Lake Auburn Watershed Protection Commission

www.lakeauburnwater.org
Wednesday, February 9, 2022 at 3:30 pm – 5:30pm
AVCOG, 125 Manley Road, Auburn, Maine

Commissioners:

Steve French, Chairperson
Minot, Buckfield, Hebron Resident

Evan Cyr, Vice Chair
Auburn Resident

Rick LaChapelle
City of Lewiston Councilor

Dan Bilodeau
AWD Trustee

Camille Parrish
Auburn Resident

Amy Landry
AVCOG Executive Director

Alan Holbrook
Turner Resident

Dan Dube
Lewiston Resident

Mary Ann Brenchick
City of Lewiston PW Director

Staff:

Sid Hazelton, Clerk
Auburn Water District

Kevin Gagne, Clerk
City of Lewiston

Heather Hunter, Finance
City of Lewiston

Michael Broadbent,
Secretary
Auburn Water District

Erica Kidd,
Watershed Manager,
LAWPC

Carolyn Houtz,
Educational Coordinator
LAWPC

AGENDA

1. Executive Session regarding potential litigation in accordance with 1 M.R.S.A. 405 (6) (E) (10 min)

2. Minutes (5 min)
   a. November 10, 2021 regular meeting
   b. December 1, 2021 Workshop

3. Consent Agenda (5 min)
   a. Financial Quarterly Update – Heather
   b. Water Quality & Watershed Update - Erica
   c. Education and Outreach - Erica

4. Open Session -Public Comment (5 min)

5. Staff Clerks Report – Kevin (10 min)

6. Lake Auburn Study
   a. Highlights/Discussion – Erica (30 min)

7. Review of Proposed Septic Ordinance changes- Kevin (10 min)

8. Upstream Watershed Policies & Projects
   a. Town of Turner – Alan (30 min)

9. Old Business
   a. Roberts Rules update (5 min)
   b. Workshop Choices & Set Dates (5 min)
      i. Recreational use on lands we own
      ii. Prioritize projects from previous studies

10. New Business (5 min)

11. Executive Session regarding negotiations of potential land transactions in accordance with 1 M.R.S.A. 405 (6) (C) - (as needed)

12. Adjourn

MEETING SCHEDULE:

April 13, 2022
June 8, 2022
September 14, 2022
November 9, 2022
December 7, 2022, if needed

Lake Auburn Watershed Protection Commission

MEETING MEMORANDUM

To: Lake Auburn Watershed Protection Commissioners
From: Kevin Gagne & Sid Hazelton, Clerks
Date: February 2, 2022
Subject: Clerk Guide and Report for February 9, 2022

Introduction:

This is a new report we are starting to help provide some written background to issues considered or taken up for action by Commissioners of the Lake Auburn Watershed Protection Commission. While we will continue to engage and present information and offer guidance as Staff to the Commissioners at meetings and workshops, this report is for additional background and information on items before you, so your time at Commission meetings can be spent collectively taking action to protect the drinking water and filtration waivers for the communities of Auburn and Lewiston instead hearing background information.

Minutes

November 10, 2021 regular meeting: Watershed Commission Secretary Mike Broadbent has completed the minutes of the regularly scheduled meeting held on Wednesday November 10, 2021 at 3:30 pm and are attached for your review and acceptance. Video of the meeting has been posted on the watershed website for public viewing and as record of the meeting.

December 1, 2021 workshop: Watershed Commission Secretary Mike Broadbent has completed the minutes of the watershed workshop held on Wednesday December 1, 2021 at 3:30 pm and are attached for your review and acceptance. Video of the workshop has been posted on the watershed website for public viewing and as record of the meeting.

Consent Items

Financial Reports

Financial Reports: The Watershed Financial report will be presented by Heather Hunter at the meeting and her Statement of Revenues & Expenditures as of December 31, 2021 is attached for your review and reference.

Water Quality & Watershed Report

Water Quality Update: Erica has attached her detailed report. Lake Auburn officially froze with full ice on January 12, 2022 and with cold temperatures ice is getting thicker and with snow cover we are experiencing better than average water quality with low turbidity and low winter algae counts. With frozen ground conditions and additional snow cover through the winter and hopes of an average or later than normal ice off – this would be favorable for continued good water quality. Spring thaw is another factor in determining ice off and the longer ice stays on the Lake and hopefully with low runoff conditions (slow spring thaw) the better water quality we see in Lake Auburn and tributaries going into the summer.

Watershed Update: Erica has attached her report and will present at the meeting. One highlight is there has been no Commission forestry activities on watershed properties this winter. However, there has been one private harvest near Taber's.

With snow conditions, improving there is more winter activity on watershed trails with snow shoeing, cross-country skiing at this time and will depend on how long the snow conditions last.

Education and Outreach Report

Education and Outreach Update: Education and outreach has been on going with some in person winter walks and there are more activities planned. Erica and Carolyn have attached their report and they continue spreading the word of watershed events on our watershed webpage, YouTube, Facebook and on Instagram. They recently hosted a Winter Wildlife Walk with Ben Nugent of USDA on Whitman Spring Road as part of the Auburn Winter Fest on January 26, 2022 and they are currently hosting a virtual Winter Scavenger Hunt for participants until February 27, 2022 – submit your pictures today and spread the word.

6. Lake Auburn Study: The Lake Auburn Study, official titled "*A Regulatory, Environmental, and Economic Analysis of Water Supply Protection in Auburn, Maine*" commissioned by the City of Auburn, Planning Department, was released in its final version on November 1, 2021. The report aimed to conduct a 'thorough review of the existing conditions, standards, regulations and practices in Lake Auburn and its watershed.' and looked to recommend ways to 'maximize the benefits and minimizes the cost of regulatory, environmental, and economic impacts to Lake Auburn, its watershed, and the surrounding communities.'

The highlights of this lengthy study are important to the Watershed Commission, as our main goal is to protect our drinking water filtration waivers and protect our drinking water for both communities. The following is a list of recommendations from the Auburn Study:

1. Revise septic system requirements of Lake Auburn watershed overlay district ordinance to allow State of Maine subsurface rules and to allow for mounded leach fields and other State approved alternative systems where there is not a 36 inch vertical separation from organic horizon and bedrock, water table or other restrictive layer.

2. Revise the Phosphorus Control ordinance to clarify the limit of project to the limit of disturbed area and not dependent upon land use.

3. Require timber harvest and agricultural activities to meet same requirements as other land uses under the Phosphorus Control Ordinance – including erosion control standards.

4. Develop standards for farm management, to be applied to farms in the watershed to control erosion and phosphorus from farms to Lake Auburn.

5. Adjust the agricultural buffer strip requirements to improve effectiveness. Recommendation is to increase buffer from 75 ft to 100 ft with vegetated buffer down gradient of all agricultural activity, perpendicular to overland flow and in all areas of the Lake Auburn Watershed.

6. Update Lake Auburn Watershed boundary to remove 148 acres along Gracelawn Road from the Lake Auburn Watershed.

7. Incorporate low impact development standards for single-family residential development in the Lake Auburn Watershed, with some square foot limit and regulations.

7. Review of Proposed Septic Ordinance changes: The City of Auburn planning board is considering action on recommendation #1 in future meeting – revision of septic system requirements in the Lake Auburn overlay district by allowing more systems as approved by State of Maine subsurface rules where the current rules for 36 inch of vertical separation cannot be met.

To better understand the implications these septic changes would have regarding the waiver from filtration that each Lewiston Water Division and the Auburn Water District have independently but work jointly to maintain, each entity has asked the Maine Drinking Water Program (regulators of the waiver) of their opinion as to how the proposed septic ordinance changes would impact each waiver from filtration. Auburn Water did receive a response from the Susan Breau, Geologist of the Maine Drinking Water Program and Lewiston Water is waiting to receive a response from Susan Breau. Before we recommended any proposed actions or motions to the Commissioners, we will need some additional time to better understand the regulatory impacts to the waivers and policy options to recommend if necessary.

City of Auburn Zoning Map Amendment: At the January 11, 2022 Planning Board workshop, the proposal for zoning changing and watershed boundary change was discussed. At the February

8, 2022 meeting, the Auburn Planning Board is considering the rezoning of properties along Gracelawn Road including the gravel pits for development. As part of the rezoning, as recommended in the Lake Auburn Economic Study and the Auburn Comprehensive Plan, the planning board is also considering redefining approximately 148 acres currently in the Lake Auburn watershed boundary to a new watershed boundary-removing the 148 acres from the watershed, as portrayed in the report for this area of Gracelawn Road. This watershed boundary change is based on topography and ground water data as evaluated in 2021. The zoning change would change the current zoning of AG- Agricultural and Resource Protection into General Business Zone/Commercial Development District and allow expanded residential density uses, retail, personal and business and professional offices, medical facilities, restaurants, hotel/motel/inns/bed & breakfast, commercial and governmental uses, research/light manufacturing/wholesale, truck terminal/distribution, contractor, motor vehicle/equipment sales, service & repair, recreational/entertainment uses and facilities. Eric Cousins presented the proposed changes to the Commission at our September 8, 2021 meeting. Based on the proposed watershed boundary changes and the water and sewer utility services provided to these parcels and future developments by the AWSD, at this time Staff does not oppose the proposed changes to the watershed boundary or zoning as described in the planning board proposal (see attached). Future considerations that would raise concerns for Staff and the WS Commission would be for any type of industrial use or discharge that may leave the facility/business and cause contamination to Lake Auburn through direct or indirect discharge. This would be on a case by case use of the proposed activities.

8. Upstream Watershed Policies and Projects: Town of Turner; we welcome Commissioner Holbrook's discussion to share the policies of the Town of Turner as it related to land use and water quality in the watershed. Turner is very important as the majority area of the upper Lake Auburn watershed, land use and management has direct impacts to water quality of Lake Auburn through runoff and tributaries to Mud Pond, Little Wilson Pond, the Basin until it flows into the north end of Lake Auburn. Residents of Turner benefit from watershed protection efforts through good water quality of Mud Pond and Little Wilson Pond and play an important partner in the protection of Lake Auburn water quality as well.

Old Business

By-Laws Update: At the December 1, 2021 Commission workshop we discussed details and options for adopting or using Robert's Rules of Order. Mary Ann Brenchick has an update to present for consideration as to how the Commission could move forward.

Workshop Choices and Set Dates: At the December 1, 2021 Commission workshop we discussed the Commissioners interest to have additional workshops. We have some draft land use plans and should consider if Commissioners want to workshop Recreational use on Watershed Commission land.

Another topic for future workshop discussion is the master plan of prioritized projects proposed from previous studies and how those projects could be scheduled and put into motion.

Understanding each Commissioner volunteers their time and effort and most are also on other Boards and Committees for their organizations, what additional days would be considered for workshops and how often would workshops like to be conducted.

Suggested motion: To have a Watershed Commission workshop on March 9, 2022 at 3:30pm to discuss recreational uses on Lake Auburn Watershed Commission land.

New Business

New Watershed Commissioner: New Lewiston City Council, Rick LaChapelle has been appointed by the Lewiston City Council to the Lake Auburn Watershed Protection Commission. We welcome Rick to the Commission and while he is not able to attend this February meeting due to prior engagements, Rick is looking forward to joining the Commission at our April 13, 2022 meeting.

Lake Auburn Watershed Protection Commission

Meeting Minutes

Wednesday, November 10, 2021

Location: Androscoggin Valley Council of Governments (AVCOG), Auburn, Maine

Time: Meeting began at 3:30 PM

Recording: The meeting was recorded.

Commissioners Present: Camille Parrish, Mary Ann Brenchick, Dan Dube, Amy Landry, Dan Bilodeau, Alan Holbrook and Steve French

Dan Dube was appointed as the City of Lewiston Commissioner- at-Large.

