Foxborough's Request for Monitoring Reductions at Its Witch Pond Wells

WRC Draft Staff Recommendation

September 9, 2021

Presentation Outline

- Background
- ITA Timeline
- Monitoring Reduction Request
- Existing Impacts
- Potential New Impacts
- Recommendations

Background

- Headwaters of the Ten Mile Basin – Bungay Brook – 0.4 sq mi
- Watershed and groundwater divide do not align
- Groundwater seepage from Lake Mirimichi to Witch Pond area

- Foxborough's water supply wells - Wells 14 & 15
- Wells adjacent to Witch Pond in an Atlantic white cedar swamp
- Discharges flow to a WWTP in the Taunton basin

- Attleborough releases water from Lake Mirimichi down Wading River
- Plainville wells on lake shore
- Mansfield Well 10 approved under ITA; shared ambient monitoring

Background

- Atlantic white cedar swamp is habitat for:
  - Hessel's hairstreak butterfly- Rare & Endangered Species list - shrub layer berry bushes are its nectar source

  - Then state-listed spotted turtle

- Witch Pond is habitat for warm water fish species

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ITA Timeline

2000 Application for 1.44 MGD

- Stated that Swamp is hydrologically isolated from the aquifer due to peat layers
- Further pump tests suggested by WRC but were not performed

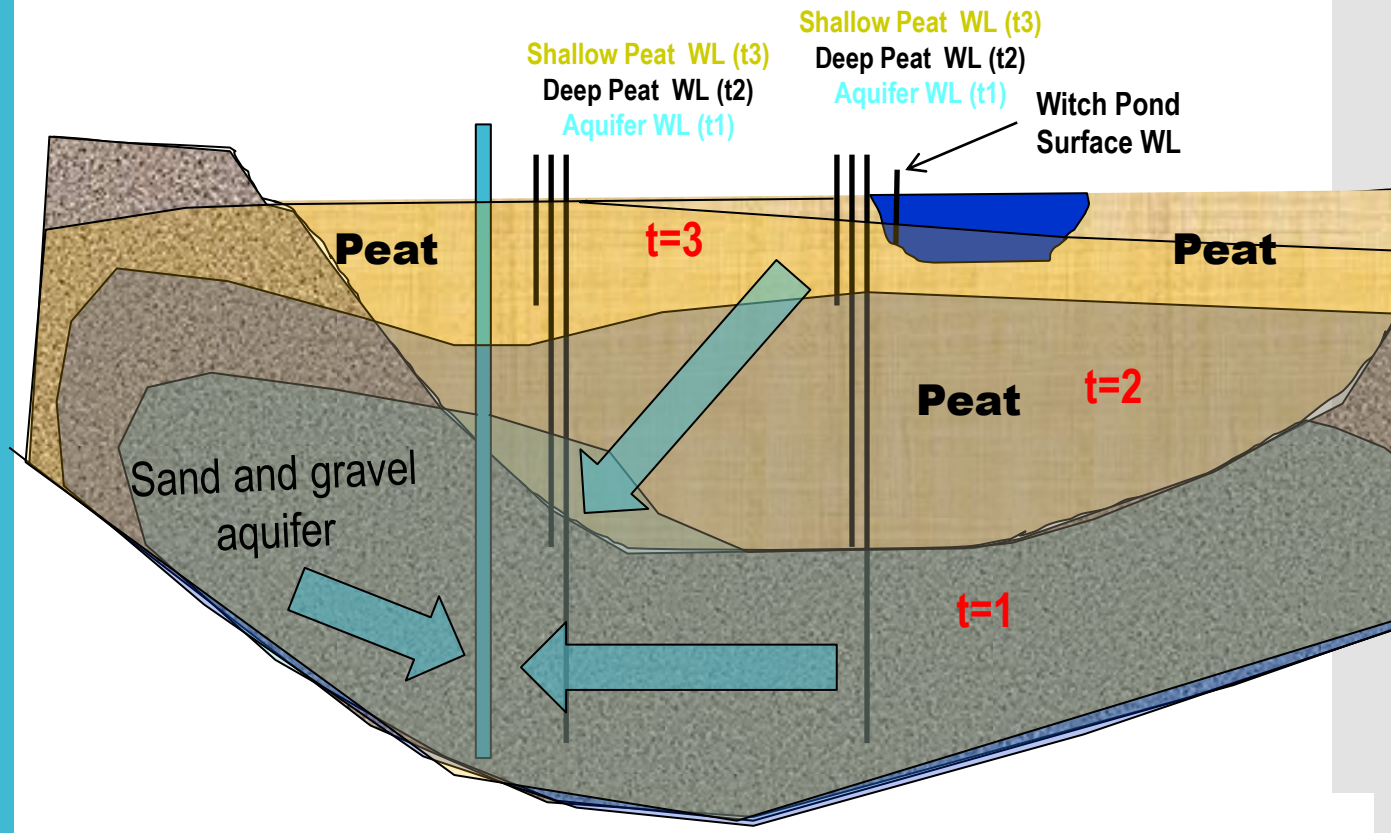
2001 Decision Approved 1.44 MGD with Conditions

