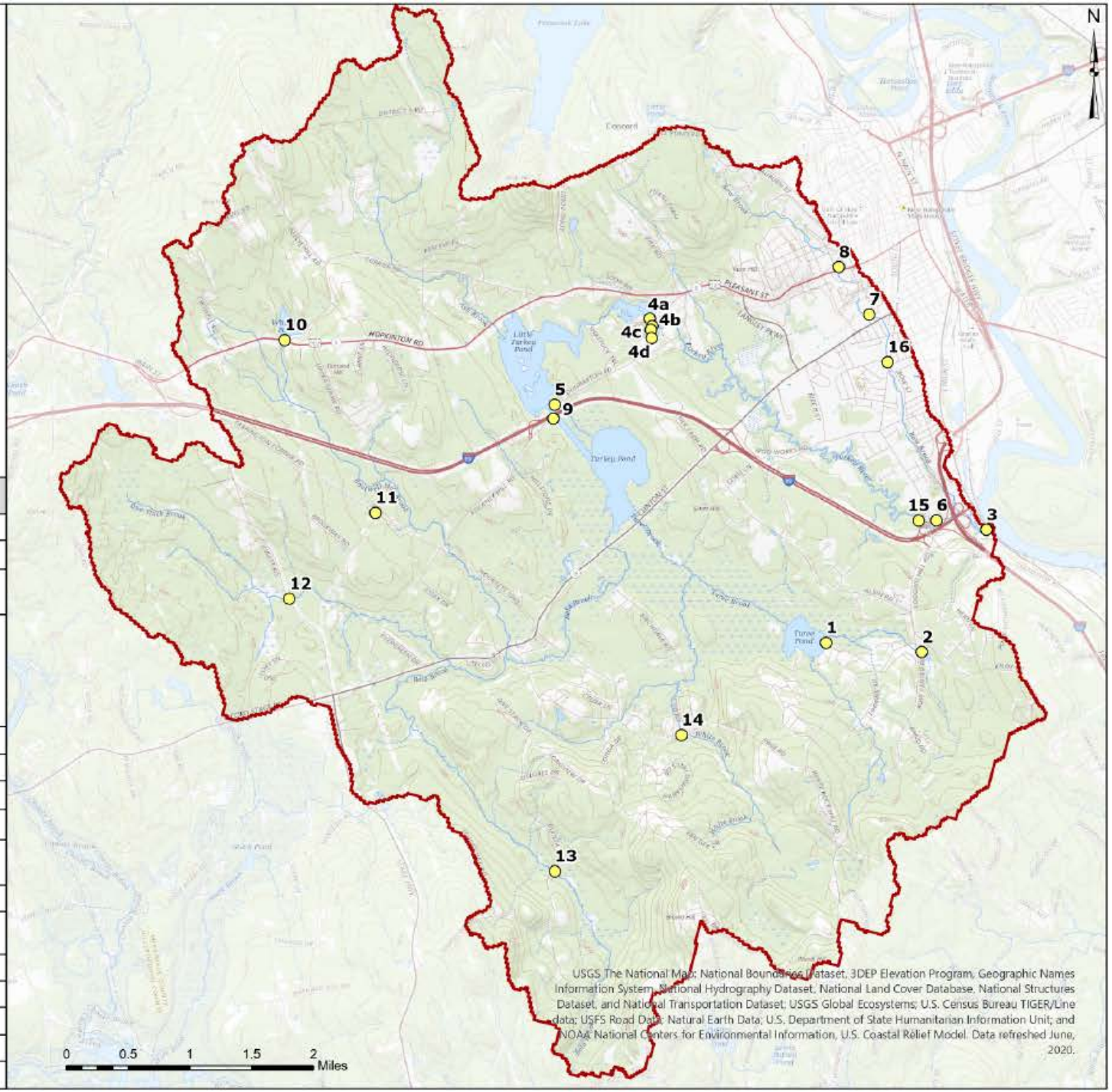
Figure 7
Potential Structural BMP Locations in the Turkey River Watershed

Comprehensive Environmental Incorporated

Legend

- BMPs
- Watershed Boundary

Site ID	Coordinates	Location
1	43.155968, -71.550860	Turee Pond Boat Launch on Falcon Way
2	43.154876, -71.535516	Bow Parks & Rec Dept. Building Parking Lot
3	43.169089, -71.525098	Grappone Toyota Service Center; Rte. 3A near Turkey River confluence with Merrimack River
4a	43.193918, -71.578870	St Paul's School, Sites 4a-4d
4b	43.193034, -71.578479	
4c	43.192602, -71.578723	
4d	43.191634, -71.578592	
5	43.183819, -71.594177	Turkey Ponds Boat House
6	43.170172, -71.533145	Hampton Inn Parking Lot
7	43.194370, -71.543858	Concord District Courthouse
8	43.199953, -71.548721	Concord High School Parking Lot
9	43.182199, -71.594389	Pedestrian Bridge over Little Turkey Pond, (adjacent to I-89)
10	43.191426, -71.637496	Whittier Pond
11	43.171142, -71.622934	Boutwell Mill Brook at Farrington Corner Road (near Brockway Road)
12	43.161189, -71.636776	One Stack Brook at Jewett Road
13	43.129170, -71.594207	Bela Brook at Grapevine Road
14	43.145162, -71.573864	White Brook at Page Road
15	43.170155, -71.535991	Turkey River near Chen Yang Li Restaurant
16	43.188773, -71.540925	Abbot Downing School



BMP Scoring Criteria

Factor	Criteria			Score		
	Low	Medium	High	Low	Medium	High
TP Removal	< 0.2 lb/yr	0.2 to 0.75 lb/yr	> 0.75 lb/yr	10	15	25
Capital Cost[1]	> $50k	$25k - $50k	< $25k	10	15	25
Waterbody Proximity	Not Near Waterbody	Within 100-ft of Waterbody	Within 50-ft of Waterbody	5	10	20
Implementation Complexity[2]	High	Moderate	Low	5	10	20
Public Visibility / Outreach	Low Potential Visibility	Moderate Potential Visibility	High Potential Visibility	0	5	10

Notes:

1. Capital cost is based on the high end of the estimate with a contingency factor of 20% applied.
2. Implementation complexity is a qualitative indicator based on the following criteria: property ownership, site access, potential for underground utility conflicts, potential for tree removal, potential for traffic impacts, and potential for wetland permitting. Scored based on professional judgement.