Commissioners Absent: Evan Cyr, Caleb Roebuck

Others Present: Sid Hazelton and Kevin Gagne, LAWPC Clerks, Michael Broadbent LAWPC Secretary, Erica Kidd Watershed Manager, Carolyn Houtz Education and Outreach Coordinator and Heather Hunter Commission Treasurer.

Agenda Item 1: Approve minutes of the regular meeting of September 8, 2021

Vote-1 On a motion by Commissioner Brenchick and seconded by Commissioner Parrish to approve the minutes as presented.

Passed 7-0

Agenda Item 2: Quarterly Financial Update – *Heather Hunter*

Heather went over a quarterly financial report that was last updated November 3, 2021. There have been a few fluctuations particularly in source protection. Overall, the Commission is in good financial shape.

Vote-2 On a motion by Commissioner Landry and seconded by Commissioner Brenchick to accept the quarterly financial report that was presented.

Passed 7-0

Agenda Item 3: 2022 Budget Approval

Heather went over the 2022 proposed Commission Budget. She explained all changes made to the budget and how they affect the operation of the Commission. There are no big changes from 2021 to 2022. There was a small increase in the contributions from both Lewiston and the Auburn Water District.

Vote-3 On a motion by Commissioner Brenchick and seconded by Commissioner Landry to accept the 2022 Budget as presented.

Passed 6-1

Heather reported that she will no longer be able to serve as Treasurer to the Commission. Heather has been with the Commission since its inception. Heather suggested that she stay on until the Audit. She asked how the Commissioners would like to replace her. Heather will look to see if there are any other staff members in Lewiston that could fill the role and Sid will check with the Auburn Water District staff.

Agenda Item 4: Future Agenda Packets

Before discussion on this item was started the Commission did introductions as there was a new Lewiston Commissioner- at-Large present. Dan Dube was introduced and welcomed to the group.

Commissioner Brenchick presented a sample agenda that is similar to what is used by the Water Pollution Control Authority. This style of agenda may help the Commission meetings flow better. This agenda is typically sent with a memo from the Manager which explains the expectation of Commissioners prior to the meeting.

The Commissioners liked the layout and would like to discuss it more at the workshop in December.

Agenda Item 5: Water Quality & Activity Report- *Erica Kidd*

Erica went over water quality graphs that were included in the agenda packet. She pointed out that currently the lake is slightly warmer than normal for this time of year. She reported that turnover of the lake should occur sometime in the coming week. In conjunction with the lake temperature the clarity of the lake is also up. Staff has been working with partners to identify the algae that is currently in the lake.

Erica also went over phosphorus, secci disk readings and fecal/total coliform sampling results from within the lake and its tributaries.

Erica presented on several timber harvests that are on-going on private property within the Watershed. She reviews harvest plans when they are sent to her by the City. There have been instances when she does not get that information so she reaches out to the owners when needed.

Erica has been working with the owners of the new horse farm on West Auburn Rd. This facility has been approved by the City. Erica has been working with them to make sure they understand their impact within the Watershed. There was some concern that those horses would utilize some of the Commission trails. It is un-clear at this time if they plan to utilize the trails in the area.

Erica reported that drainage improvements along Whitman Spring Road are on-going. Lewiston crews have been working to replace culverts and stabilize drainage areas.

Erica provided an update on the City of Auburn's efforts to amend the strip zones within the Watershed. The proposed changes would increase the developable area within the Watershed. The Planning Board has voted against moving forward with this change. The City is also looking to revise their comp-plan. The proposed changes would again increase the developable area within the Watershed. Erica is going to continue to monitor the progress of this revision.

Lake Auburn Study; Sid forwarded all of the Commissioners a copy of the now completed Lake Auburn Study. He would like to receive feedback from Commissioners which would be helpful to present back to the City. The City plans to go over the Study with the Councilors in the Spring on 2022. At this time the City does not plan to have a public presentation of the study. Commissioner Bilodeau recommended that Commissioners look at page 41 and consider adopting more stringent best management practices as they relate to the Commission logging practices.

There was also discussion on working with our neighboring towns to protect the Watershed in those communities.

Blanchard Pond Remediation; Erica went over a Remediation proposal for the Blanchard Pond watershed. This is work Erica would like to see happen in the Spring of 2022.

Vote-4 On a motion by Commissioner Brenchick and seconded by Commissioner Bilodeau to accept the Tighe-Bond proposal and to proceed with the design and remediation work as presented.

Passed 7-0

Carolyn Houtz introduced herself as the new Education and Outreach Coordinator for the Commission. Carolyn has a background in Environmental Science and Stewardship and also has a degree in Environmental Science and Economics. She is excited to join our team and has been getting acclimated with the Watershed. She has updated our social media pages and wants to increase our activity. Carolyn has also started meeting with stewards of the Watershed to introduce herself and start a working relationship.

Agenda Item 9: Open Session-Public Comments

No comments.

Agenda Item 6: Land Negotiation – Executive Session regarding potential land transactions in accordance with 1 M.S.R.A. § 405(6)(E).

Vote-5 On a motion by Commissioner Brenchick and seconded by Commissioner Landry to go into Executive Session pursuant to 1 M.S.R.A. § 405(6)(E).

Passed 7-0

Executive Session ended at 4:53pm

Agenda Item 7: Executive Session regarding potential litigation in accordance with 1 M.S.R.A. § 405(6)(E).

Vote-6 On a motion by Commissioner Brenchick and seconded by Commissioner Landry to go into Executive Session pursuant to 1 M.S.R.A. § 405(6)(E).

Passed 7-0

Executive Session ended at 5:12 pm

Commissioner French asked Sid if he could send all of the Commissioners a copy of the report submitted to the Board of Professional Engineers by Commission attorney, Jim Pross.

Agenda Item 8: December 1 Workshop – Set agenda

There was discussion by the Commissioners that they would like a review of Robert's Rules. There has been discussion about changing the format of the agendas and frequently asked questions by the Commissioners.

Agenda Item 10: Open Session-Commissioners

Dan updated the Commissioners on the progress of the review of the Bi-Laws for the Protection of Lake Auburn. Dan serves on an Auburn Water District appointed committee assigned to review the existing Bi-laws.

Agenda Item 11: Adjourn Meeting.

Vote-7 On a motion by Commissioner Parrish and seconded by Commissioner Bilodeau to adjourn the meeting

Passed 7-0

A true record, attest;

Michael Broadbent
Secretary of the LAWPC

Lake Auburn Watershed Protection Commission

WORKSHOP

Meeting Minutes

Wednesday, December 1, 2021

Location: Androscoggin Valley Council of Governments (AVCOG), Auburn, Maine

Time: Meeting began at 3:30 PM

Recording: The meeting was recorded.

Commissioners Present: Dan Dube, Mary Ann Brenchick, Caleb Roebuck, Amy Landry, Dan Bilodeau, Alan Holbrook, Evan Cyr and Steve French

Commissioners Absent: Camille Parrish

Others Present: Kevin Gagne, LAWPC Clerk, Michael Broadbent LAWPC Secretary, Erica Kidd Watershed Manager and Carolyn Houtz Education and Outreach Coordinator.

Agenda Item 1: Review of Robert's Rules

Commissioner Brenchick gave a presentation on the history and basic guidelines of Robert's Rules. Commissioners then discussed the ability to either adopt all of Robert's Rules or only the sections that apply to the Commission and how it operates.

Items of interest were discussed including majority voting and how to properly close an executive session. It was agreed that the Commission should stay consistent with the Auburn Water District's bi-laws.

Agenda Item 2 & 3: FAQ List – from our Commissioners, Topics for future workshops

Discussions of Robert's Rules led directly into agenda items 2 & 3. The Commissioners are interested in having future workshops and discussed several topics for discussion including some of the frequently asked questions they all have:

- How to properly close/come out of executive sessions.
- Amending the format of meeting agendas
- What specific powers do the Commission Clerks have.
- Create a formal mechanism to set the time frame for meetings and to extend them if needed.

- How and when should we review and comment on the Lake Auburn Study conducted by the City of Auburn.
- Prioritize projects from previous studies in the watershed.
- Creating recreation easements for the City on Commission properties.
- Recreational use of Commission land – trails, snowmobiling, etc.
- Guidance for Commissioners on how to properly engage with surrounding towns on the importance of watershed protection.

A true record, attest;

Michael Broadbent
LAWPC Secretary

Lake Auburn Watershed Commission
Statement of Revenues & Expenditures
As of 12/31/21

	Original Operating Budget	Final Operating Budget	Operating Account	Balance	Sinking Fund	YTD Combined	12/31/20 Combined
Revenues:							
Contributions - AWD	52,500.00	52,500.00	52,500.00	-	22,500.00	75,000.00	65,000.04
Contributions - LWD	52,500.00	52,500.00	52,500.00	-	22,500.00	75,000.00	65,000.00
Timber Harvesting	20,000.00	20,000.00	93,763.92	(73,763.92)		93,763.92	-
Gain on Sale of Assets			4,576.64	(4,576.64)	21,253.82	25,830.46	
Water Withdrawal Revenue			4,421.45	(4,421.45)		4,421.45	7,282.68
Intergovernmental	1,500.00	1,500.00	2,200.00	(700.00)		2,200.00	2,000.00
Interest	2,500.00	2,500.00	344.82	2,155.18	957.75	1,302.57	3,963.94
Total Revenues	**129,000.00**	**129,000.00**	**210,306.83**	**(81,306.83)**	**67,211.57**	**277,518.40**	**143,246.66**
Expenditures:							
Auburn Water Department	6,000.00	6,000.00	5,191.00	809.00		5,191.00	6,755.35
Lewiston Water Division	6,000.00	6,000.00	8,991.17	(2,991.17)		8,991.17	4,281.50
Executive Administration	1,000.00	1,000.00	-	1,000.00		-	62.49
Forestry	4,500.00	4,500.00	10,064.59	(5,564.59)		10,064.59	4,895.00
Outside Services	3,325.00	3,325.00	3,435.00	(110.00)		3,435.00	3,325.00
Sanitary Facilities	3,760.00	3,760.00	2,680.00	1,080.00		2,680.00	3,680.00
Source Protection	60,500.00	60,500.00	41,198.99	19,301.01		41,198.99	111,806.99
Repairs to Property & Equipment	6,000.00	6,000.00	3,252.94	2,747.06		3,252.94	2,454.77
Public Education	1,775.00	1,775.00	2,371.28	(596.28)		2,371.28	17.00
Public Ed. - Labor	24,000.00	24,000.00	11,902.33	12,097.67		11,902.33	11,975.44
Public Ed. - Supplies	1,800.00	1,800.00	2,035.79	(235.79)		2,035.79	838.98
Public Ed. - Events	1,500.00	1,500.00	189.49	1,310.51		189.49	-
Public Ed. - Outside Services	1,000.00	1,000.00	-	1,000.00		-	838.69
Public Ed. - Public Relations	2,500.00	2,500.00	498.52	2,001.48		498.52	1,079.49
Public Ed. - Miscellaneous	1,750.00	1,750.00	1,183.83	566.17		1,183.83	661.93
Liability & D&O Insurance	12,150.00	12,150.00	12,075.47	74.53		12,075.47	11,446.08
Legal	1,000.00	1,000.00	6,454.50	(5,454.50)		6,454.50	127.50
Audit/Financial Services	6,695.00	6,695.00	6,595.26	99.74		6,595.26	6,441.26
Property Taxes	5,025.00	5,025.00	4,515.20	509.80		4,515.20	4,710.32
Operational Supplies	1,000.00	1,000.00	1,999.73	(999.73)		1,999.73	2,201.62
Depreciation/Amortization Expense			4,166.94	(4,166.94)	32,677.16	36,844.10	70,538.42
Miscellaneous	1,010.00	1,010.00	435.49	574.51	1,740.00	2,175.49	3,367.33
Total Expenditures	**152,290.00**	**152,290.00**	**129,237.52**	**23,052.48**	**34,417.16**	**163,654.68**	**251,505.16**
Excess Revenues Over Expenditures	(23,290.00)	(23,290.00)	81,069.31		32,794.41	113,863.72	(108,258.50)
Retained Earnings/Fund Balance, 1/1			2,137,348.81		3,411,135.20	5,548,484.01	5,656,742.51
Retained Earnings/Fund Balance, 12/31			**2,218,418.12**		**3,443,929.61**	**5,662,347.73**	**5,548,484.01**

Water Quality Report

1. Ice-on was 1/12/22.
2. No in-lake or tributary sampling occurs during ice-on.
3. Turbidity in January has been between 0.4-0.6 NTU.
4. Please see attached temperature and turbidity graphs for reference.
5. Fecal datasheets are also included.