- Water conservation requirements
- Establish replicated wetlands for area taken by new WTF
- Water no more than 1 foot below the peat surface → Water elevation thresholds to trigger reduced & no pumping until recovery above thresholds
- Maintain native vegetation
- Hydrologic and vegetation monitoring required for operational life

2009 Baseline Monitoring Completed & Pumping Initiated

ITA Timeline

Hydrologic Monitoring 2010



- Impacts propagate up from aquifer to surface over summer season
- Long-term dewatering trend
- Can lead to permanent hydrocompaction

ITA Timeline

Wetland Monitoring 2011

- WRC Decision: "…monitoring should be performed to verify that … vegetative species that represent sources of nectar to Hessel's Hairstreak butterfly remain intact."
- Rapid changes in species composition to more dry tolerant species

ITA Timeline

2013 Amendment to the Conditions

- Added threshold to a deep peat monitoring location to trigger reduced and no pumping earlier and prevent dewatering of surficial peat

2016 Monitoring Plan Revised

- Reflected the new threshold for deep peat
- Eliminated monitoring at site F-4A because replicated wetland did not function as Atlantic white cedar swamp

Current Monitoring

- Mansfield provided data for shared ambient wells; Foxborough did not start measuring once Mansfield was no longer required to monitor
- Surveying to adjust for shifting in peat or well replacement but multiple adjustments that are not documented or justified

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Monitoring Reduction Request, March 2020

1) Eliminate some non-threshold monitoring locations

2) Eliminate winter monitoring in remaining non-threshold locations

3) Reduce frequency for vegetation monitoring

4) Reduce scope for reporting

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Existing Impacts - Hydrology

Hydrologic Data Analysis

- Water levels measured every six hours
- Counted the number of times measurements were below the threshold – either reduced pumping or no pumping
- Calculated the total time spent below a threshold for the specified time period

Existing Impacts - Hydrology

Which monitoring sites trigger and in which months?

Threshold Sites	Hours spent below reduced or no pumping threshold, January 2011 through December 2020												
	Total Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
F1AS	0	0	0	0	0	0	0	0	0	0	0	0	0
F1APD	690	0	0	0	0	0	0	18	0	576	96	0	0
F1AD	0	0	0	0	0	0	0	0	0	0	0	0	0
F2S	2484	0	0	0	0	0	0	0	324	1440	720	0	0
F2AD	0	0	0	0	0	0	0	0	0	0	0	0	0
F7D	72	0	0	0	0	0	0	0	0	0	66	0	6
SG1	8448	0	0	0	0	0	186	96	1950	3102	2238	876	0
F7PD	4026	0	0	0	0	0	0	0	456	2052	1146	372	0

Existing Impacts – Hydrology

How much time spent below thresholds since 2013 Amendment?

