



CLIENTS | PEOPLE | PERFORMANCE

# Town of Uxbridge – Comprehensive Wastewater Management Planning

## Board of Selectmen – Recommended Plan Presentation

Marc R Drainville, PE, BCEE, LEED AP | GHD

January 11, 2016



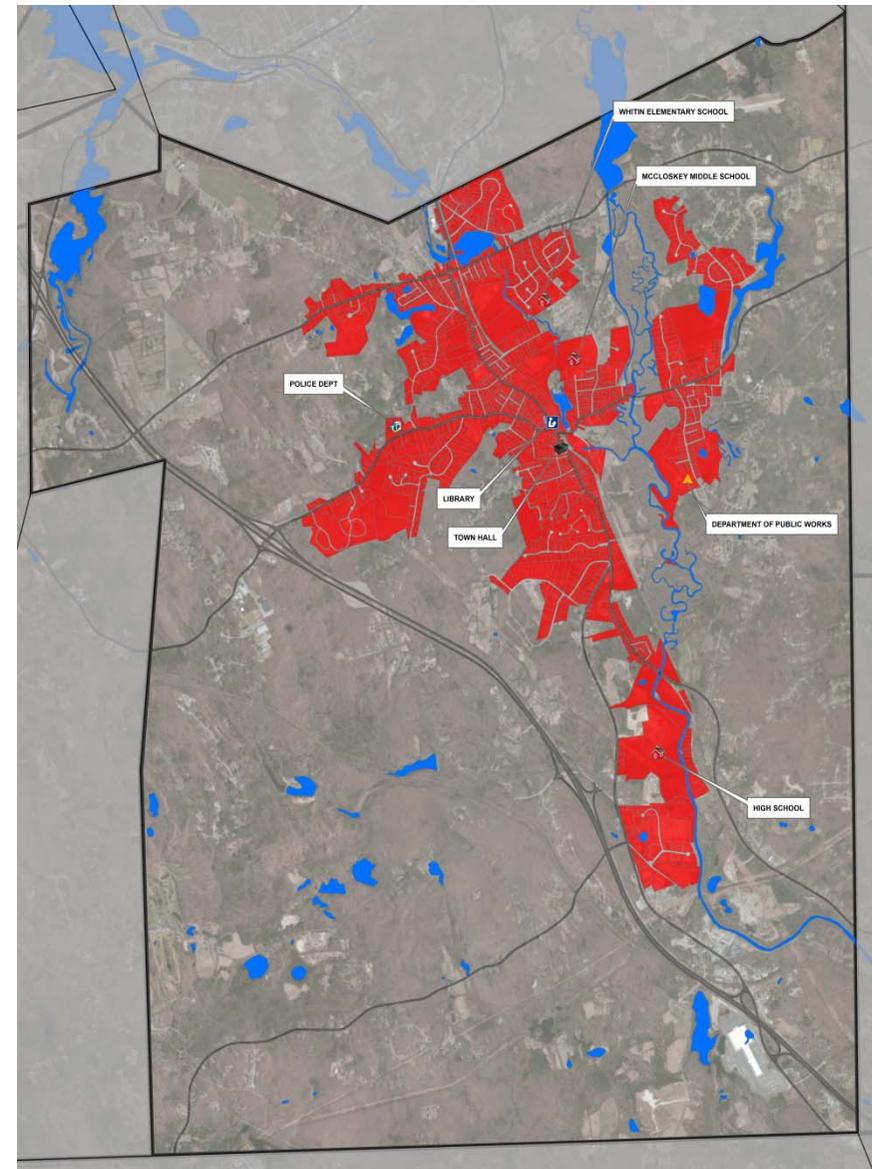
# Agenda

- Background
- Makeup of CWMP
  - Needs Assessment Summary
  - Alternatives Analysis Summary
  - Recommended Plan Summary
- Progress Schedule
- Consequences of No Action Alternative
- Progress Since Last Update
- Public Involvement / Public Participation
- Going Forward



# Background

- Approximately half of the population is connected to the Town's wastewater collection system, including:
  - Majority of commercial district
  - Municipal buildings
    - Taft Early Learning Center
    - Whitin Elementary School
    - McCloskey Middle School
    - Uxbridge High School
    - Police Department
    - Fire Department
    - Department of Public Works
    - Town Hall