Watershed Report

1. Lake Study proposed septic ordinance change brought to City Council on 1/3/22, who directed the Planning Board to further review the change. This topic has not yet been an agenda item for a Planning Board meeting.
2. Lake Study proposed watershed boundary change also brought to City Council on 1/3/22 and passed to Planning Board for public hearing on 2/8/22.
3. The key points of the Lake Study that could impact the watershed are included in this packet. Please see the Executive Summary and Section 5.
4. City of Auburn will be resurfacing sections of roads in the watershed in 2022: Skillings Corner Road, Johnson Road, Dillingham Hill Road, and Beaver Road.
5. Beaver were trapped and removed near the headwater of Townsend Brook on the Auburn/Turner town line in January.
6. Timber harvests took place on private property in the watershed near Tabers in Auburn.
7. Staff are considering hiring a part-time, year-round Watershed Warden to patrol the watershed in place of the Auburn Police Department lake patrols that take place during the summer.
8. Erica Kidd has been working with Alan Holbrook to include the Town of Turner in watershed protection. More information on the Town of Turner is included in this packet.

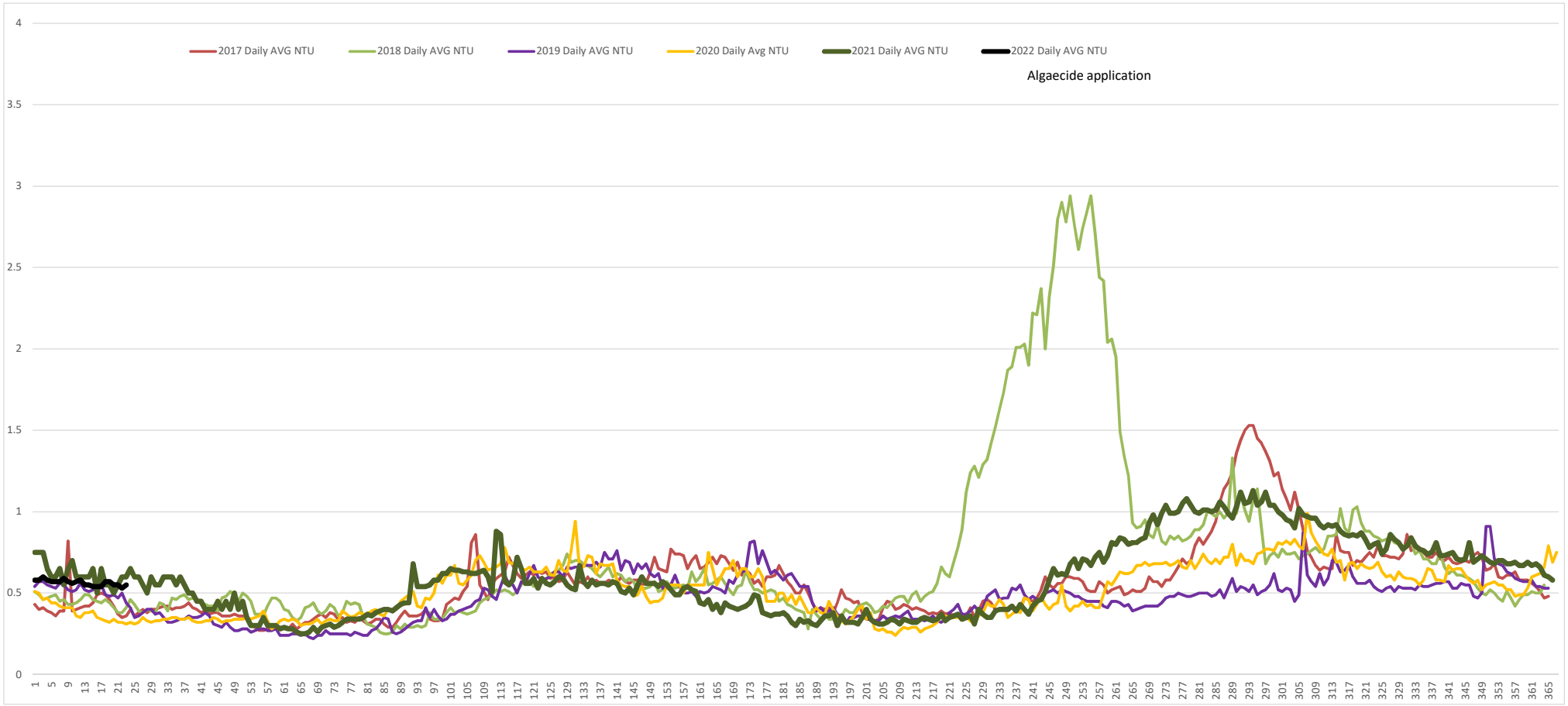
Education and Outreach Report

- November 23 Auburn Middle School Field Trip – Pollution lesson, plant tour, Salmon Point walk
- November 20 Salmon Point Clean Up – Cleaning trails, removing Asiatic bittersweet
- January 26 Wildlife and Nature Walk at the Summer Street Conservation Easement
- Tot Lot Presentation and discussions – Next steps are building up a volunteer base and regular clearing days
- Social Media Updates
- Website Updates
- Trail Updates, creating maps for the public
- Planning with Auburn Conservation Commission, Androscoggin Land Trust, for invasive management
- Planning with LA Arts for seasonal art events
- Planning with Auburn Girl Scouts for May Water Day
- 2 cancelled field trips due to COVID – created the need for virtual tours and more digital information

Upcoming Events:

- Edward Little High and AVEC wildlife and nature walks

- February 8th Water and Wildlife – Online presentation hosting the Center for Wildlife
- March 20th Sponsored Public Skate with Lake Stewards of Maine
- June Soil in and out of the Watershed Talk Series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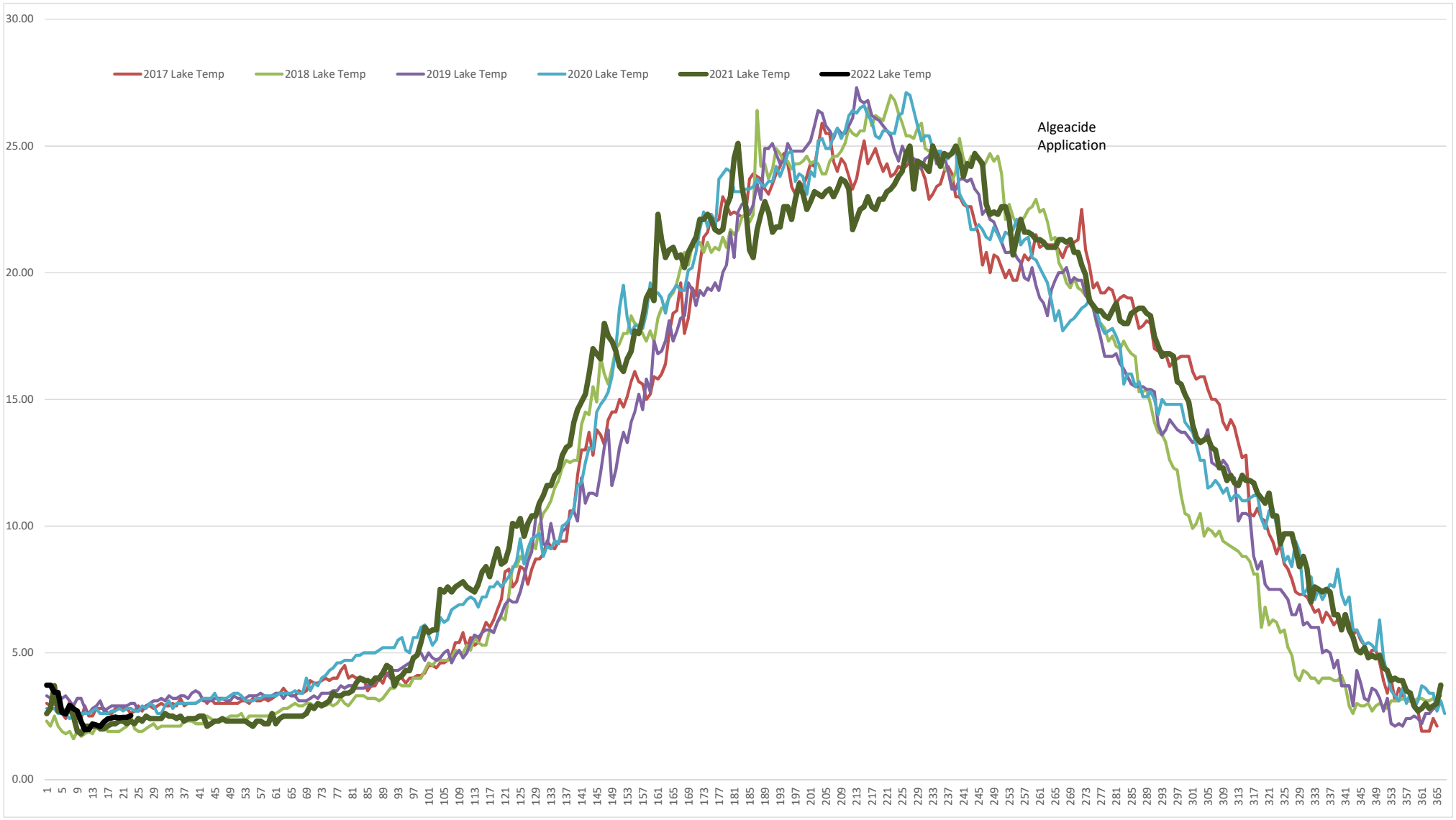
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Nov-21						INLINE					
Collected			Temp	Turbidity		Ph	Amount	FECAL	QUANTITRAY		Fecal
DATE	TIME	BY	*C	1720E	TU5200	230 A	Sample	BACTERIA	TOTAL	E.COLI	Confirmation
11/1	0330	DAF	13.5	0.90	0.90	7.08	100	1	770.1	1	P,P
11/2	0345	DAF	13.1	1.05	1.10	7.01	100	4			P,P/P,P/P,P/P,P
11/3	0350	DAF	13.0	0.90	0.85	7.05	100	6			P,P/P,P/P,P/P,P/P,P
11/4	0345	DAF	12.3	0.95	1.00	7.04	100	4			
11/5	0345	DAF	12.3	0.95	0.85	7.00	100	3			
11/6	0800	LRB	11.8	0.90	0.80	7.12	100	0			
11/7	0845	LRB	12.0	0.85	0.90	7.06	100	3			
11/8	0305	DAF	11.7	0.85	0.80	7.20	100	2	344.8	2	
11/9	0350	DAF	11.6	0.90	0.90	7.18	100	0			
11/10	0320	DAF	12.0	0.90	0.95	7.00	100	0			
11/11	0620	DAF	11.8	0.85	0.90	6.98	100	1			
11/12	0415	DAF	11.8	0.85	0.80	7.12	100	2			
11/13	0620	DAF	11.7	0.85	0.85	7.06	100	5			
11/14	0630	DAF	11.3	0.85	0.85	7.20	100	10			
11/15	0355	DAF	11.1	0.90	1.00	7.09	100	2	385.4	<1	
11/16	0350	DAF	10.9	0.90	0.90	7.04	100	2			
11/17	0355	DAF	11.3	0.90	0.90	7.26	100	2			
11/18	0355	DAF	10.4	0.75	0.80	7.15	100	2			
11/19	0400	LRB	10.4	0.75	0.80	7.05	100	2			
11/20	0810	LRB	9.3	0.85	0.90	7.15	100	3			
11/21	0805	LRB	9.7	0.75	0.75	7.19	100	5			
11/22	0355	DAF	9.7	0.75	0.75	7.08	100	2	261.3	1	
11/23	0350	DAF	9.7	0.80	0.80	7.03	100	0			
11/24	0345	DAF	9.1	0.85	0.85	7.08	100	0			
11/25	0540	DAF	8.4	0.80	0.80	7.09	100	1			
11/26	0550	DAF	8.8	0.75	0.70	7.09	100	0			
11/27	0545	DAF	8.3	0.75	0.75	7.11	100	3			
11/28	0645	DAF	7.0	0.95	1.00	7.15	100	3			
11/29	0615	DAF	7.6	0.75	0.75	7.03	100	0	95.9	1	
11/30	0345	DAF	7.5	0.75	0.70	7.06	100	0			