	# of months with thresholds triggered at one or more sites	% of time spent beyond thresholds during months with triggers	Other relevant conditions
2013	2	41	Emergency Declaration (ED)
2014	3	19	ED
2015	3	46	
2016	5	64	ED, Drought
2017	2	4	
2018	2	16	
2019	4	65	
2020	6	57	ED, Drought

- Significant time spent beyond thresholds most years
- With ED + Drought
  - 2016 – 1 foot target exceeded at 1.26 feet below peat surface
  - 2020 – 1 foot target exceeded at 2 ft below peat surface
- 2020 ED ended 9/29/2020 → Witch Pond has still not recovered as of 9/3/2021 → Concern that permanent compaction has occurred as feared back in 2010!

Existing Impacts - Wetlands

Impacts Remain After 2013 Amendment

- Wetlands Monitoring Methods
  - 2014 - after amendment and noted impacts to wetlands, Foxborough changed consultants and methods
  - 2014 and 2015 - new methods damage vegetation
  - Monitoring performed less than annual basis (~~2016,~~ 2017 limited, ~~2018,~~ 2019 limited, ~~2020~~)
  - 2021 - expect a full round of monitoring

- Wetlands Reporting
  - Baseline Report 2009 – states *no invasive species*
  - 2011 – states more dry tolerant species
  - Most recent reports (2017, 2019)– state no change from previous years and that *native species remain dominant*
  - However, reporting does not compare each year to baseline, only to more recent times
  - Each monitoring site has a corresponding well but water level trends not analyzed in conjunction with the vegetation trends

Existing Impacts - Water Conservation

- Residential use reduced
- UAW >30%
- Reducing UAW by 20% to 10% ~ Pumping at Witch Pond

0.47 MGD (2015-2020)

Year	Unaccounted - for Water (%)	Residential Use (gallons)
2020	32	59
2019	35	53
2018	36	54
2017	42	56
2016	23	55
2015	17	68
2014	19	60
2013	12	58
2012	20	59
2011	17	62
2010	5	77
2009	11	65

Month of 2020	Pumping All Sources (MGD)	20% of All Pumping (MGD)
January	2.01	0.40
February	1.95	0.39
March	1.99	0.40
April	1.87	0.37
May	2.15	0.43
June	2.53	0.51
July	2.42	0.48
August	2.45	0.49
September	2.33	0.47
October	2.20	0.44
November	2.09	0.42
December	2.03	0.41

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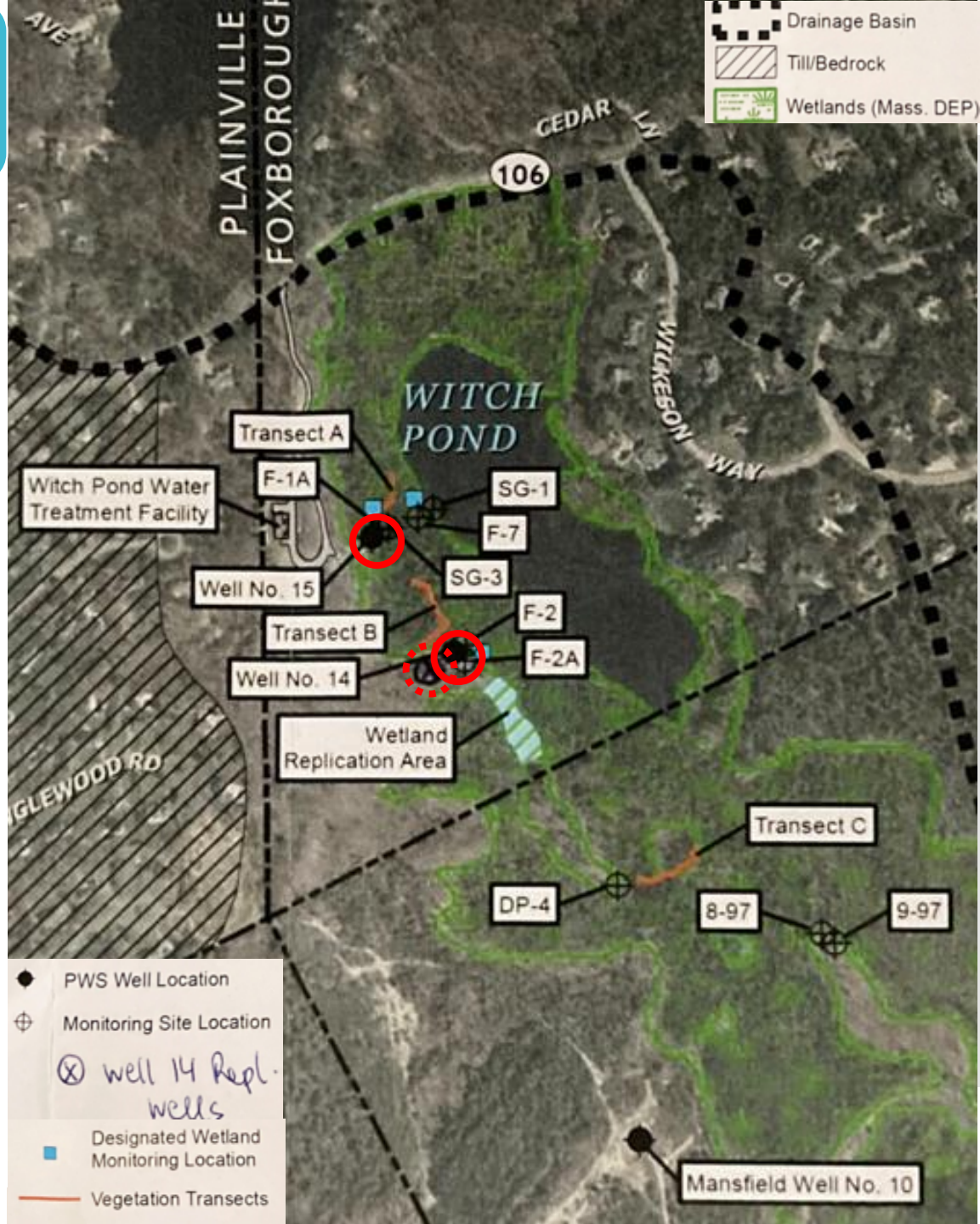
Potential New Impacts Replacement Well 14R