Area ID	Location	Existing Issues	Proposed Improvements	Estimated Load Reduction			Construction Cost ($)	Engineering Cost ($)	Capital Cost Range		Ranking Factors / Scoring					Score	Site Priority
				TP (lb/yr)	TN (lb/yr)	TSS (ton/yr)					TP Removal	Capital Cost	Waterbody Proximity	Imp. Complexity	Public Visibility		
1	Turee Pond Boat Launch on Falcon Way	Eroding parking area near boat launch.	Pave boat ramp and parking area and install tree box filter.	0.22	1.64	0.06	$65,000	$26,000	$72,800	$109,200	M	L	H	M	H	65	Medium
2	Bow Parks and Rec Dept. Building Parking Lot	Eroding sandy slope and runoff discharge from parking lot into Bow Town Pond.	Stabilize/armor eroding slope (appx. 2,200 sf), repave parking lot, install series of 3 treebox filters, and improve vegetated buffer.	1.50	6.50	1.18	$195,000	$78,000	$218,400	$327,600	H	L	H	L	H	70	High
3	Grappone Toyota/Service Center	Gully erosion along bank at access point to Turkey River.	Stabilize eroding bank (appx. 600 sf) with native vegetation plantings and bio-stabilization techniques.	1.00	2.00	1.10	$15,000	$6,000	$16,800	$25,200	H	M	H	H	M	85	High
4a	St. Paul's School	Narrow buffer adjacent to Library Pond.	Enhance buffer along the shoreline with double row of shrub plantings (appx. 2,000 sf). Stabilize walking path upgradient of narrow buffer with pea gravel.	-	-	-	$23,000	$9,200	$25,760	$38,640	L	M	H	M	M	60	Medium
4b		Unstabilized bank and narrow buffer adjacent to Library Pond.	Stabilize appx. 700 sf area using biostabilization techniques.	0.20	0.60	0.40	$7,000	$2,800	$7,840	$11,760	M	H	H	H	M	85	High
4c		Narrow buffer along appx. 100 ft of shoreline receives runoff from paved Rectory Rd.	Enhance buffer along the shoreline with double row of shrub plantings (appx. 2,100 sf)	0.70	1.30	0.80	$12,000	$4,800	$13,440	$20,160	M	H	H	M	M	75	High
4d		An unpaved footpath discharges directly into southern side of Library Pond.	Install waterbars to redirect runoff away from Pond and reduce erosion. Enhance appx. 375 sf buffer area with woody plantings.	1.55	4.10	1.73	$16,000	$6,400	$17,920	$26,880	H	M	M	H	M	75	High
5	Crumpacker Boathouse	Eroding dirt road and minimal buffer adjacent to Little Turkey Pond.	Install waterbars to direct runoff away from Pond and reduce erosion. Enhance 2,100 sf buffer with double row of shrubs/trees.	0.12	0.90	0.0	$21,000	$8,400	$23,520	$35,280	L	M	M	M	M	50	Low
6	Hampton Inn Rear Parking Lot	N/A - opportunistic implementation area.	Install appx. 1,000 sf infiltration basin or rain garden in center of the parking lot.	0.31	2.60	0.04	$27,000	$10,800	$30,240	$45,360	M	M	L	L	L	40	Low
7	Concord District Court	Minimal buffer along Bow Brook. Areas of erosion observed at culvert.	Develop a 20-ft Stabilize erodin							,080	L	H	H	H	M	80	High
8	Concord High School Parking Lot	N/A - opportunistic implementation area.	Install infiltratio parking lot.							,040	H	M	M	L	M	60	Medium
9	Footpath Along Interstate-89	Runoff from concrete foot bridge enters Little Turkey Pond.	Install infiltratio Armor downgra							,840	L	H	M	L	L	50	Low
10	Currier Road Culvert near Whittier Pond	Areas of erosion adjacent to culvert headwall and road shoulder. Sediment buildup downstream of culvert.	Armor headwall forebay and lined riprap channel downstream of culvert to prevent further erosion.	-	-	-	$13,000	$5,200	$14,560	$21,840	L	H	M	L	L	50	Low
11	Boutwell Mill Brook	Runoff from the roadway and parking area enter Boutwell Mill Brook.	Stabilize side of Farrington Corner Road with riprap. Install treebox filter to collect runoff from unpaved parking area.	0.16	1.47	0.03	$27,000	$10,800	$30,240	$45,360	L	M	H	L	L	50	Low
12	Jewett Road Culvert Over One Stack Brook	Erosion of headwall embankment caused by runoff from road.	Install riprap along headwall and wingwall embankment areas to limit erosion caused by surface runoff.	-	-	-	$5,000	$2,000	$5,600	$8,400	L	H	H	M	L	65	Medium
13	Grapevine Road Culvert Over Bela Brook	Unstabilized area and erosion directly adjacent to Bela Brook from Grapevine Rd.	Stabilize existing area with riprap. Create small riprap lined energy dissipation area (110 sf) around existing catch basin.	0.06	0.11	0.07	$9,000	$3,600	$10,080	$15,120	L	H	M	H	L	65	Medium
14	Page Road Culvert Over White Brook	Roadside erosion of sandy soils on the southern side of Page Road.	Armor area surrounding culvert inlet and outlet, including embankment, to prevent erosion. Establish vegetated buffer along roadway (appx. 150 ft) consisting of shrubs and hearty grasses.	0.34	0.68	0.40	$18,000	$7,200	$20,160	$30,240	M	M	H	M	L	60	Medium
15	Turkey River Near Chen Yang Li Restaurant	Embankment adjacent to Turkey River is getting undercut from parking lot runoff.	Stabilize embankment with gabion wall (appx. 10 ft tall by 100 ft long). Enhance stream buffer with native woody plantings (appx. 2,800 sf).	-	-	-	$86,000	$34,400	$96,320	$144,480	L	L	M	L	L	35	Low
16	Abbot-Downing School	N/A - opportunistic implementation area.	Armor unpaved footpath with gravel to limit erosion. Direct runoff from upgradient parking area to approx. 300 sf raingarden.	0.20	1.68	0.03	$22,000	$8,800	$24,640	$36,960	M	M	M	L	H	55	Low
			TOTALS	7.4	32.7	6.0	$608,000	$243,200	$680,960	- $1,021,440							

If all listed BMPs are constructed:

- TP load reduced by **7.4 lbs/yr**,
- **Cost range:** $681K - $1M (avg. $44K per site)

Example BMP Sites

AREA 1: Turee Pond Boat Launch and Parking Area

Location: Turee Pond Boat Launch
Subwatershed: Turee Pond
Owner: New Hampshire Dept. of Fish and Game
Priority: Medium

Photo 1-1: Boat ramp extending into Turee Pond.

Photo 1-2: Concrete block boat ramp undercut.

Photo 1-3: Dirt parking area eroding and washing into pond.

Proposed Improvements:

1. **Pave** parking /boat launch area; Install **trench drain** above boat launch to capture runoff

2. Install **tree box filter** north of the boat ramp to capture runoff from the trench drain and parking.

3. **Regrade undercut** at boat ramp; ensure proper future maintenance

AREA 2: Bow Parks and Recreation Parking Lot

Location: Bow Parks and Recreation Building
Subwatershed: Turee Pond
Owner: Town of Bow
Priority: High

Photo 2-4: Proposed BMP configuration for Bow Parks and Recreation Parking Lot

Proposed Improvements:

1. Install **asphalt berm** on south side of parking lot; direct runoff into treebox filters.
2. **Re-pave /re-grade parking lot** to eliminate ponding and unwanted flow channels, promoting positive drainage to tree box filters.
3. Increase **vegetated buffer** along shoreline areas with a double row of shrub plantings.
4. **Stabilize steep slope** with riprap and vegetation
5. Install **sediment traps** in existing catch basins.

AREA 3: Turkey River Historic Landing

Location: Grappone Toyota Service Center
Owner: Bow Junction Associates Inc.
Subwatershed: Turkey River
Priority: High

Photo 3-1: Severe erosion adjacent to water access point.

Photo 3-2: Loose stone and sand on slope.

Photo 3-3: Severe erosion adjacent to water access point.