# Background

- Uxbridge Wastewater Treatment Facility (WWTF) was originally constructed in 1979
- The majority of the equipment is 35+ years old and has been operating continuously 24 hours a day, 7 days a week, 365 days a year



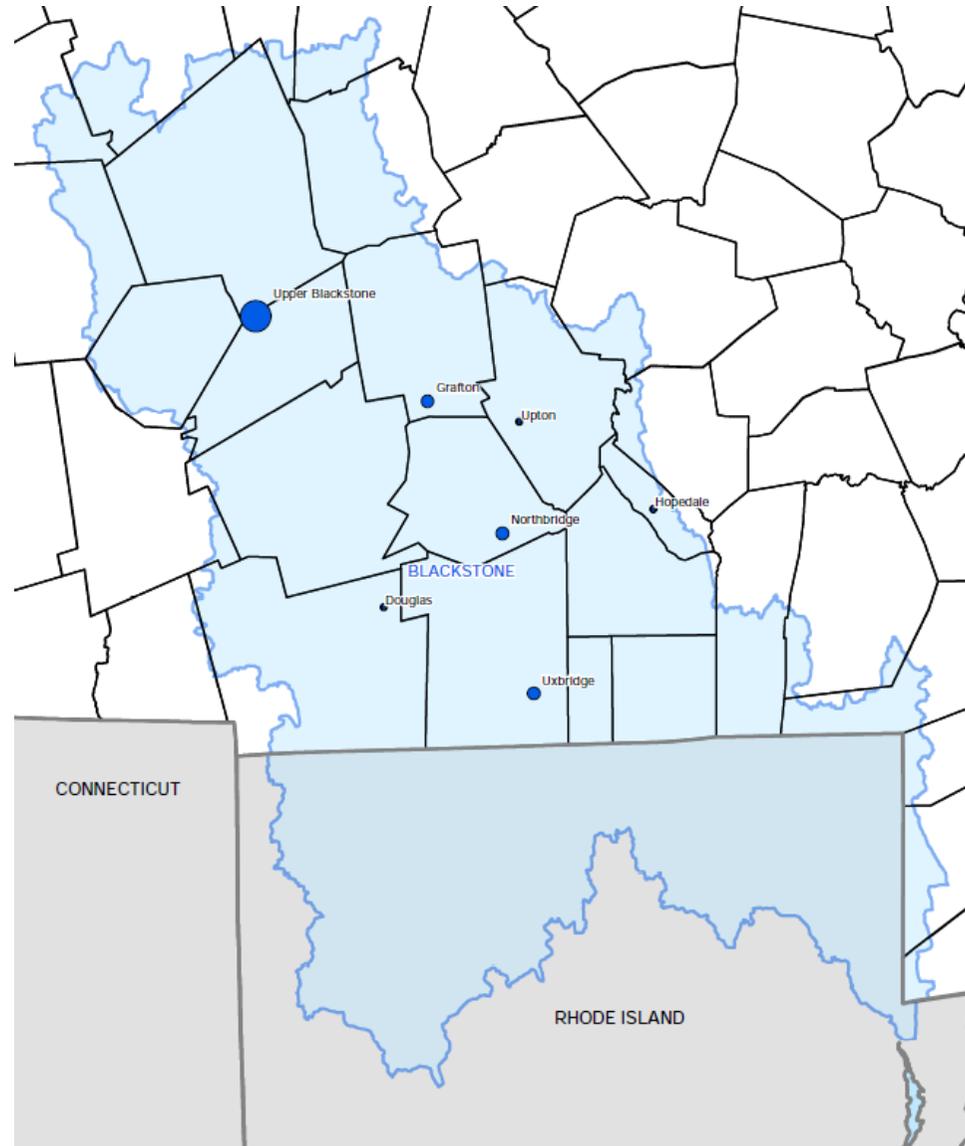
# What happens to treated water?