Dec-21

INLINE

Collected			Temp pH probe	Turbidity		Ph	Amount	FECAL	QUANTITRAY		Fecal
DATE	TIME	BY	*C	1720E	TU5200	230 A	Sample	BACTERIA	TOTAL	E.COLI	Confirmation
12/1	0350	DAF	7.4	0.75	0.75	7.04	100	1			P,P
12/2	0335	DAF	7.5	0.75	0.70	7.03	100	0			
12/3	0420	DAF	7.4	0.75	0.70	7.06	100	1			P,P
12/4	0630	DAF	6.5	0.75	0.75	7.06	100	4			P,P/P,P/P,P/P,P
12/5	0615	DAF	6.5	0.70	0.65	7.09	100	4			P,P/P,P/P,P/P,P
12/6	0350	DAF	5.9	0.70	0.70	7.09	100	0	248.1	2	
12/7	0750	LRB	6.5	0.65	0.55	7.07	100	0			
12/8	0350	DAF	5.9	0.70	0.65	7.07	100	0			
12/9	0735	LRB	5.6	0.65	0.60	6.96	100	5			
12/10	0600	LRB	5.1	0.65	0.60	7.12	100	4			
12/11	0550	DAF	5.0	0.60	0.60	7.04	100	4			
12/12	0600	DAF	5.2	0.65	0.65	7.03	100	3			
12/13	0350	DAF	4.8	0.60	0.60	7.06	100	2	27.5	<1	
12/14	0345	DAF	4.9	0.70	0.75	7.10	100	3			
12/15	0345	DAF	4.8	0.70	0.70	7.06	100	3			
12/16	0510	DAF	4.9	0.70	0.60	7.11	100	5			
12/17	0725	LRB	4.4	0.60	0.60	7.12	100	5			
12/18	0810	LRB	4.3	0.60	0.60	7.15	100	3			
12/19	0830	LRB	3.9	0.65	0.70	7.16	100	2			
12/20	0350	DAF	4.0	0.70	0.75	7.14	100	10	22.8	5.2	
12/21	0305	DAF	3.9	0.65	0.70	7.16	100	4			
12/22	0255	DAF	3.9	0.65	0.70	7.10	100	0			
12/23	0400	DAF	3.5	0.65	0.60	7.06	100	5			
12/24	0515	DAF	3.4	0.65	0.65	7.09	100	2			
12/25	0430	DAF	2.9	0.60	0.60	6.97	100	0			
12/26	0350	DAF	2.7	0.65	0.65	7.01	100	1			
12/27	0305	DAF	2.8	0.60	0.60	6.98	100	3	10.9	1	
12/28	0345	DAF	3.0	0.60	0.55	7.04	100	2			
12/29	0345	DAF	2.8	0.60	0.55	7.08	100	3			
12/30	0320	DAF	2.9	0.60	0.50	7.17	100	0			
12/31	0930	LRB	3.0	0.55	0.55	7.14	100	2			

Jan-22			INLINE								
Collected			Temp	Turbidity		Ph	Amount	FECAL	QUANTITRAY		Fecal
DATE	TIME	BY	*C	1720E	TU5200	230 A	Sample	BACTERIA	TOTAL	E.COLI	Confirmation
1/1	0925	LRB	3.0	0.55	0.55	7.15	100	2			P,P/P,P
1/2	0935	LRB	3.0	0.55	0.55	7.09	100	2			P,P/P,P
1/3	0305	DAF	2.9	0.55	0.55	7.12	100	6	10.8	1	
1/4	0800	DAF	2.9	0.55	0.50	7.16	100	1			
1/5	0345	DAF	2.4	0.55	0.50	7.17	100	0			
1/6	0350	DAF	2.3	0.55	0.60	7.21	100	0			
1/7	0250	DAF	2.2	0.55	0.60	7.22	100	2			P,P/P,P
1/8	0805	LRB	1.8	0.55	0.55	7.18	100	2			P,P/P,P
1/9	0805	LRB	2.0	0.50	0.50	7.23	100	2			P,P/P,P
1/10	0350	DAF	2.0	0.50	0.45	7.20	100	4	3.1	1	
1/11	0745	LRB	1.2	0.50	0.55	7.17	100	1			
1/12	0330	DAF	1.3	0.55	0.60	7.21	100	1			
1/13	0350	DAF	1.5	0.55	0.55	7.25	100	1			
1/14	0345	DAF	1.4	0.55	0.55	7.23	100	3			
1/15	0620	DAF	1.2	0.50	0.50	7.29	100	0			
1/16	0630	DAF	1.2	0.50	0.45	7.26	100	0			
1/17	0550	DAF	1.4	0.50	0.50	7.22	100	0	6.3	<1	
1/18	0750	LRB	1.3	0.50	0.40	7.16	100	0			
1/19	0320	DAF	1.6	0.50	0.50	7.20	100	0			
1/20	0410	DAF	1.5	0.50	0.45	7.17	100	0			
1/21	0930	DAF	1.4	0.50	0.50	7.09	100	0			
1/22	0945	LRB	1.5	0.45	0.50	7.18	100	0			
1/23	0945	LRB	1.4	0.45	0.50	7.23	100	0			
1/24	0340	DAF	1.5	0.50	0.55	7.16	100	0	3	<1	
1/25	0315	DAF	1.7	0.50	0.50	7.21	100	0			
1/26	0310	DAF	1.8	0.50	0.45	7.26	100	0			
1/27	0325	DAF	1.8	0.50	0.40	7.24	100	0			
1/28	0415	DAF	1.8	0.45	0.40	7.21	100	0			
1/29	0615	DAF	1.7	0.45	0.40	7.26	100	0			
1/30	0615	DAF	1.8	0.45	0.40	7.27	100	0			
1/31	1035	LRB	1.5	0.40	0.40	7.22	100	0	3.1	<1	

Executive Summary

Lake Auburn is the only public drinking water supply for the Maine cities of Auburn and Lewiston. In recent years, signs of declining water quality have given rise to public calls for actions that would upend the status quo of the last several decades. Some have argued that the authorities in charge of ensuring a clean water supply from Lake Auburn should protect more of the watershed that contributes to the lake. Others have called for the City of Auburn, the Auburn Water District, or other authorities to revise the regulatory framework that protects the lake from encroaching activities that could contaminate it, while still others have proposed proactively building a water filtration plant to treat water of more variable quality. These suggested actions, while not inherently conflicting, have not yet been comprehensively examined for the potential benefits to Lake Auburn's water quality, nor have the regulatory or economic impacts been adequately considered.

The City of Auburn commissioned the present study to address this gap in understanding about Lake Auburn's present state compared to a range of future scenarios. In 2021, the City hired the interdisciplinary consultant team of FB Environmental Associates, Horsley Witten Group, and the University of Maine to 1) carry out a thorough review of existing conditions, standards, regulations, and practices in Lake Auburn and its watershed, 2) quantify to the greatest extent possible the regulatory, environmental, and economic impacts of the current status quo and future scenarios, and 3) evaluate and recommend potential ways forward that maximizes the benefits and minimizes the costs of regulatory, environmental, and economic impacts to Lake Auburn, its watershed, and the surrounding communities.

This report follows three lines of inquiry examining the key aspects of Lake Auburn as a water supply – its regulations, its environment, and its economics. These lines of inquiry are treated individually as sections of this report, but with the understanding that they are closely intertwined and inform each other. **Section 1** introduces Lake Auburn, outlines the motivation and purpose of the study, and gives key background information such as historical context and a summary of current conditions.

Section 2, Analysis of Regulatory Impacts, examines the regulatory framework protecting water quality. City of Auburn regulations are evaluated through literature review and comparative analysis using other water supply lakes and State and federal models. We found that the regulatory framework for the protection of Lake Auburn as a water supply is mostly robust and effective. We recommend several revisions that will better align the regulations with the best available science and State and regional norms and apply them more fairly across different land uses and activities:

- Align the septic system regulations contained in the Lake Auburn Watershed Overlay District Ordinance with the best available science and Maine's septic system regulations.
- Develop a clear set of standards for farm management that will limit phosphorus loading from commercial agricultural activities.
- Incorporate low impact development requirements for new single family residential development.

Section 3, Analysis of Environmental Impacts, analyzes the environmental impact of various development and water quality scenarios for the Lake Auburn watershed. The analysis uses a well-documented watershed model paired with in-lake empirical formulas to predict water quality outcomes under each future scenario. This section also reviews recreational uses of the lake, forest management, and the history of land purchases for water supply protection in the watershed. We find that Lake Auburn reached a tipping point in the 2010s where key environmental thresholds were reached or passed. In the lake, levels of phosphorus – a key nutrient for the growth of aquatic algae – rose above 10 parts per billion (averaged annually) and elevated the risk of algae blooms. Meanwhile, in the watershed, forested land cover dipped below 75% of the land area, meaning that more sources of phosphorus contamination, such as impervious surfaces, areas of bare soil, and septic systems, were contributing to the lake. Treatment of the lake with alum in 2019 was successful and achieved a temporary reset in lake phosphorus levels.

Looking forward, our model projects existing conditions and development rates ahead to 2100 (the "Business as Usual" scenario), by which time Lake Auburn will again near the tipping point of 10 parts per billion phosphorus, even with the regular use of alum treatments. Future scenarios that ease restrictions on residential growth will result in higher concentrations of phosphorus and higher risk of algae blooms. Requiring low impact development – innovative techniques that reduce impervious cover and encourage stormwater to pass through the groundwater before reaching the lake, thus filtering out contaminants – makes a small but significant positive impact on phosphorus and the risk of algae growth.

Section 4, Analysis of Economic Impacts, examines the costs and benefits of the same development and water quality scenarios for the Lake Auburn watershed that are covered by the environmental analysis in Section 3. The analysis combines well-established economic methods with data on land use and water quality to systematically evaluate how these scenarios change or reallocate costs and benefits. We find that the source of the largest increases in benefits in all future scenarios is the increase in property taxes collected by Auburn, which climb from $3.6 million to $9 million annually in the highest development scenario. Meanwhile, the source of the largest extra costs is in dealing with declining water quality in Lake Auburn, especially treating water in a filtration plant which is estimated at over $3 million annually. Table 4-7 provides a detailed summary of our estimated aggregate costs and benefits across all scenarios. We find that the added benefits to Auburn are mostly or entirely offset by increased costs to Lewiston, resulting in negligible net economic benefit to the communities served by Lake Auburn.