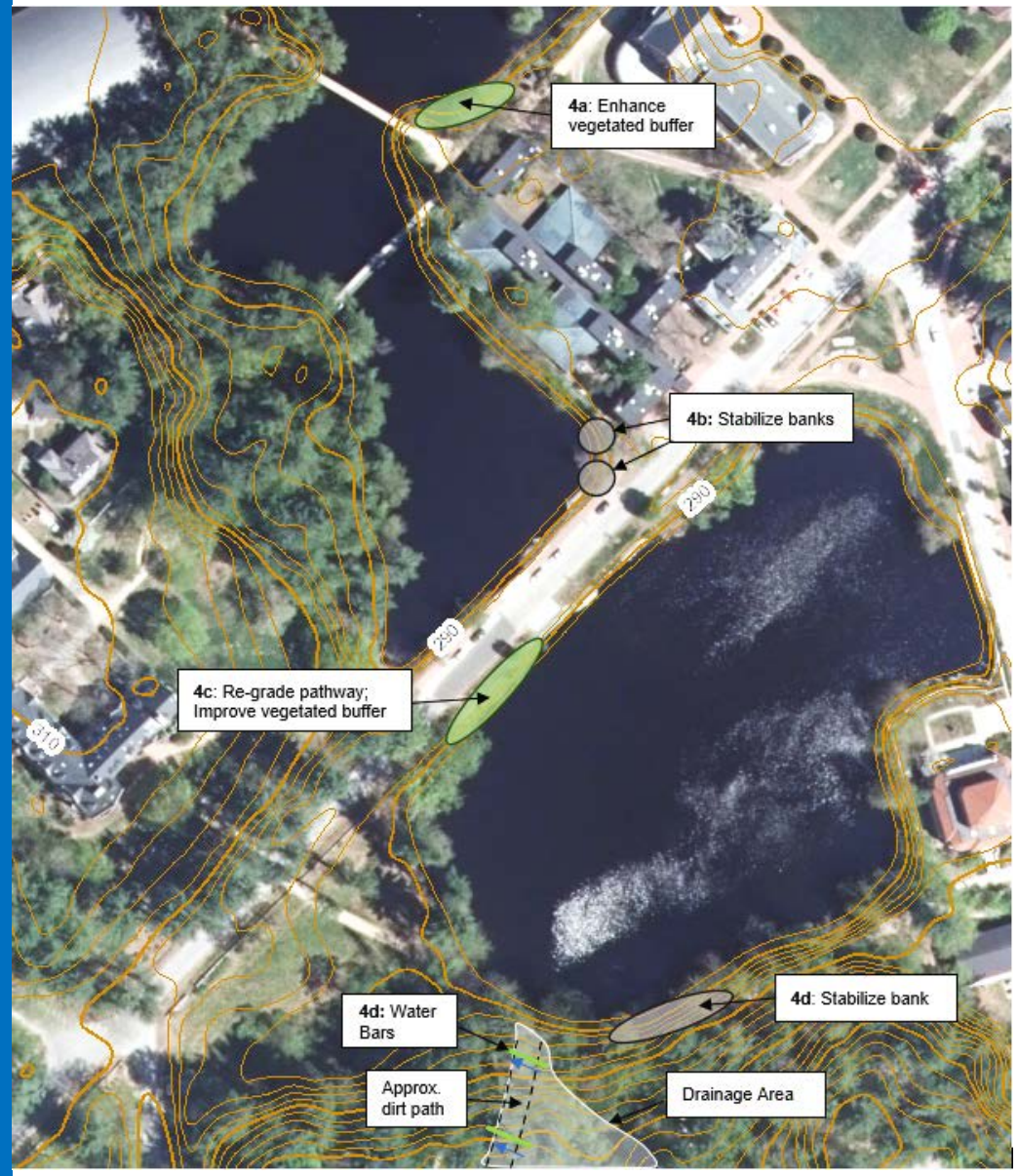
Proposed Improvements:

Stabilize eroding bank with **native vegetation / bio-stabilization** techniques.

Pedestrian access point to remain.

AREA 4: St. Paul's School

Location: Library Pond
Owner: St. Paul's School
Subwatershed: Turkey River
Priority: Varies (See Table 15)



Proposed Improvements:

4a: Enhance buffers with native trees and shrubs

4b: Stabilize eroding banks using a combination of biostabilization and stone stabilization as needed.

4c: Re-grade dirt pathway to promote drainage of runoff away from Library Pond. Improve buffer with native plantings.

4d: Install **2 water bars** on dirt footpath descending hill towards site 4d. Stabilize eroding bank and improve buffer with native plantings.

AREA 7: Concord District Court

Location: Grassed Fields North of Court House
Owner: State of New Hampshire
Subwatershed: Bow Brook
Priority: High

Photo 7-1: Western portion of Bow Brook.

Photo 7-2: Edge of roadway erosion channel.

Photo 7-3: Eastern portion of Bow Brook

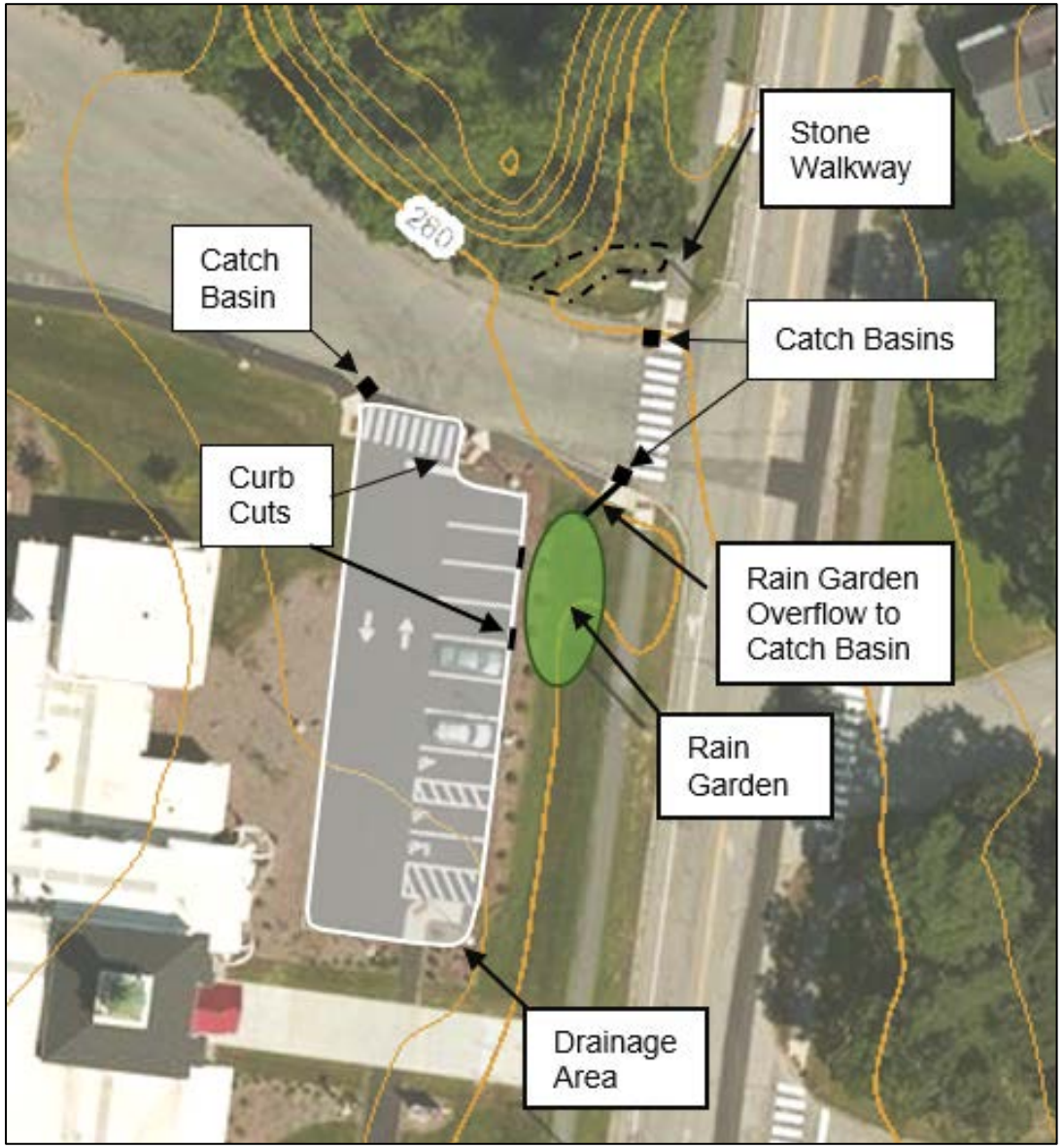
Proposed Improvements:

1. Develop **20-ft "no-mow" zone** along 1000 feet of Bow Brook to allow both herbaceous and woody vegetation to grow, stabilizing the bank and increasing attenuation of stormwater pollutants

2. Stabilize roadway erosion with riprap

AREA 16: Abbot-Downing School

Location: 152 South Street, Concord, NH **Subwatershed**: Bow Brook
Owner: City of Concord **PRIORITY**: Low



Proposed Improvements:

1. **Armor the unpaved footpath** down to the stream with gravel to limit erosion.