- Treated effluent is discharged to the Blackstone River (receiving water is Narragansett Bay)
- US Environmental Protection Agency (EPA) along with Massachusetts Department of Environmental Protection (MassDEP or DEP) grants a permit which allows this discharge, but only under certain conditions:
  - Quantity is restricted
  - Quality is restricted
- All permits have expiration dates and fines are issued for non-compliance
- Treatment levels (quality) increase as dictated by environmental impacts



# Background

- WWTF discharges like yours are contributing to degradation of water quality
- All facilities on the Blackstone River and other similar water bodies are being impacted



# Permit Background

- Wastewater treatment facility is allowed to continue to operate as long as it has a current discharge permit
- In 2010 the Town was notified by EPA that a new discharge permit for the wastewater treatment facility would be issued soon
- Permit was issued in 2013, appealed by the Town and ultimately became effective in June 2014 in a form that was modified from its original version
- Negotiations by Town with EPA gave the Town until 2020 to come into full compliance with the permit



## Permit Background (Cont.)

- A consent order schedule is currently in effect in return for allowing the Town time to come into compliance with the new permit
- At this time, interim discharge limits are in effect (most of which are expected to require no changes to the plant)
- One requirement of the permit is to complete a Comprehensive Wastewater Management Plan (CWMP) and then to implement changes recommended by this Plan



# Comprehensive Wastewater Management Plan

**Purpose of the CWMP** – The CWMP is a planning document that allows the Town to determine current and future wastewater related needs

- Phase I – Needs Assessment
- Phase II – Alternatives Evaluation
- Phase III – Recommended Plan



# Comprehensive Wastewater Management Plan

**Phase I – Needs Assessment** - This is the first phase of Comprehensive Wastewater Management Planning and it involves the initial assessment of the wastewater needs for the Town of Uxbridge.

Uxbridge's wastewater needs are defined by identifying the Town goals for wastewater management, evaluating the existing conditions, reviewing regulatory requirements, developing projections of the future conditions, and then comparing these goals and conditions to the wastewater limitations in the Town.

**Phase II – Alternatives Evaluation**

**Phase III – Recommended Plan**



# Comprehensive Wastewater Management Plan

## **Phase I – Needs Assessment**

**Phase II – Alternatives Evaluation** - Once the needs are developed, alternative solutions are identified. These solutions are then summarized and screened to retain only the most feasible ones. Feasible solutions (technical as well as management) are then grouped into alternative scenarios for detailed evaluation.

## **Phase III – Recommended Plan**



# Comprehensive Wastewater Management Plan

## **Phase I – Needs Assessment**

## **Phase II – Alternatives Evaluation**

**Phase III – Recommended Plan** – this will identify all recommendations from the Plan including what is required at the wastewater treatment facility to meet the new permit.



---

# Comprehensive Wastewater Management Plan

- Phase I – Needs Assessment
- Phase II – Alternatives Evaluation
- Phase III – Recommended Plan



# Phase 1 - Needs Assessment

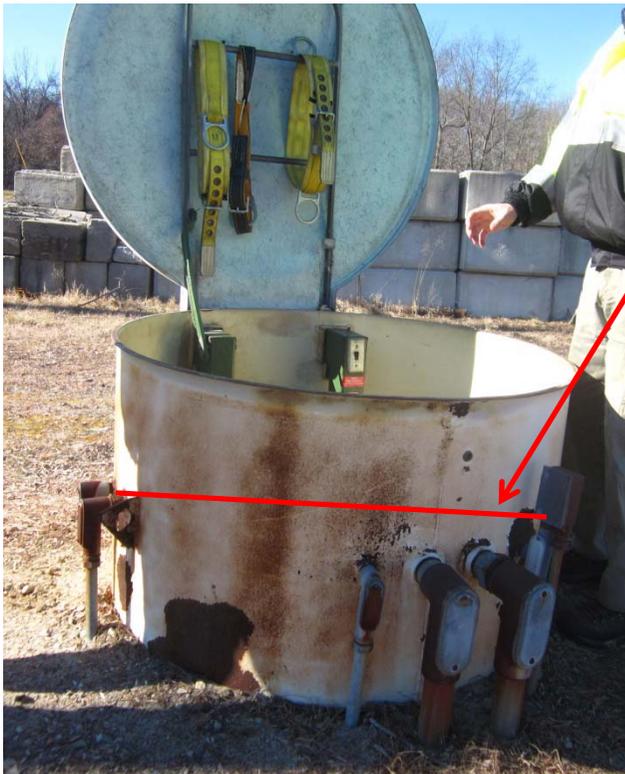
## Conclusion:

1. Evaluation found no concentrated, problematic areas for on-site wastewater disposal. Although general indicators exist in all study areas for locations that may be problematic for on-site wastewater disposal sites, known conditions such as septic system failures and impaired groundwater quality did not indicate any portions of the Town that would be unsuitable for on-site wastewater disposal systems.
2. The existing centralized WWTF has age and permit related shortcomings that will be evaluated in Phases II and III
  - The facility is unable to meet the new permit
  - Most components of the facility have far exceeded their useful life



# Age and Permit Related Needs

Water elevation observed during flooding event



West River Pump Station

Process equipment rusted to an unknown degree – treatment process at risk



Secondary Clarifier

Structural integrity unknown – potential safety hazard



Main Pump Station – Wetwell Service Tube

Uxbridge: CWMP

# General Comments

- Equipment well past design life.
  - Less reliable spare parts no longer routinely stocked for out-dated equipment
  - Photos below are examples of failures from other facilities – not Uxbridge
  - Permit violations typically result from failures



Potential Failure – Structural Integrity



Potential Failure – Metal Fatigue



---

# Comprehensive Wastewater Management Plan

- Phase I – Needs Assessment
- Phase II – Alternatives Evaluation
- Phase III – Recommended Plan



## Phase II - Alternatives Assessment

- Structural components of the facility (tanks and buildings) are in good condition
- Mechanical components are designed for a 20 year life (current age of most equipment ~ 35 years, equipment has been operating continuously since startup)
- Focus on “Fix it First” alternatives (reuse of existing infrastructure)



# No Action Alternative

- Areas of the Town Which Utilize On-Site Wastewater Disposal
  - Continue to utilize on-site wastewater disposal
  - Feasible and cost-effective option
- Areas of the Town Serviced by Centralized Treatment
  - Cost of operating and maintaining existing equipment will rise as equipment becomes increasingly more obsolete and replacement parts become more difficult and costly to obtain
  - Frequency of equipment failures will increase
  - Facility is unable to fully meet the new permit
  - Permit non-compliance causing degradation of water quality conditions in Blackstone river will expose the Town to legal enforcement by MassDEP, USEPA and environmental groups.



## Alternatives Analysis – Alternatives Recommended for Further Evaluation

Process	Recommended Alternatives
Preliminary Treatment	<ul style="list-style-type: none"> <li>• Replacement of grinder and coarse bar screen with two fine screens and replacement of all mechanical equipment which is past its useful life</li> </ul>
Secondary/Advanced Treatment	<ul style="list-style-type: none"> <li>• MLE</li> <li>• IFAS</li> <li>• Biomag</li> </ul>
Disinfection	<ul style="list-style-type: none"> <li>• Chlorination</li> <li>• UV Disinfection</li> </ul>
Post-Aeration	<ul style="list-style-type: none"> <li>• Mechanical Post Aeration</li> </ul>
Odor Control	<ul style="list-style-type: none"> <li>• Biofilter</li> </ul>
Sustainability	<ul style="list-style-type: none"> <li>• Water conservation</li> <li>• Energy efficiency</li> <li>• Energy recovery</li> <li>• Alternative energy</li> </ul>
Flow and loading reduction	<ul style="list-style-type: none"> <li>• Conduct further investigations on recommendations of the I/I analysis</li> <li>• Continue policies encouraging water conservation</li> <li>• Proceed with Growth Neutral Controls</li> </ul>



---

# Comprehensive Wastewater Management Plan

- Phase I – Needs Assessment
- Phase II – Alternatives Evaluation
- Phase III – Recommended Plan



## Phase 3 - Recommended Plan

- Continued reliance on on-site wastewater disposal systems for areas outside the existing collection system.
  - For sites where Title 5 septic systems are not suitable, due to site constraints or other environmental factors it is recommended that Innovative & Alternative systems be considered on a location by location basis.
- Upgrade existing WWTF to meet new effluent permit requirements and replace equipment that is past its useful life
- New effluent permit average monthly flow = 2.5 MGD
  - Based on CWMP flow projections it is recommended that:
    - WWTF upgrade average flow (Phase 1) = 1.5 MGD
    - Town reserves remainder of capacity for a future Phase 2