Section 5 provides a summary of key findings, a discussion on several topics that overlap the regulatory, environmental, and economic analyses, and a set of holistic recommendations for the City of Auburn and other stakeholders to consider:

1. The City of Auburn should not seek to ease the current resource protection zoning or consider rezoning portions of the watershed for increased density. Increased density and new opportunities for residential development are better suited to other areas of Auburn outside of the Lake Auburn watershed.

2. The Auburn Planning Board and City Council should take up our recommended ordinance revisions and, if acceptable in their current form, adopt them. These recommended revisions are fully elaborated in Section 2 and in a separate document to the City.

3. The City of Auburn should share the findings on aggregate economic impacts with all partners and stakeholders for use in an open, transparent, and thoughtful public discussion of the fairness, equity, and sustainability of the current cost sharing and benefit allocations, as well as practical ways forward.

4. The City of Auburn, the Auburn Water District, the City of Lewiston, and the Lake Auburn Watershed Protection Commission should fully support collaborative work with local governments, land trusts, private landowners, and other potential partners in the upper Lake Auburn watershed to control development and limit phosphorus loading.

5. The key Lake Auburn stakeholders should cooperatively conduct a comprehensive review and gap analysis of current water quality monitoring efforts carried out by both the Auburn Water District and Bates College in the Lake Auburn watershed. This initiative should produce a monitoring plan, create a position for a full-time, dedicated data manager, continue collaboration with Bates College on student-assisted monitoring, and consider creating a technical science advisory board to the Lake Auburn Watershed Protection Commission to establish or maintain key local, State, and regional partnerships for review and guidance on water quality issues.

6. Given its high probability of causing a filtration waiver violation, a swimming area will likely not be feasible for Lake Auburn at any time unless State and federal authorities sign off. If a swimming area were to be re-instituted at Lake Auburn, we provide many actions that would need to take place to ensure that the area does not contribute to water quality degradation. Refer to Swimming in Section 3.

7. Allowance of only small watercraft restricted to areas away from the water supply intake should continue, and improved stabilization techniques at vehicle and pedestrian access points along the lake shoreline should be implemented, along with clear and effective barriers to foot and vehicle access.

8. The Lake Auburn Watershed Protection Commission should coordinate with local youth conservation groups or AmeriCorps to perform annual maintenance of trails and install best practices that limit erosion of trails, especially those sections nearest the lake. In addition, surveying how much horse manure may be found on the trails to inform a reconsideration of horseback riding near the lake is recommended, as manure can be a significant nutrient source in sufficient quantities. Finally, it is recommended that the City acquire permanent recreational trail easements to LAWPC properties with trails for guaranteed public access in the future.

9. The Lake Auburn Watershed Protection Commission should develop a comprehensive natural resource management plan for their lands that focuses firstly on drinking water protection and secondly on wildlife habitat protection, with multiple management options offered. The plan should incorporate new mapping of critical resources such as streams, wetlands, vernal pools, cover types, and rare, threatened, and endangered species present.

10. The Lake Auburn Watershed Protection Commission should work with local conservation groups and land trusts to purchase land in the watershed outside of Auburn. We also recommend that the Commission consider putting all their properties into permanent conservation.

5 Findings, Synthesis, & Holistic Recommendations

This section draws out key conclusions from the report's preceding Sections 2, 3, and 4 which contain our analyses of the regulatory, environmental, and economic impacts of Lake Auburn as a public drinking water supply. Synthesis and further discussion, along with consideration of examples from comparable water supplies, are also provided for several key conclusions that recur throughout the preceding sections. Lastly, this section puts forth holistic recommendations for the City of Auburn, as well as the broader community of stakeholders, with the aim of promoting water supply protection efforts and initiatives that preserve or improve the balance among regulatory, environmental, and economic impacts.

Photo Credit: Sun Journal

Key Findings

Section 2, Analysis of Regulatory Impacts

We found that the regulatory framework for the protection of Lake Auburn as a water supply can be revised to be more clearly defined, better aligned with the best available science and State and regional norms, and more fairly applied across different land uses and activities. Specific recommendations are described in depth in Section 2, and direct ordinance language revisions are provided in a separate document to the City. A summary of our recommended revisions is outlined below:

- Revise the septic system requirements of the Lake Auburn Watershed Overlay District Ordinance to incorporate the Maine Subsurface Wastewater Disposal Rules, including provisions that allow for mounded leach fields and other State-approved alternative designs where there is not a native, in-situ, 36-inch vertical separation between the bottom of the organic horizon and the bedrock, water table, or other restrictive layer. Refer to Appendix 1.

- Revise the Phosphorus Control Ordinance to clarify that the limit of a project area does not apply to a given land use but to a demarcated limit of disturbance, such that all disturbance within that area is required to meet the erosion and sedimentation controls and other phosphorus controls under a plan required by the Phosphorus Control Ordinance.

- Require timber harvest and agricultural activities to meet the same requirements as other land uses under the Phosphorus Control Ordinance. Currently, timber management and harvesting must be conducted in accordance with a forest management plan prepared and supervised by a registered forester, while agriculture must be conducted in accordance with a soil and water conservation plan approved by the ACSWCD, making these uses effectively exempt from City oversight. Removing the exemption and requiring timber and agriculture to meet the same erosion control standards under the Phosphorus Control Ordinance would ensure that water quality protection is a central feature of any timber harvesting or agricultural activities in the Lake Auburn watershed.

- Develop a clear set of standards for farm management that will be consistently applied to farms in the watershed for the purpose of controlling erosion and limiting the delivery of excess phosphorus from the farm practices to Lake Auburn. One approach is to set a concrete limit on the amount of agricultural activities that are phosphorus-intensive (e.g., commercial raising of livestock, fertilized row crops, manure spreading). It is important to note that water quality is predicted to be much worse across all future scenarios if agricultural land use does not decline as predicted.

- Adjust the agricultural buffer strip requirement in the Lake Auburn Watershed Overlay District Ordinance to improve its effectiveness. Recommended adjustments include widening the buffer to 75 or 100 feet, requiring the buffer to be vegetated, and requiring the buffer to be located downgradient of all agricultural activities, perpendicular to the direction of overland flow, in all areas of the watershed (as opposed to requiring buffers only for agricultural activities that are adjacent to surface water).

- Update the Lake Auburn Watershed Overlay District Ordinance to reflect the revised watershed boundary, reducing the existing watershed boundary by 148 acres in the Gracelawn Road area.

- Incorporate low impact development requirements for single family residential development on the 1- and 3-acre lots allowed in the Lake Auburn watershed by way of referencing the Maine Stormwater Management Design Manual, Volume 2. The use of low impact development can help to limit the impacts of stormwater runoff and associated erosion and pollutants from sites. The standards as they apply to a water supply watershed are presented below:

  - » Disturbance on an individual lot must be less than 15,000 square feet (including building, driveway, walkways, lawn area, construction access, and grading).

  - » A minimum natural vegetated buffer must be maintained downgradient of all developed areas on the lot. This buffer shall be 50 feet wide if naturally forested or 75 feet wide if maintained as a natural meadow.

  - » No more than 7,500 square feet of impervious cover is located on the property.

  - » A minimum of 40 percent of the lot area must be maintained as an undisturbed natural area. If the existing land has been disturbed by prior activities, a natural vegetated buffer and/or undisturbed natural area may be proposed through restoration and revegetation.

Section 3, Analysis of Environmental Impacts

We found that Lake Auburn water quality in the last decade had reached a tipping point, whereby nuisance algae blooms were becoming more frequent and were threatening the filtration waiver. The partial alum treatment conducted in 2019 significantly reduced the

in-column total phosphorus concentration and locked in a portion of the sediment-bound phosphorus, effectively resetting the system and giving the water districts additional time to ramp up watershed protection and nutrient reduction efforts. We also found that projecting current status quo conditions into the future (i.e., the "Business As Usual" scenario) resulted in Lake Auburn once again reaching a tipping point by 2100, even with the assumption that the in-column total phosphorus concentration and sediment-bound phosphorus would be repeatedly reset by an alum treatment every 10 years (see discussion in Section 2 about this assumption for further context). Modeled predictions for the other future scenarios where the regulatory framework is adjusted to allow more development in the Auburn portion of the watershed results in greater water quality degradation and a higher risk of blooms, ultimately triggering the need for a filtration plant in the "Maximum Development Allowing Building on LAWPC Lands" scenario. The use of low impact development techniques has a small positive effect on water quality in these future scenarios but does not ameliorate the high risk of frequent algae blooms. Taken together, the future scenarios show that Auburn alone does not have the land use control tools to stave off water quality decline in Lake Auburn; sustained collaboration with the upper watershed municipalities is essential to achieve the needed phosphorus load reductions over the remainder of the 21st century.

Section 4, Analysis of Economic Impacts

We found that expanding development in the Lake Auburn watershed provided minimal overall net economic benefit when accounting for the benefits and costs of all affected stakeholders, including the City of Lewiston who would otherwise carry the additional costs of watershed protection and water treatment through the existing cost sharing agreement in order for the City of Auburn to benefit from increased property tax revenues. In other words, the increased net benefits to the City of Auburn would be mostly or entirely offset by increased net costs to AWD and LWD customers, resulting in negligible net economic benefit to the communities served by Lake Auburn. This reallocation of benefits and costs among all affected stakeholders for the future scenarios highlights important questions of equity and fairness, which were raised during the process of producing this report and conversing with key community representatives. We emphasize that the costs associated with addressing declining water quality are costs to all water users and that the risk of incurred costs that are higher than our conservative estimates is very real.

Synthesis & Discussion

In summary, our analyses determined that Lake Auburn is nearing its assimilative capacity for nutrient load (even with the partial alum treatment) and cannot handle much more additional nutrient load without diminishing water quality and its associated benefits. We found no net environmental, economic, or social benefit supporting expansion of development in the Lake Auburn watershed. Instead, we recommend that low impact development strategies are incorporated into existing zoning standards and required for all future development and redevelopment projects in the Auburn portion of the watershed. We also recommend that the other four headwater towns of Turner, Minot, Hebron, and Buckfield also incorporate low impact development requirements on future development projects. Lake Auburn cannot maintain excellent water quality in the future without the full participation of the other watershed towns. More development cannot be allowed in the Auburn portion of the watershed even with low impact development requirements implemented in Auburn. Even if reduced development through conservation or other means is achieved in the headwater towns, any additional development in Auburn has an outsized negative impact since its drainage area goes directly to the lake. It is also important to understand that a filtration plant does not allow for greater development of the watershed because the filtration plant only treats extracted drinking water for the consumer and does not treat in-lake water quality for recreation and for meeting State criteria for designated uses.

> We found no net environmental, economic, or social benefit supporting expansion of development in the Lake Auburn watershed.

Below, we present further discussion on three important topics: regulation of septic systems, environmental risk and uncertainty, and comparable water utilities.

Regulation of septic systems: The regulatory and environmental analyses examined multiple issues surrounding septic systems and their contributions of phosphorus to Lake Auburn. At first glance, there may appear to be a contradiction between 1) the recommended ordinance revision from the regulatory analysis (Section 2) that the septic design standard should be revised in such a way that will allow previously non-buildable sites to become buildable and 2) the conclusion from the environmental analysis (Section 3) that Lake Auburn will arrive at a tipping point of declining water quality by 2100 even in the absence of any pro-development changes (i.e.,

the "Business As Usual" scenario). Indeed, our buildout analysis determined that more than 100 additional new homes could be built in the watershed if the septic system siting requirement for 36 inches of suitable in-situ soil were revised.