2. Direct runoff from parking area to a **rain garden** (approx. 300 sf) by installing curb cuts. Connect underdrains in the rain garden to the catch basin at corner of South Street / school entrance.

Culvert Improvements

Why did the turkey cross the culvert?

Because it had full aquatic organism passage compatibility.

Culvert Improvements

Stream Crossing Structure Improvement Prioritization Metrics

Priority	Structure Condition	Aquatic Organism Passage Compatibility	Geomorphic Vulnerability	Hydraulic Vulnerability
High	Poor condition	No passage	Fully or mostly incompatible	Overtops at < 25-yr storm
Medium	Fair condition	Reduced passage	Partially compatible	Overtops at 50-100-yr storm
Low	Good condition	Full passage	Fully or mostly compatible	Overtops at >100-yr storm

Sub-Watersheds Stream Crossings Map

Turkey River Watershed

Legend

- Stream Crossing
- Stream, River
- Lake, Pond, Reservoir
- Town Boundaries

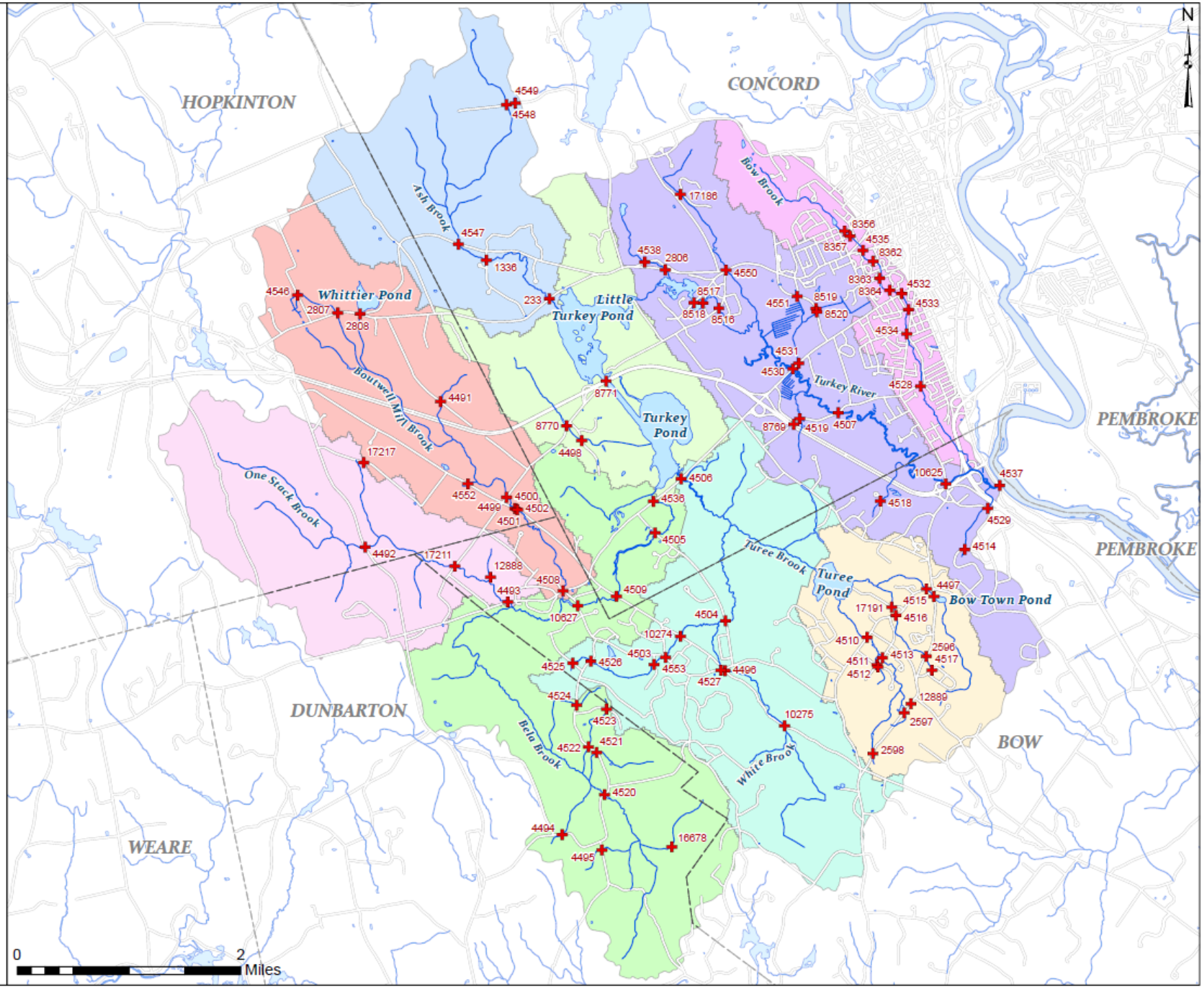
SubWatershed

- Ash Brook
- Bela Brook
- Boutwell Mill Brook
- Bow Brook
- One Stack Brook
- Turee Brook
- Turee Pond
- Turkey Pond/ Little Turkey Pond
- Turkey River

UPPER MERRIMACK WATERSHED ASSOCIATION

Prepared by:

Comprehensive Environmental Incorporated



Culvert Prioritization Matrix *(exerpt)*

Subwatershed	SADES ID	Town	Road Name	Structure Condition	AOP Compatibility	Geomorphic Compatibility	Hydraulic Vulnerability	SITE PRIORITY
Ash Brook	233	Concord	Hopkinton Rd	Poor	Reduced Passage	*no score*	*no score*	HIGH
	1336	Concord	Shenondoah Drive	Good	Full Passage	Mostly Incompatible	*no score*	MEDIUM
	4548	Concord	District 5 Road	Good	Reduced Passage	Mostly Compatible	High	MEDIUM
	4549	Concord	District 5 Road	Good	Reduced Passage	*no score*	*no score*	MEDIUM
	4547	Concord	Currier Road	Good	Full Passage	Partially Compatible	*no score*	LOW
Bela Brook	4494	Dunbarton	Grapevine Drive	Good	No Passage	Partially Compatible	High	HIGH
	4495	Dunbarton	Guinea Road	Good	Reduced Passage	Partially Compatible	High	MEDIUM
	4520	Dunbarton	Grapevine Road	Good	Reduced Passage	*no score*	*no score*	MEDIUM
	10627	Bow	Page Road	Fair	Reduced Passage	Partially Compatible	Medium	MEDIUM
	16678	Dunbarton	Stone Rd.	Fair	Reduced Passage	Mostly Incompatible	*no score*	MEDIUM
	4521	Dunbarton	Grapevine Road	Good	No Passage	Fully Compatible	Medium	MEDIUM
	4522	Dunbarton	Grapevine Road	Good	Full Passage	Mostly Compatible	Medium	MEDIUM
	4523	Dunbarton	Zachary Drive	Good	Reduced Passage	*no score*	*no score*	MEDIUM
	4524	Dunbarton	Grapevine Road	Good	Reduced Passage	Mostly Compatible	High	MEDIUM
	4505	Concord	Birchdale Road	Good	Full Passage	*no score*	*no score*	LOW
	4509	Concord	Hookset Tpk	Good	Full Passage	*no score*	*no score*	LOW
	4536	Concord	Clinton Street	Good	Full Passage	*no score*	*no score*	LOW
Boutwell Mill Brook	2807	Hopkinton	Hopkinton Rd	Fair	No Passage	*no score*	*no score*	HIGH
	2808	Hopkinton	Hopkinton Rd	Poor	*no score*	*no score*	*no score*	HIGH
	4491	Hopkinton	Upper Straw Road	Good	No Passage	Mostly Compatible	High	HIGH
	4501	Hopkinton	Branch Londonderry Tpk	Poor	Reduced Passage	*no score*	*no score*	HIGH
	4546	Hopkinton	Crowell Road	Good	No Passage	*no score*	*no score*	MEDIUM
	4552	Hopkinton	Farrington Corner Road	Good	Reduced Passage	Mostly Compatible	High	MEDIUM
	4500	Hopkinton	Branch Londonderry Tpk	Good	No Passage	*no score*	*no score*	MEDIUM
	4499	Hopkinton	Stickney Hill Road	Good	Reduced Passage	Fully Compatible	Low	LOW
	4502	Hopkinton	Branch Londonderry Tpk	Good	Full Passage	*no score*	*no score*	LOW
	4508	Bow	Clinton Street	Good	Full Passage	Mostly Compatible	*no score*	LOW

Septic System Risk Analysis

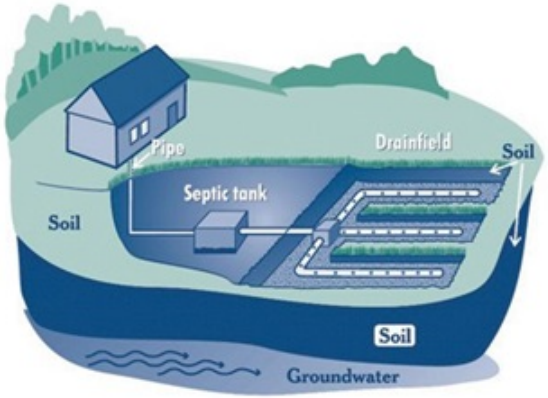


Table 18. Septic System Analysis for the Turkey River Watershed

Subwatershed	Septic System Characteristics		Environmental Conditions of Septic Systems			
	Total Number of Parcels on Septic Systems	Septic Density (tanks/acre)	Within 200 Feet of a Waterbody	With Very Limited Soil Absorption Rating	With Both Conditions	With Both Conditions and in a 1% FEMA Flood Zone
Turkey River	322	0.08	14	313	14	0
Bow Brook	37	0.03	7	37	7	0
Turkey Ponds	111	0.05	17	111	17	2
Ash Brook	127	0.05	11	124	9	0
Turee Brook	548	0.15	32	543	31	0
Turee Pond	331	0.19	23	327	23	0
Bela Brook	359	0.10	22	354	21	4
Boutwell Mill Brook	277	0.10	21	274	20	2
One Stack Brook	165	0.06	4	165	4	2
Total	**2,277**	**0.09 (Avg)**	**151**	**2,248**	**146**	**10**

Septic System Risk Analysis for the Turkey River Watershed

Legend

- Parcels with Septic Systems in Limited Soils, 1% FEMA Flood Zone, and 200' Buffer
- Parcels with Septic Systems in Limited Soils and 200' Buffer
- Parcels with Septic Systems in 200' Buffer
- Other Parcels with Septic Systems
- Parcels on Sewer
- Other Parcels
- Sub Watersheds
- Stream, River
- Lake or Pond
- Wetland
- Watershed Boundary
- Town Boundaries

Septic Tank Absorption Rating

- Very limited

FEMA Flood Hazard

- 1% Annual Chance Flood Hazard

Note: Selected Areas are within 200 ft. of surface water or wetlands, in areas of 1% FEMA flood hazard, and/or areas where soils have a Very Limited Absorption Rating for septic systems.

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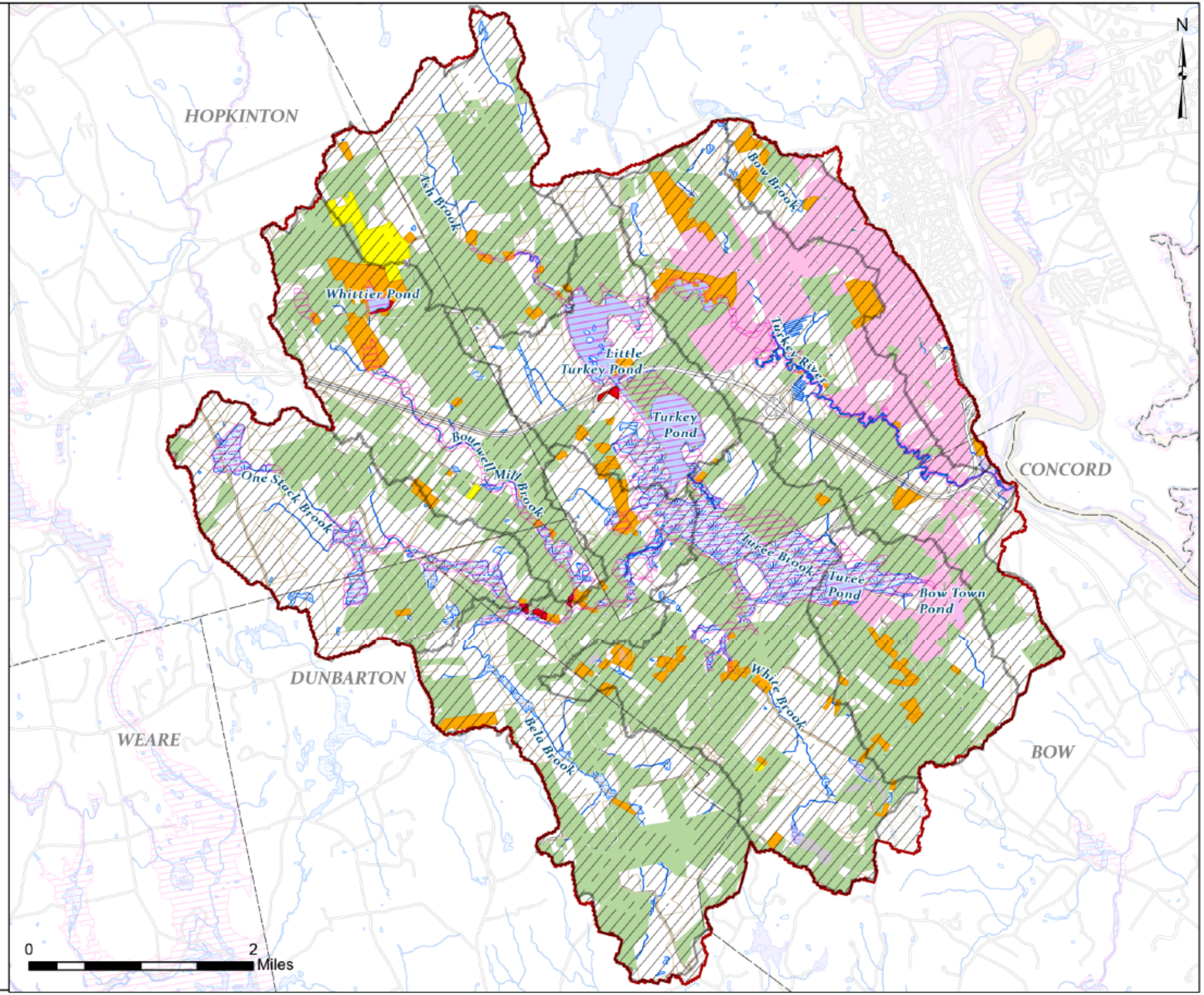
Data Sources: GRANIT, CNHRPC, NRCS



Non-structural BMPs

Public Information and Education

Land Conservation

Regulatory Tools

Institutional Practices

Public Information and Education

Watershed Steward Program (New Hampshire Rivers Council program)

UMWA will work with the Soak up the Rain program to identify specific infiltration projects in the Turkey River watershed.