# Recommended Plan Components

Component	Recommendation
Administrative Recommendations	<ul style="list-style-type: none"> <li>• Develop an electronic tracking system for septic pumping records and Title 5 inspections to help the Town identify future wastewater needs through the tracking of septic system issues</li> <li>• Review and update the existing sewer regulations and bylaws</li> <li>• Implement a fiscal sustainability planning system through the development of a Wastewater Asset Management Plan</li> <li>• Explore implementing growth management control regulations</li> </ul>
Collection System	<ul style="list-style-type: none"> <li>• Develop a SewerCAD model to allow the Town to identify hydraulic constraints within its existing collection system</li> <li>• Conduct targeted I/I investigations</li> </ul>
Pump Stations	<ul style="list-style-type: none"> <li>• Replace West River Pump Station in kind</li> </ul>
Septage Receiving	<ul style="list-style-type: none"> <li>• Process septage received at the facility with the solids stream instead of with the liquid stream</li> <li>• Replace existing septage receiving equipment</li> <li>• Install new septage holding tanks which are adequately sized to treat expected septage volumes</li> </ul>
Influent Pump Station and Preliminary Treatment	<ul style="list-style-type: none"> <li>• Replace mechanical equipment at influent pump station and aerated grit chamber</li> <li>• Upgrade the pumps at the influent pump station to a model that is capable of passing wipes and floatables further downstream</li> <li>• Replace comminutor with a fine screen to protect downstream secondary treatment equipment</li> <li>• Reconfigure existing preliminary treatment process to remove floatables from the liquid stream with a fine screen prior to the aerated grit chamber by reversing the flow through the two structures</li> </ul>
Primary Clarification	<ul style="list-style-type: none"> <li>• Reuse existing tanks and replace mechanical equipment in existing primary clarifier tanks</li> </ul>

## Recommended Plan Components – cont.

Component	Recommendation
Secondary Treatment	<ul style="list-style-type: none"> <li>Expand existing tankage, through the construction of additional tankage, to provide adequate volume for MLE process.</li> </ul>
Disinfection and Post Aeration	<ul style="list-style-type: none"> <li>Expand existing chlorine contact tank to provide adequate contact time.</li> <li>Abandon existing cascade aerator and construct a new mechanical post-aeration system.</li> </ul>
Sludge Holding Tank and Sludge Pumping Station	<ul style="list-style-type: none"> <li>Replace mechanical equipment in the Sludge Holding Tank and Sludge Pumping Station</li> </ul>
Sludge Processing	<ul style="list-style-type: none"> <li>Replace mechanical equipment in existing gravity thickener</li> <li>Construct a new gravity thickener to provide redundancy in sludge processing</li> </ul>
Process Building	<ul style="list-style-type: none"> <li>Architectural modifications to provide adequate working conditions for operations staff.</li> </ul>
Ancillary Equipment	<ul style="list-style-type: none"> <li>Replace existing plant water system</li> </ul>
Site-Wide Support Related Improvements	<ul style="list-style-type: none"> <li>Replace HVAC equipment which is past its useful life</li> <li>Renovate the existing Administration/Process Building to accommodate larger offices, conference room, control room and new lab design. Expand administration area into the Process area to include new locker rooms and a new training room</li> </ul>
Major Electrical Facilities and Backup Power	<ul style="list-style-type: none"> <li>Replace electrical components which are past their useful life</li> <li>Replace generator</li> </ul>
System Wide SCADA, Instrumentation and Controls	<ul style="list-style-type: none"> <li>Replace controls which are past their useful life</li> <li>Implement a SCADA system for the WWTF</li> </ul>

# Septage Costs

	Current	Town Septage Only	2013 Septage Quantities
Capital Costs		\$3,700,000	\$6,800,000
Annual Debt Service		\$185,000	\$340,000
Annual O&M Costs		\$50,000	\$80,000
Annual Septage (gal)		1,375,000	4,230,000
Fee (\$/1000 gal)	\$75	\$201	\$117

Rate increases required to **break even** for upgraded septage infrastructure:

- Town Septage only - 168% increase in fee
- 2013 Septage Quantities - 56% increase in fee
- In FY11 - FY 14 septage revenue ranged annually from \$236,000 - \$290,000 (8-27% of WW revenue)