To address this apparent contradiction, we argue that the septic design standard should be judged not only by its adherence to the best available science but by its simplicity, straightforwardness, and fairness. The key questions are: does the existing septic design standard accomplish its stated purpose of regulating septic systems effectively for water quality protection, or is its water quality benefit primarily in its de facto restriction of buildable areas in the watershed? Are there improvements that could be made to achieve the stated goal? With our recommended revision, we aim to have the septic design standard achieve its stated purpose of effectively regulating both new septic system construction and replacement/reconstruction of existing septic systems as they age out, so that septic systems with alternative technologies and innovative phosphorus controls can be phased in. Restrictions on developable land are better left to base and resource protection zoning than to septic design standards.

The project team also noted in conversations with multiple Lake Auburn stakeholders a concern about an unintended consequence of the requirement in the current ordinance for 36 inches of suitable in-situ soil to site a septic system. The concern is that this requirement for deep, native soils has led to the preferential siting of some septic systems on deep formations of sand and gravel aquifer, which provide some of the only suitable sites in the watershed with the requisite depth to bedrock, water table, or other restrictive layer. While our team did not conduct any field assessments, witness this condition firsthand, or review any documentation of this condition, we agree with the premise that these sand and gravel formations should not be considered suitable sites for septic systems, at least without the importation of suitable reactive soils for nutrient and pathogen processing that the recommended ordinance revisions would allow. Adopting the Maine State standards while preserving the minimum 36-inch vertical separation would alleviate the potential for this unintended consequence.

Environmental risk and uncertainty: The risk of deteriorating water quality threatening Lake Auburn's ability to remain a high quality public drinking water supply is a throughline of this entire study. In its simplest terms, risk is the probability of a negative outcome, though the severity of the negative outcome in question is usually included when evaluating that risk. A high risk of a minor inconvenience (e.g., the risk of getting caught in traffic if leaving downtown Boston by car at 5:00 PM on a business day) requires minimal forethought, while a low risk of major damage (e.g., the risk of a flood destroying private or public infrastructure from a hurricane or Nor'easter) requires extensive planning and preparation. Uncertainty is the degree to which the risk cannot be quantified, due to a number of factors, such as insufficient data about existing conditions, insufficient predictive models for the future, and inherent randomness in nature. It is difficult but possible to predict with reasonably low uncertainty the risk of an outcome that has occurred before (e.g., an algae bloom in Lake Auburn). It gets much more difficult to predict the risk of a particular outcome (e.g., a filtration waiver violation in Lake Auburn) if that outcome has never occurred before, because the data and predictive models have not been tested against that outcome in the real world. In this situation, the uncertainty surrounding such an outcome remains relatively high even with excellent data and predictive models.

This study examined Lake Auburn's risk of negative water quality outcomes now and in the future under various scenarios, though with considerable uncertainty due to a number of confounding or unknown factors. However, we can say with certainty that all additional development raises the risk of water quality degradation, whether due to phosphorus loading, pathogens from subsurface wastewater disposal, emerging contaminants such as pharmaceuticals and personal care products, etc. Even if the increased risk resulting from any individual parcel-scale decision is small, the aggregate impact of thousands of individual decisions over the coming decades is what matters.

From a risk management perspective, the entire spectrum of outcomes should at least be understood, including the least probable, most negative outcome (i.e., the worst-case scenario). The worst-case scenario would be that Lake Auburn's water quality would deteriorate past the point of useful public drinking water supply. Phosphorus enrichment to the point of having uncontrolled algae blooms every year, with cyanobacteria and associated cyanotoxins, would be the most likely condition of such a worst-case scenario. If this unlikely but highly undesirable scenario were to occur, Auburn and Lewiston would be forced to consider other alternatives that previously would not have been seriously deliberated, such as drawing upon the Androscoggin River for drinking water. The cost of this worst-case scenario was not evaluated in our economic analysis because our environmental models do not predict conditions to deteriorate to that degree under the chosen scenarios. But in managing environmental risk, this unlikely but highly undesirable outcome should be included in the overall picture of Lake Auburn's possible future.

Comparable water utilities: Comparison of Lake Auburn and LAWPC/AWD/LWD with other water sources and utilities is illustrative of their strengths, weaknesses, and projected future needs (Table 5-1). Lake Auburn's key

Table 5-1. Lake Auburn and comparable water supply lakes and ponds in Maine.

Waterbody	Water Utility	Waterbody Surface Area (acres)	Watershed Area (acres)	Communities Served	Watershed Communities	Filtration Waiver?
Lake Auburn	Auburn Water District	2,277	9,651	Auburn, Lewiston, Poland	Auburn, Turner, Minot, Hebron, Buckfield	Yes
China Lake	Kennebec Water District	29,992	234,000	Waterville, Winslow, Fairfield, Benton, Vassalboro, Maine Water Company - Oakland	Vassalboro, China, Albion	No
Sebago Lake	Portland Water District	635	4,600	Portland, South Portland, Westbrook, Falmouth, Cumberland, Cape Elizabeth, Gorham, Windham, Scarborough, Raymond	24 municipalities (Androscoggin, Cumberland, Oxford counties)	Yes
Floods Pond	Bangor Water	3,939	16,704	Bangor, Eddington, Hampden, Hermon, Orrington, Clifton, Veazie, Hampden Water District	Otis, Clifton	Yes

comparables are China Lake, which supplies the Kennebec Water District (KWD) serving Waterville and surrounding communities; Sebago Lake, supplying the Portland Water District (PWD); and Floods Pond, used by Bangor Water, an independent water utility, to serve Bangor and surrounding communities.

China Lake is nearly double the size of Lake Auburn, with a 3,939-acre lake surface and a nearly 17,000-acre watershed, but the lake divides into two basins nearly equal in size, the west basin and the east basin. The KWD has a water supply in-take located in the west basin, where the shoreline is mostly under KWD control and managed as water supply protection land. The east basin is nearly all under private ownership and has much more shoreline development. The China Lake Outlet Stream, the only outlet of the entire lake, is in the west basin at the dam in Vassalboro. Considered by itself, the west basin is very similar to Lake Auburn in terms of shoreline and watershed management - mostly forested, under public water utility control, with universal restrictions on swimming and bodily contact but with limited recreational fishing allowed. Like Lake Auburn, China Lake serves one community within the lake watershed (Vassalboro) and several communities outside its watershed (Waterville, Winslow, Fairfield, Benton, and the Maine Water Company in Oakland), while the upper watershed towns of China and Albion do not use KWD water.

The key difference between China Lake and Lake Auburn is that China Lake has experienced algae blooms nearly every summer since the 1980s. Blooms were more severe through the 1980s and 1990s, and since the early 2000s, there have been some trends of improvement, including coldwater fish species survival. Since 1993, KWD has filtered the drinking water supply using a granular activated carbon filtration system capable of producing up to 12 MGD, though current demand stands at 3 MGD. The plant was constructed in the early 1990s for a cost of roughly $25 million. According to KWD Superintendent Roger Crouse, P.E., if water quality were to decline significantly from its current stable state, such as increased algae blooms and turbidity, KWD would have to change their operations to handle the lower quality in-take water (R. Crouse, pers. comm). The carbon filters would need to be backwashed more frequently, and the additional backwash water would need to be accommodated somehow in the existing lagoons or else the lagoons would need to be expanded at significant cost. The alum dose used to pretreat the water before filtration would also need to be raised. The key takeaway is that decreased in-take water quality at a filtration plant taxes the system, raises the volume of the waste stream, and adds significant cost and complexity to the treatment process, meaning that water supply managers cannot forgo water quality protection efforts simply because a filtration system is in place.

Sebago Lake is the public drinking water supply source used by the PWD to supply Portland, South Portland, Westbrook, and surrounding Greater Portland communities - roughly one sixth of Maine's population. The lake is roughly 10 times the size of Lake Auburn, with a surface area of nearly 30,000 acres and a watershed area of 235,000 acres. Sebago is the deepest lake in New England at 316 feet at its deepest point. Like Lake Auburn, Sebago Lake qualifies for a filtration waiver owing to a history of excellent water quality. The existing disinfection plant has a production capacity of 54 MGD and currently experiences a demand of 22 MGD. With such a large water supply lake, the capacity of the plant will be exceeded long before any concern of safe yield from the lake arises.

Land use in the Sebago Lake watershed is largely composed of private forestlands. The PWD owns 2,500 acres (or about 1% of the watershed), with 800 acres of mostly shoreland designated as 'No Trespassing' and 1,700 acres of land designated as free for public access for many forms of recreation. Another 28,000 acres are owned or

managed by land trusts. The water supply in-take is at the far southern extent of the lake in the Lower Bay. A 3,000-foot 'No Trespassing' zone surrounds the in-take, and no bodily contact is allowed within two miles of the in-take. Boating, fishing, snowmobiling, and ice fishing are allowed within the 2-mile limit but not within the 3,000-foot limit. Overall, the restricted area is very similar in size and structure to that of Lake Auburn (with the exception that the on-ice activities are not allowed on Lake Auburn). Taking Sebago Lake as a whole, however, the major difference with Lake Auburn is that Sebago's Lower Bay comprises a small fraction of the overall lake, the rest of which has no special swimming or boating restrictions for water supply.

Sebago Lake and its watershed are located many miles away from the service areas of the PWD. This geographical separation means that the communities served by PWD have no ability to enact land use controls on the lakeshore or in the watershed, unlike the situation in Lake Auburn where the City of Auburn can use its zoning ordinances to enact protections for the shorefront and watershed. It is likely that this lack of control over Sebago Lake's upper watershed has spurred the PWD to focus on cooperation with land trusts and private forestland owners to conserve tracts of land. As an example, PWD Environmental Services Manager Paul Hunt told the project team that the PWD is part of a partnership, Sebago Clean Waters, that seeks to raise the total amount of land conserved (and managed at least partly for water supply protection) from the current 12% of the watershed to 25% in the next 15 years (P. Hunt, pers. comm).

In all the examples considered, the authorities in charge of water supply protection emphasize the need to maintain shoreline control as much as possible, to conserve key water supply lands, and to tightly regulate recreation, regardless of current water quality.

Floods Pond in Otis, Maine has been the public water supply source for Bangor Water, the independent water district that serves Bangor and surrounding communities since 1959. At 635 acres of surface area, surrounded by a 4,600-acre watershed in Otis and neighboring Clifton, Floods Pond is less than half the size of Lake Auburn. Maximum depth is similar at 133 feet. Like Lake Auburn, Floods Pond also qualifies for a filtration waiver owing to its historically excellent water quality.

Land use in the Floods Pond watershed is largely controlled by Bangor Water, which owns or holds landowner agreements to manage 4,500 acres or more than 99% of the watershed land area. There is no public access to Floods Pond, which is home to a native population of Arctic char (Salvelinus alpinus), a coldwater fish species closely related to both salmon and lake trout that has been used by the Maine Department of Inland Fisheries and Wildlife to establish coldwater fish populations in other Maine lakes. Fishing, boating, and swimming are prohibited, as are hiking, wildlife viewing, and hunting in posted areas that include the entire shoreline.

The geography of Floods Pond as a water supply resembles China Lake more than Lake Auburn. The vast majority of Bangor Water customers are in downstream communities (Bangor, Eddington, Hampden, Hermon, and Orrington), while the protected shoreline and watershed areas are in upstream communities that do not use the water. (A small portion of Clifton is served by Bangor Water.) Bangor Water controls nearly all the Floods Pond watershed in Otis and Clifton, 4,500 acres total and more than LAWPC controls in the Lake Auburn watershed. Recreational activities are also much more restricted at Floods Pond than at Lake Auburn. Floods Pond provides a useful comparison point at the more restrictive end of the spectrum that puts the lost tax revenues and recreational opportunities at Lake Auburn in perspective.