UMWA will work with the Green SnowPro program to provide information to commercial property owners about sensible salt application.

Low Impact Development (LID) Techniques for Homeowners **workshop**

Coordination meetings with DPWs, NH Stream Crossing Initiative, NHDOT

Land Conservation

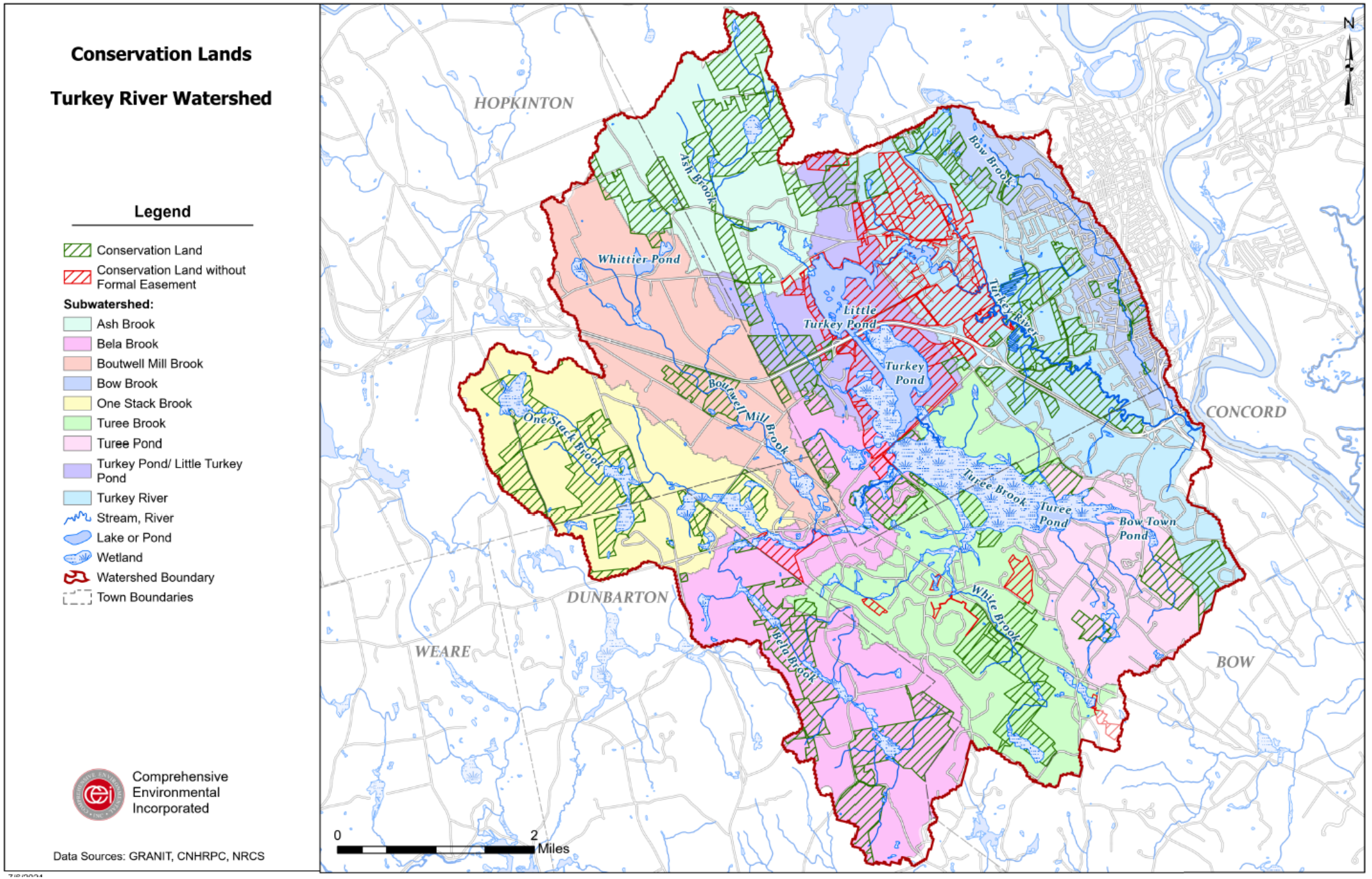
Coordinate with watershed municipalities and conservation groups to prioritize:

- land conservation goals
- target parcels

Silk Farm Wildlife Sanctuary, Concord

Conservation Lands

Turkey River Watershed



Comprehensive Environmental Incorporated

Data Sources: GRANIT, CNHRPC, NRCS

7/8/2024

Regulatory Tools

- **Strengthen municipal stormwater regulations**
- **Establish town regulations to enable/promote installation of alternative wastewater treatment systems based on proximity to a waterbody (i.e., 200 meters) for new development, redevelopment and replacement of failed systems.**
- **Develop landscaping fertilizer ordinances**

Institutional Practices

- **Increase frequency of catch basin cleaning** (*2 additional cleanings per year*)

- **Develop Enhanced Street/Pavement Cleaning Programs**

- **Develop Enhanced Organic Waste and Leaf Litter Collection Programs**

Non-structural BMPs

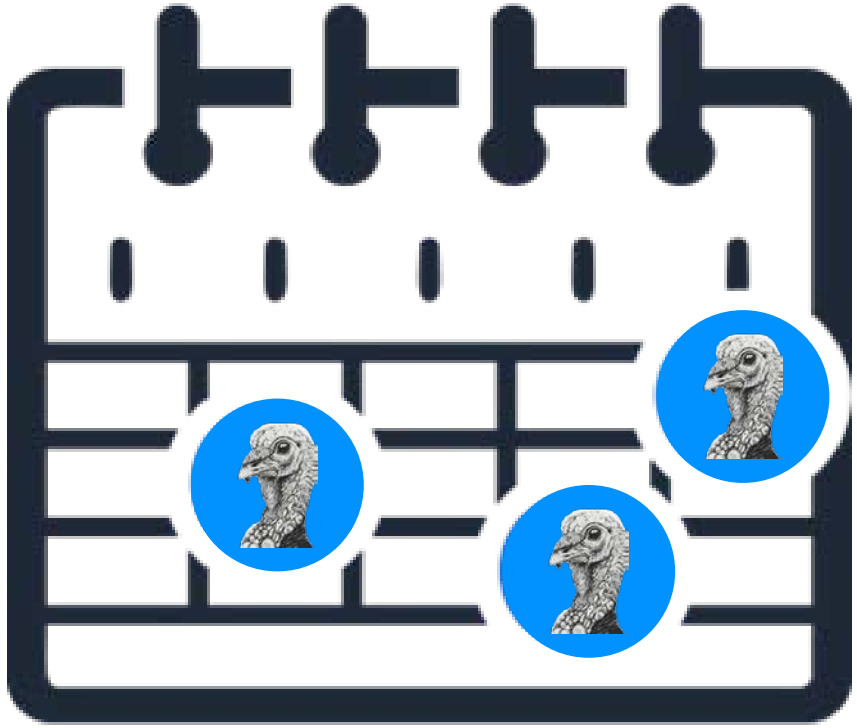
BMP Priority Ranking Factors*

L = Low	M = Medium	H = High

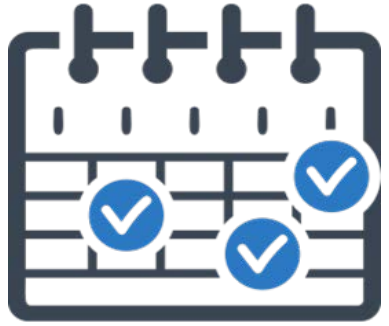
** For cost factors, lower cost = higher priority*