## Capital Costs for Recommended Plan

<b>Cost Component</b>	<b>Capital Costs (\$)</b>
WWTF & West River PS Improvements	\$37,800,000
Septage Receiving Improvements (1)	\$6,800,000
Total Capital Costs(2)	\$44,600,000

(1) Capacity to accept and process septage as a regional facility, per 9/28/15 BOS vote

(2) Costs rounded to three significant figures and adjusted for estimated mid-point of construction



# Consent Order Deadlines

Critical Milestone	Deadline
Endorse CWMP at Board of Selectmen Meeting	January 11, 2016*
Submit Final Design of WWTF Upgrades Necessary to comply with all effluent limits in NPDES Permit	October 15, 2016
Initiate Construction of the WWTF Upgrades	June 30, 2017
Complete Construction of WWTF Upgrades	December 31, 2019
Full Compliance with NPDES Permit	June 1, 2020

\*Extended deadline



# Consequences of No Action Alternative (WWTF)

## Cost of No Action Alternative for WWTF Upgrades:

- If final design is not submitted to MassDEP by October 15, 2016:
  - Non-compliance with the Consent Order
  - More stringent permit limits would take effect and fines would begin to accrue immediately (revert to the 2013 permit limits which facility cannot meet with existing infrastructure)
- Penalties/Costs
  - Annual fine of \$1,825,000 - \$18,250,000 for knowingly violating permit (\$5,000 - \$50,000 fine per day of violation)
  - Town will likely lose eligibility for 0% SRF financing (\$5.9 to \$9.9 mil in interest savings)
  - Unknown legal fees
  - Town will still need to complete project



# Consequences of No Action Alternative (WWTF)

- Ignoring permit conditions rare but has been done in the past
- 2013 – San Antonio Water System (SAWS), TX: Violations included effluent limit violations
  - Civil penalty of \$2,600,000 for Clean Water Act violations
  - Paid legal fees
  - Required to upgrade facility
- 2013 – Miami-Dade County, FL: Violations included NPDES permit effluent violations
  - Civil penalty of \$978,000 for Clean Water Act violations
  - Paid legal fees
  - Required to upgrade facility
- 2012 – City of Fitchburg, MA: Violations included permit limits including total phosphorus
  - Civil penalty of \$141,000 for Clean Water Act violations,
  - Required to undertake \$200,000 Supplemental Environmental Project
  - Paid legal fees
  - Required to upgrade facility



# Upper Blackstone Water Pollution Abatement District (UBWPAD)

- Issued updated permit in 2008 – included more stringent nitrogen and phosphorus limits
- UBWPAD challenged permit's phosphorus, nitrogen and aluminum discharge limits
- UBWPAD argued that key parts of the scientific record before the EPA were inadequate and unreliable, and that the agency irrationally based the permit's limitations on this flawed record
- Verdict – available science and data concerning both UBWPAD's discharge and the quality of the affected waters supported EPA's judgement to impose tighter permit limits for the three chemical elements
- UBWPAD's petitions were denied in 2012



# Progress Since Last Update

- In October 2014, we received DEP approval of a Plan of Study
- In April 2015, we received DEP conditional approval for Phase I – Needs Assessment Report and Phase II – Alternatives Screening Analysis Report
- Phase III Recommended Plan Report currently under MassDEP Review
- Conceptual Design and Value Engineering Review completed for WWTF Upgrade



# Public Involvement/ Public Participation

Event	Date
Board of Selectmen Meeting	March 24, 2014
Planning Board	June 11, 2014
Board of Selectmen Meeting	July 28, 2014
Board of Selectmen Meeting	November 10, 2014
Board of Selectmen Meeting	January 12, 2015
Board of Selectmen Meeting	April 27, 2015
Board of Selectmen Meeting	September 28, 2015
Board of Selectmen Meeting	January 11, 2016

- Approval of the CWMP is critical to remain on schedule – public notification of this process is critical
- Web Site



---

# Going Forward

- Fact Sheet
- Informational Session



---

# Request

DPW requests endorsement of the CWMP

Endorsement will allow the report to be submitted and keep the project on schedule with the consent order





[www.ghd.com](http://www.ghd.com)