To summarize, these comparisons with other water supply lakes demonstrate that the protections surrounding Lake Auburn do not exceed those of China Lake, Sebago Lake, or Floods Pond. The restrictions on recreational opportunities at Lake Auburn are similar to those at other drinking water supplies, including filtered and unfiltered water sources. Similarly, land use restrictions within the Lake Auburn watershed are far from the most prohibitive among the examples discussed, with only 20% of the watershed held or managed as water supply land compared to 99% of the Floods Pond watershed. In all the examples considered, the authorities in charge of water supply protection emphasize the need to maintain shoreline control as much as possible, to conserve key water supply lands, and to tightly regulate recreation, regardless of current water quality.

Holistic Recommendations

1. We recommend that the City of Auburn not seek to ease the current resource protection zoning or

consider rezoning portions of the watershed for increased density (e.g., village node-style development). Increased density and new opportunities for residential development are better suited to other areas of Auburn outside of the Lake Auburn watershed, preferably areas already served by sanitary sewer (for the benefit of nearby water resources such as the Androscoggin River). This recommendation is based on two key findings of this study that are fully elaborated in Section 3:

- Lake Auburn and its watershed are already at or near the key environmental thresholds of 10 parts per billion annual average total phosphorus and 75% forested watershed land cover; and
- The future scenario models showed that easing restrictions on further development in the Lake Auburn watershed would set the lake on a path toward deteriorating water quality, regardless of the beneficial effects of requiring low impact development techniques and without obvious management strategies to combat further declines in water quality.

2. We recommend that the Planning Board and City Council take up our recommended ordinance revisions and, if acceptable in their current form, adopt them. If not acceptable in their current form, the recommended revisions should be reworked and made more practicable but not watered down or fundamentally changed in their intent or effect. These recommended changes represent a move toward simpler, more transparent, more evenly applied regulations that are based on the best available science. These recommended revisions are fully elaborated in Section 2 and in a separate document to the City.

3. We recommend that the City of Auburn share the findings of Section 4, Analysis of Economic Impacts, with all partners and stakeholders so that the accounting of aggregate economic impacts of the existing conditions and various future scenarios are used as the basis for an open, transparent, and thoughtful public discussion of the fairness, equity, and sustainability of the current cost sharing and benefit allocations, as well as practical ways forward. This recommendation is based on the key finding that any net benefits to the City or Auburn residents and taxpayers from expanded residential development in the Lake Auburn watershed would be counterbalanced by additional costs to Lewiston and its residents and taxpayers, in the form of increased costs associated with mitigating declining water quality and decreased benefits from recreation. These findings are fully elaborated by Section 4 of this report. As a next step in this planning process, we recommend that a scenario be modeled and run through a benefit cost analysis that meets the target water quality goal for Lake Auburn, which was not possible in the future scenarios modeled in this study when considering Auburn-only changes to regulations and management approaches. Developing a scenario that meets the water quality goal may require several iterations. The scenario should likely expand the existing Lake Auburn Watershed Overlay District to the upper watershed towns, require implementation of low impact development techniques on new development watershed-wide, and account for septic design standard changes.

4. We recommend that the City of Auburn, City of Lewiston LWD, AWD, and LAWPC fully support collaborative work with local governments, land trusts, private landowners, and other potential partners in the upper Lake Auburn watershed (Turner, Minot, Hebron, and Buckfield) to control development and limit phosphorus loading. Historically, LAWPC has been an active player in fostering collaborative action between the local governments, with representation from the upper watershed towns. This recommendation is based on the key finding from this study that Auburn alone cannot accomplish sufficient phosphorus load reductions to prevent deteriorating water quality in Lake Auburn, but will require active participation from the upper watershed towns. This finding is fully elaborated in Section 3.

5. We recommend completing a comprehensive review and gap analysis of current water quality monitoring efforts carried out by both AWD and Bates College in the Lake Auburn watershed. Identify gaps based on weaknesses and assumptions for the model. From the review and gap analysis, devise a robust long-term water quality monitoring plan and annual cost estimate for Lake Auburn. We also recommend that 1) the AWD hire a full-time, dedicated data management technician for improved management, access, and analysis of collected water quality data; 2) the AWD and LWD continue collaboration with Bates College on student-assisted monitoring; and 3) LAWPC consider creating a technical science advisory board to establish or maintain key local, State, and regional partnerships that can help to provide regular review and guidance on water quality issues.

6. Given its high probability of causing a filtration waiver violation, a swimming area will likely not be feasible for Lake Auburn at any time unless State and federal authorities sign off. If a swimming area were to be re-instituted at Lake Auburn, we provide many actions that would need to take place to ensure that the area does not contribute to water quality degradation. Refer to Swimming in Section 3.

7. Allowance of only small watercraft restricted to areas away from the in-take should continue, and improved stabilization techniques at vehicle and pedestrian access points along the lake shoreline should be implemented, along with clear and effective barriers to foot and vehicle access.

8. We recommend that the LAWPC coordinate with local youth conservation groups or AmeriCorps to perform annual maintenance of trails and install best practices that limit erosion of trails, especially those sections nearest the lake. In addition, surveying how much horse manure may be found on the trails to inform a reconsideration of horseback riding near the lake is recommended, as manure can be a significant nutrient source in sufficient quantities. Finally, it is recommended that the City acquire permanent recreational trail easements to LAWPC properties with trails for guaranteed public access in the future.

9. We recommend developing a comprehensive natural resource management plan for LAWPC lands that focuses firstly on drinking water protection and secondly on wildlife habitat protection if in the interest of public water supply protection, with multiple management options offered. We also recommend developing natural resource inventories for all LAWPC lands to map critical streams (perennial and intermittent), wetlands, vernal pools, cover types, rare, threatened, and endangered species present, etc. to include in individual natural resource management plans that set management objectives and methods to achieve water resource and wildlife habitat protection for each LAWPC parcel. If timber harvesting continues in the Lake Auburn watershed on LAWPC or private lands, then we recommend a series of actions to minimize forestry impacts to water quality. Refer to Forest Management in Section 3.

10. We recommend that LAWPC work with local conservation groups and land trusts to purchase land in the watershed outside of Auburn. We also recommend that LAWPC consider putting all their properties into permanent conservation. These properties are currently protected under the LAWPC by-laws but provide no higher-level legal protection from future development if said by-laws were to be revoked.

Photo Credit: Sun Journal

Town of Turner Regulations that are Helpful to LAWPC

1. **Erosion and Sedimentation Control Policy**:
    a. Activities that disturb soil and require a permit need an E&S plan.
2. **Zoning Ordinance**:
    a. Districts-
        i. Rural I District
            1. Purpose is to maintain rural character including agricultural and forest lands.
            2. Medium density allowed.
        ii. Rural II District
            1. Purpose is preserve areas not well suited for development.
            2. Includes 'critical watersheds'.
            3. Development at low densities- 5 acre min. lot size.
        iii. Shoreland District
            1. Allows residential use while protecting water quality.
        iv. Resource Protection District
            1. Purpose is to regulate development which would adversely affect water quality, etc.
        v. Many potential uses in these districts require a Site Plan Review by the Planning Board, which includes a review of potential impacts to water quality.
    b. Performance Standards-
        i. Soils
            1. Land uses must not cause severe erosion, mass soil movement, or water pollution.
            2. Soils report required for subsurface wastewater disposal
        ii. Water Quality
            1. No discharge of any pollutant to waters of the State is permitted
        iii. Septic Waste Disposal
            1. Before a building permit is issued, a soil suitability report required.
        iv. Shoreland Areas
            1. 100' setback from high-water line of ponds; 75' setback from wetlands
            2. New construction must minimize stormwater runoff from site
            3. Agriculture limitations- manure stockpiles, tilling, etc.
            4. Vegetation removal limitations
        v. Individual Lot Phosphorus Management
            1. Purpose of these standards to maintain water quality of lakes and ponds in Turner and those it shares with adjacent communities by controlling the transport of phosphorus from their direct watersheds.
            2. Phosphorus Management Control Permit required for development activities within the direct watershed of a lake or pond.
3. **Comprehensive Plan Update Section I (2020)**:
    a. Planning Area: Natural Resources-

i. Turner's goal: to maintain the high quality of its own natural resources and those it shares, or to improve the quality if they have been diminished.
ii. Section notes that development can create higher concentrations of phosphorus, a detriment to water quality. Acknowledges part of Lake Auburn watershed is in Turner and that Little Wilson Pond crosses town borders into Auburn.

b. Planning Area: Regional Coordination-
i. Turner's goal: to develop and participate in regional programs to achieve common desires.
ii. Includes Lake Auburn watershed and that portion of the watershed contained in Turner
iii. As part of the *Regional Coordination Policy*, Turner will:
1. Continue to participate in the *Lake Auburn Watershed Protection Commission* by having a Turner representative on the board.
2. Develop with appropriate communities an acceptable lake protection level for phosphorus concentration for Little Wilson Pond.
3. Regulate development within the Lake Auburn watershed to comply with assigned lake protection levels.
4. Seek professional assistance in determining appropriate lake protections levels and ordinance provisions. This is a Planning Board responsibility.

4. **Comprehensive Plan Update Section II (2020)**:
a. Natural Resources-
i. Acknowledges Lake Auburn is an important cold water fishery and the drinking water supply for Lewiston and Auburn.
ii. Includes phosphorus data for Mud Pond, Little Wilson Pond, The Basin, and Lake Auburn.

Town of Turner Watershed Projects Recommended in Prior Studies

Diagnostic Study of Lake Auburn and its Watershed: Phase 1 (2013):

1. Skillings Corner Road: Culvert near intersection with Fern Street and Wilson Hill Road- remove sediment accumulation and stabilize bank. Evaluate size and effectiveness of culvert to minimize overtopping of road.
2. Robinson Road: Roadside stabilization, riprap to slow water velocity
3. Little Wilson Pond Road: install shoreline stabilization and sediment BMPs along the road
4. East Hebron Road: Armor roadside along channel.

Diagnostic Study of Lake Auburn and its Watershed: Phase 2 (2014):