Non-structural BMP Category	BMP Description	Relevant Authorities	How BMP Achieves Pollutant Load Reductions or Other WRMP Goals	Pollutant Load Reduction Potential	Anticipated Costs	Feasibility	PRIORITY
Public Information and Education	Watershed Steward Program™ property assessments and related outreach	UMWA, NHRC, watershed homeowners	Reduces pollutant (P,N, and bacteria) loading by improved land management, such as reduced fertilizer use, improved septic system maintenance, stabilization of eroding areas, pet waste management, etc.	M	H	H	High
	Meetings with town DPW staff and staff of NHDOT and the NHSCI to coordinate WRMP implementation	UMWA, town DPWs, NHDOT, NHDES	Reduces pollutant (P,N, and bacteria) loading by improving coordination with agencies that are critical to BMP implementation. Improves schedule coordination, BMP prioritization, and BMP implementation logistics.	M	H	H	High
	Updates to the UMWA website to update public on the Turkey River WRMP and implementation efforts	UMWA	Serves as the primary clearinghouse for web-based information on progress to develop, implement, and update the WRMP.	L	H	H	Medium
	Conduct LID for Homeowners workshop	UMWA, watershed homeowners	Reduces pollutant (P and N) loading by educating homeowners and promoting adoption of LID practices such as raingardens, vegetated buffers, etc.	L	H	H	Medium
Land Conservation	Coordinate with local conservation groups to prioritize land conservation goals/target parcels. (land trusts, town planning/conservation staff, CNHRPC, UMWA, NHDES)	UMWA, CNHRPC, town planning staff, and other local land conservation orgs.	Prevents increases in pollutant loading associated with land development.	H	H	H	High
Regulatory Tools	Strengthen town stormwater regulations based on SWA model standards	Concord, Bow, Dunbarton, and Hopkinton Planning Boards and Boards of Selectmen	Reduces future increases in pollutant (P, N, and bacteria) loading associated with land development by improving regulatory performance standards for new development and redevelopment projects.	H	H	M	High
	Develop landscaping fertilizer ordinances	Concord, Bow, Dunbarton, and Hopkinton Planning Boards and Boards of Selectmen	Reduces P and N loading from landscaping fertilizer applications.	H	L-M	M	Medium
	Establish town regulations to enable/promote installation of alternative wastewater treatment systems based on proximity to a waterbody (i.e., 200 meters) for new development, redevelopment and replacement of failed systems.	Concord, Bow, Dunbarton, and Hopkinton Planning Boards and Boards of Selectmen	Reduces nutrient and bacteria loading from wastewater sources.	H	H	M	High
Institutional Practices	Increase frequency of catch basin cleaning (2 additional cleanings per year)	Town DPW/Highway Depts., NHDOT	Reduces P and N load as calculated according to NH Small MS4 General Permit formulas for each practice.	M	L	M	Medium
	Develop Enhanced Street/Pavement Cleaning Programs	Town DPW/Highway Depts., NHDOT		M	L-M	M	Medium
	Develop Enhanced Organic Waste and Leaf Litter Collection Programs	Town DPW/Highway Depts., NHDOT		M	L-M	M	Medium