- Well 14 and 15 did not provide expected yields
- Only about half of the WMA permitted average annual volume of 0.48 MGD each and 0.96 MGD total
- January 2021 – MassDEP approved replacement well (14R) at same yield same as Well 14



Potential New Impacts Replacement Well 14R

- Future pumping can increase by 51%
- Historical pumping already impacting Swamp

	Annual Average Daily Withdrawal (MGD)		
Year	**Well 14**	**Well 15**	**Total**
2015	0.18	0.20	0.38
2016	0.27	0.21	0.48
2017	0.31	0.31	0.63
2018	0.20	0.30	0.49
2019	0.25	0.17	0.42
2020	0.23	0.18	0.41
Average	0.24	0.23	**0.47**

* Total values may not be the exact sum of individual values due to rounding

Can increase to 0.48 MGD

Can increase to 0.71 MGD

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Recommendations - Hydrologic

Existing pumping impacts → Additional analyses to **quantitatively define reduced pumping and adjust thresholds** to minimize time spent beyond thresholds in consultation with state staff

Historical pumping may increase with replacement well → **Continue most hydrologic monitoring** for new or additional impacts

For non-threshold wells, remove equipment December 1st - May 31st

Correct deviations from hydrologic monitoring plan

Recommendations - Wetlands

Reporting that compares conditions over time starting with baseline; ties water levels to wetlands conditions over time

Re-evaluate available methods to get necessary data with minimal damage in consultation with state staff

Invasive species removal to correct damage in consultation with state staff

Survey of measuring points immediately after thaw or well replacement; submit adjustments for staff approval

Recommendations - Water Conservation

Create a plan with verifiable, quantitative metrics to track progress in meeting 10% UAW per 2001 Conditions in consultation with state staff

Develop a program aggressively promoting conservation by industrial, commercial and institutional water users per 2001 Conditions

Recommendations – Compliance and Reporting

Streamlined Annual Monitoring Reports with outline to be provided by WRC staff

Create a plan with verifiable, quantitative metrics to track progress in meeting 10% UAW per 2001 Conditions in consultation with state staff

Written notification of non-compliance to WRC within 48 hours. Written description of activities and timeline for correction within 1 week and when completed.