6 Schedule and Milestones

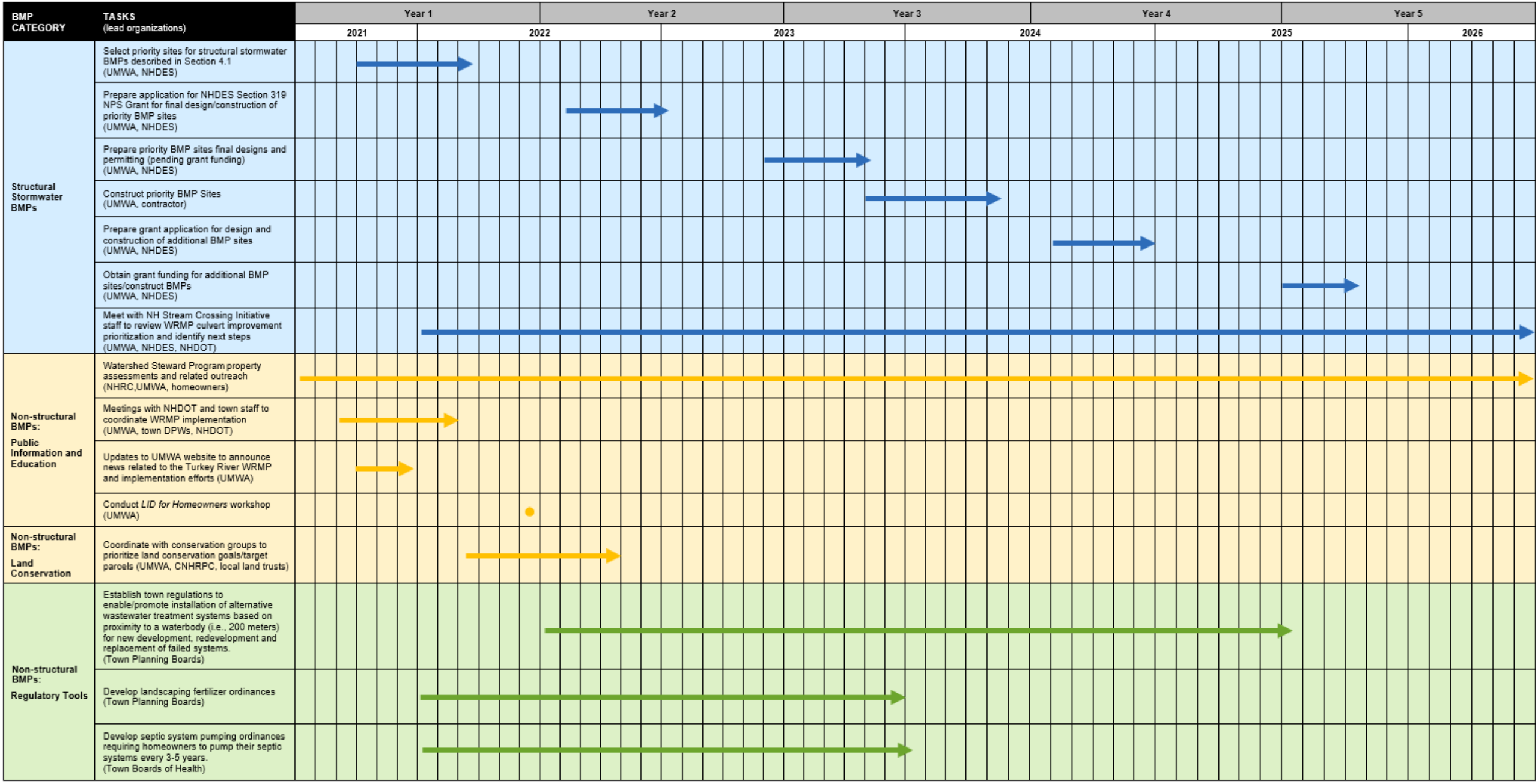


6 Schedule and Milestones

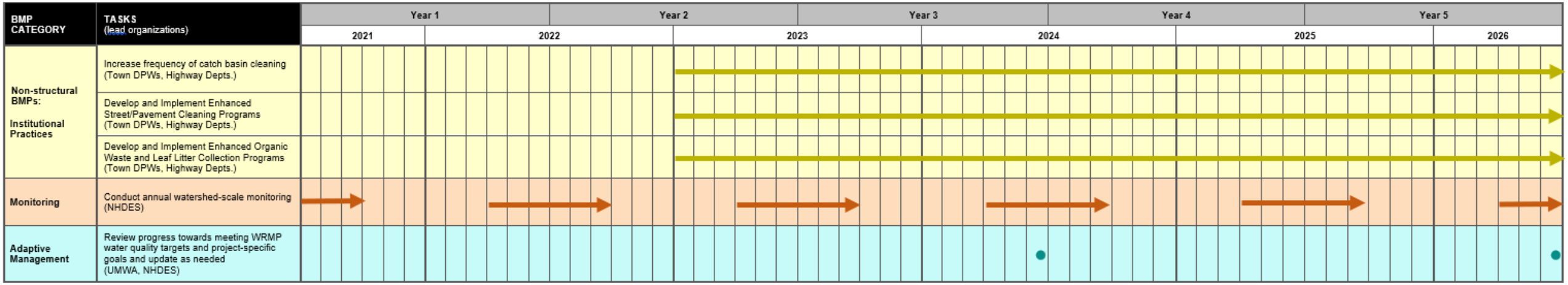


- **5-year planning/implementation period: Sept. 2021 – Sept. 2026**
- **Schedule / milestones organized according to:**
  - **Structural Stormwater BMPs**
  - **Non-structural BMPs**
    - Public Information and Education
    - Land Conservation
    - Regulatory Tools
    - Institutional Practices
  - **Monitoring**
  - **Adaptive Management**

Next Steps: Schedule and Milestones



Next Steps: Schedule and Milestones



7 Evaluation Criteria and Monitoring

EVALUATION CRITERIA

- **Water Quality Target:** TP concentration of **0.027 mg/L** for the Turkey River mainstem
- **TMDL Criteria:** Update the WRMP to reflect TMDL criteria *if established in the future*.
- **Project-Specific Indicators (**e.g., # of BMPs constructed, acres of new conservation land**)**

Monitoring

1. Continue monitoring at **4 existing stations in the Turkey River mainstem.** These stations should continue to provide basis **for comparison to the TP goal** (27 ug/L).

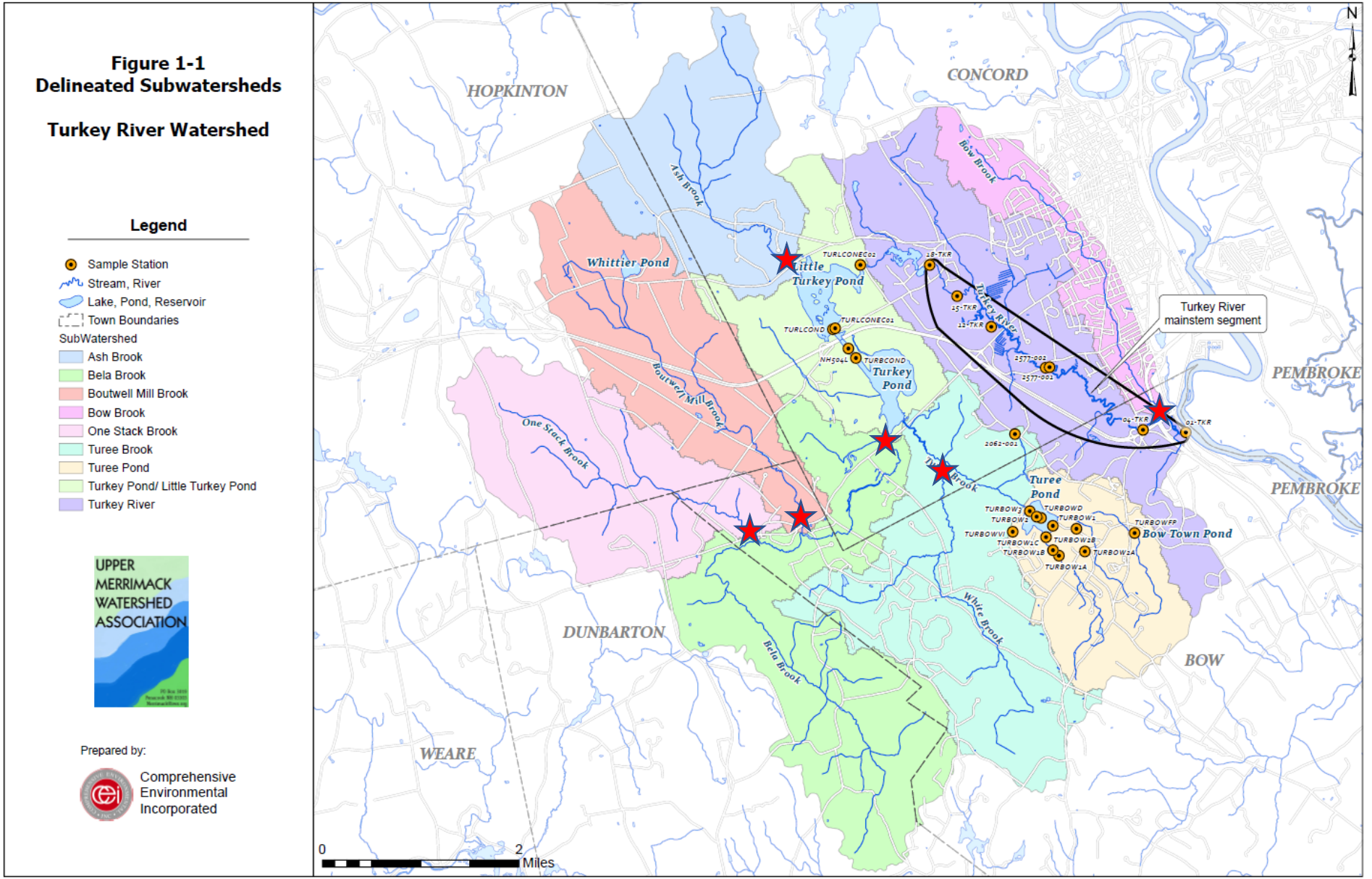
2. Median TP in Turkey River mainstem (30.5 ug/L) is based on very limited data. **More frequent TP monitoring** (e.g., annual summer monitoring) will strengthen the basis for future water quality goal setting and/or adaptive management.

3. The 6 river monitoring stations upstream of the mainstem are **not well distributed in watershed** - all within tributaries to Turee Pond.

- Monitoring stations should be established (★) at the **downstream reach of Ash Brook, Boutwell Mill Brook, One Stack Brook, Bela Brook, White Brook, and Bow Brook**.

Figure 1-1
Delineated Subwatersheds

Turkey River Watershed



Tributary data will :

1. help **characterize nutrient dynamics** in the watershed and

2. **track tributary response** to BMPs and future land development

Adaptive Management

- If, after **5 years of WBPA implementation**, direct measurements and indirect indicators do not show progress towards meeting water quality targets, **management measures and water quality targets should be revisited and modified accordingly**.

NEXT STEPS…

- Review/finalize the WRMP
- BMP implementation for high priority sites
  - Funding – select top sites for grant applications
- Coordination meetings
  - culvert priorities
  - structural BMPs
  - land protection, etc.
- Public outreach
  - UMWA website updates
  - Watershed Steward Program

Questions?