1. Monitor sediment accumulation in The Basin and upstream ponds at the beginning and end of each sampling season.

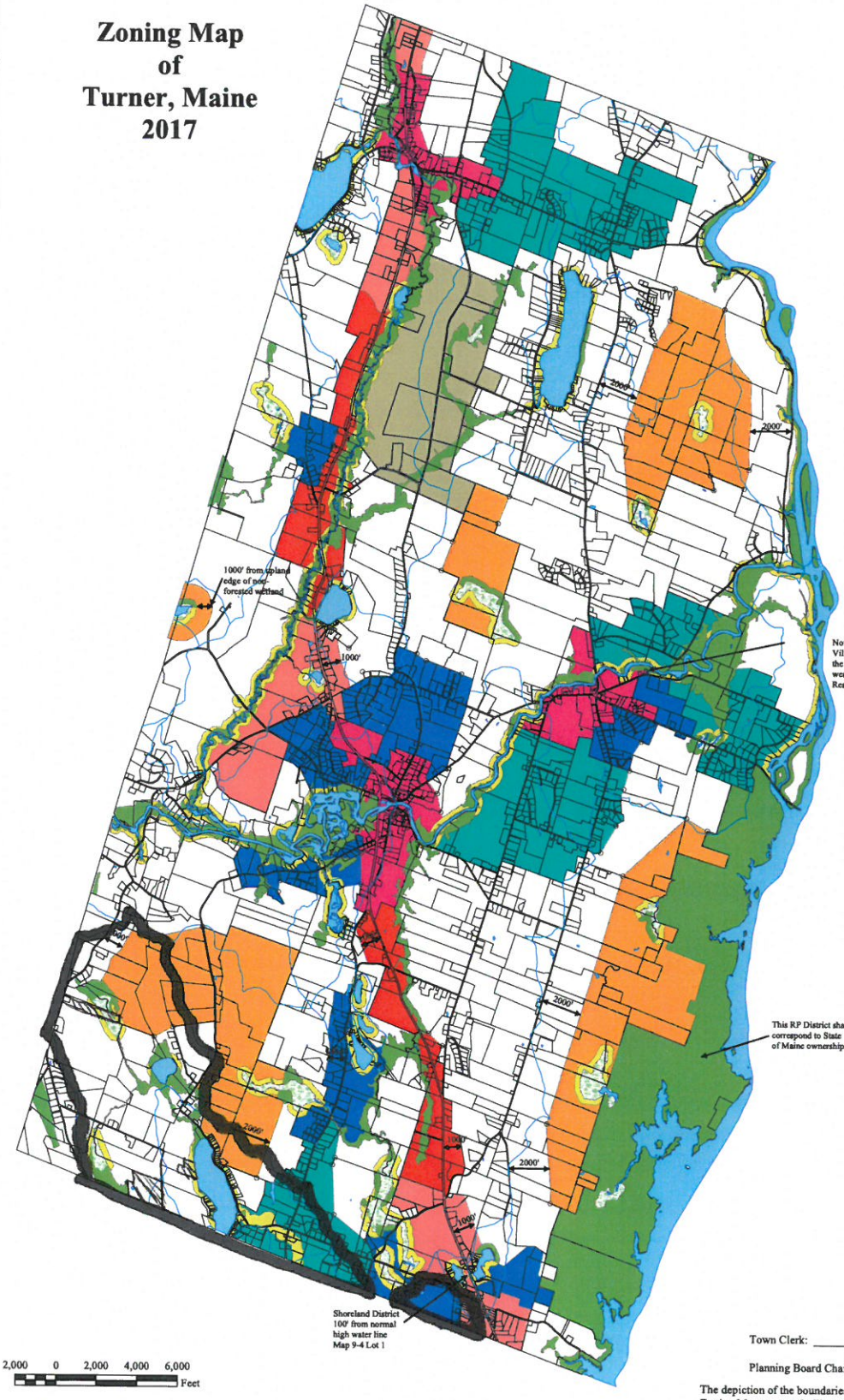
The Origins and Dynamics of Phosphorus in Maine's Lake Auburn Watershed (2020):

1. Ground-truth the loading hotspots identified by the Soil and Water Assessment Tool (SWAT). Look for signs of runoff and/or erosion-induced loading. Implement intervention strategies as needed.
2. Continue to increase watershed sampling. This could involve conducting in-lake sampling in the Basin, *Little Wilson Pond, and Mud Pond*. Focus particular attention on the Basin, *Little Wilson Pond, and Mud Pond*.
3. Investigate potentially high loading around Mud Pond. Consider conducting sampling in and around Mud Pond, then explore mitigation measures.
4. Pursue mitigation strategies for any AWD/LWD sampling location with P concentrations over 20 ug/L.

Completed Projects (2015-2017 EPA Grant):

1. Culvert upsized on Little Wilson Pond Road
2. Culvert upsized on Gurschick Road
3. Little Wilson Pond waterfront property owners installed stormwater BMPs

Zoning Map of Turner, Maine 2017



Note:
Village Zoning District boundary description from the easterly line of Map 56 Lot 47 then westerly to the westerly line of Map 56 Lot 43 then northerly to the Resource Protection District

Zone
- Rural I
- Rural II
- Resource Protection
- Shoreland
- Village
- General Residential I
- General Residential II
- Commercial I
- Commercial II
- Agricultural/Industrial
- Wetland

This RP District shall correspond to State of Maine ownership

Effective Date: July 12, 1993
Amended: June 11, 1994
April 13, 1996
July 21, 1997
April 10, 1999
April 8, 2000
April 5, 2003
April 3, 2004
April 8, 2006
April 5, 2008
April 4, 2009
April 10, 2010
April 2, 2011
April 14, 2012
April 9, 2016
April 8, 2017

2,000 0 2,000 4,000 6,000 Feet

AVCOG
WESTERN MAINE
Androscoggin Valley Council of Governments

Map Prepared
April 14, 2017
JAM

Document Path: \\AVCOG-SERVER2\Shared\jmaloney\Turner\Ordinances\Turner_Zoning_Map2017.mxd

Town Clerk: _____

Planning Board Chair: _____

The depiction of the boundaries of the Shoreland Areas on this the Official Zoning Map are merely illustrative of their general location. The exact boundaries of the zone shall be determined by on-site inspection and measurement from the normal high-water line or upland edge of a wetland.

The exact boundaries of the Resource Protection District designation due to 100-Year Floodplains shall be determined by the "Flood Insurance Study, Androscoggin County, Maine", dated July 8, 2013 with accompanying Flood Insurance Rate Map entitled "Digital Flood Insurance Rate Map, Androscoggin County, Maine".

LAWPC WATERSHED - TURNER

WATERSHED LANDS
- LAWPC LAND
- CONSERVATION EASEMENT
- LIFE ESTATE

NOT TO SCALE

LAKE AUBURN
WATERSHED BOUNDARY

N

MUD
POND

LITTLE
WILSON
POND

HEBRON

MINOT

AUBURN

City of Auburn
City Council Information Sheet

Council Workshop or Meeting Date: January 3, 2022 **Order:** 05-01032022

Author: Eric J. Cousens, Director of Planning and Permitting

Subject: Initiate the discussion of Zoning Considerations from 2021 Updated Comprehensive Plan

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Information: The comprehensive plan update adopted on December 6, 2021 identified zoning map and text amendments needed to implement the goals of the plan updates. We do not have capacity to consider all the changes at once, but we plan an ambitious effort to have changes under consideration going forward. Below are four changes that staff suggests we start discussing by having the Council initiate their consideration pursuant to Chapter 60, Article XVII Division 2 of City Ordinances. Initiation of these discussions will direct staff to draft the amendments and forward them to the Planning Board for a public Hearing and recommendation back to the Council on how to proceed.

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a. **Gracelawn area;** 148 acres from Agriculture and Resource Protection to Commercial Development District (CDD). Approximately, 37 acres are not shown as CDD in approved FLU mapping, but the council did approve utilizing the Auburn Lake Watershed Study. In that study they suggested moving the watershed boundary out and a result from that, we are suggesting moving the proposed CDD boundary out to match the new watershed boundary another 37 +/- acres as intended. (See attached a.)

Proposed Zone Change:

COMMERCIAL DEVELOPMENT DISTRICT (CDD)

Objective – Allow for the development of a wide range of uses including those that involve the sales of motor vehicles and/or that generate significant truck traffic. The district will allow for both existing and new residential use at a density of up to 16 units per acre.

Allowed Uses – The Commercial Development District generally follows the boundaries of the General Business and General Business II (Minot Avenue) Zoning Districts, in effect at the time of the 2021 Comprehensive Plan update. The following general types of uses should be allowed in the General Business Development District:

- Low and High Residential Density Uses
- Retail uses including large-scale uses (>100,000 square feet)
- Personal and business services

- Business and professional offices
- Medical facilities and clinics
- Restaurants
- Hotel, motels, inns, and bed & breakfast establishments
- Low and High-Density Residential Uses
- Community services and government uses
- Research, light manufacturing, assembly, and wholesale uses
- Truck terminals and distribution uses
- Contractors and similar activities
- Motor vehicle and equipment sales
- Motor vehicle service and repair
- Recreational and entertainment uses and facilities

Development Standards – The City's development standards for the Commercial Development District should provide property owners and developers flexibility in the use and development of the property. The standards should include provisions to manage the amount and location of vehicular access to the site, minimize stormwater runoff and other potential environmental impacts, require a landscaped buffer along the boundary between the lot and the street, and provide for the buffering of adjacent residential districts.

b. **Washington Street Area;** 716 acres from General Business to Commercial Formed Based Code Gateway Development District. Approximately 9.63 acres were not included in the FLU mapping. But approved in the order by the council for the approval of the specific lot PID 199-052. (See attached b.)

COMMERCIAL FORM-BASED CODE GATEWAY DEVELOPMENT DISTRICT (WASHINGTON STREET) (CFBCGD-W)

Objective – To allow for mixed use development while protecting and providing transitions to the abutting residential neighborhoods. Within this area attractive road fronts should be established that enhance a complete street city gateway and provide the essence of a welcoming, vibrant community, with neighborhood and community retail, business and service establishments that are oriented to and built close to the street. The zone is appropriate in areas where a more compact urban development pattern exists or where a neighborhood-compatible commercial district is established which exhibits a pedestrian scale and character. The CFBCGD-W should enhance development and design standards to allow this area to evolve into an attractive gateway into the city. Specifically, a portion of this designation pushes a transformation of Washington Street South/Routes 4 and 100 to a two-lane high-speed connector while Washington Street North Routes 4 and 100 becomes a local connector with future Form Based Code Commercial Development. Residential uses should be allowed at a density of up to 16 units per acre provided they are accessory to commercial uses.

Allowed Uses – The Commercial Form-Based Code Gateway Development District – W generally follows the boundaries of the existing General Business areas along Washington Street, in effect at the time of the 2021 Comprehensive Plan update. The Commercial Form-Based Code Gateway Development District – W should allow for medium-scale, multi dwelling development with up to three stories (plus attic space), with multiple

commercial uses allowed that mirror existing form based code within the city to include, but not be limited to general offices, government uses, lab and research facilities, low impact industrial, studios, parks and open spaces, veterinary services, medical and dental clinics, general retail, restaurants, schools, churches, convenience stores with gas stations, specialty shops, auto service stations, care facilities, lodging, clinics and hotels.

Development Standards – New development, redevelopment and substantial expansions should be subject to an enhanced set of development and design standards to assure that this area evolves as an attractive gateway. These standards should maintain appropriate setbacks for new development, encouraging shallow or no front setbacks, screen parking areas from Washington Street and provide incentives for the use of shared driveways and curb-cuts. Provisions for on street parking should be encouraged. All uses in this district should be located, sited, and landscaped in such as manner as to preserve open space, control vehicle access and traffic and provide adequate buffering and natural screening from Washington Street. This designation is intended for areas near, in, along neighborhood corridors and for transit-supportive densities.

c. <u>Court Street/City Core of Urban Residential Area;</u> 1,687.41 acres of Urban Residential to Traditional Neighborhood Development District Areas. (See attached c.)

<u>TRADITIONAL NEIGHBORHOOD DEVELOPMENT DISTRICT (TND)</u>

Objective – Allow for the development of a wide range of residential and community uses at a density of up to 16 units per acre in areas that are served or can be served by public/community sewerage and public/community water (see Figures 2.3, 2.4 and 2.6). New development should be designed to minimize the number of vehicular access points to existing collector or other through roads.

Allowed Uses – The Traditional Neighborhood Development District generally follows the boundaries of the Urban Residential Zoning District, in effect at the time of the 2021 Comprehensive Plan update. The following general types of uses should be allowed within the Traditional Neighborhood Development District:

- Low and High-Density Residential Dwellings
- Home Occupations
- Plant/Crop-Based Agriculture
- Community Services and Government Uses
- Small Offices and Mixed-Use Buildings
- Small commercial operations that do not exceed the average lot size of the neighborhood (or more than two times the average size of the home).

Development Standards – Residential uses should be allowed at a density of up to 16 units per acre with no minimum road frontage required, shared driveways are encouraged. The areas within the Traditional Neighborhood designation are served by public/community sewer and water. In general, the minimum front setback should be 10 feet. Side and rear setbacks should be 5-15 feet or 25% of the average depth of the lot to establish dimensional standards that relate to the size and width of the lot.

d. **Subsurface Wastewater Disposal in the Lake Auburn Watershed**; Maintain a requirement for a minimum depth of 36 inches above the limiting factor/constraining layer (groundwater or bedrock), while allowing the use of State-approved alternative septic system and leach field designs that meet statewide standards.

City Budgetary Impacts: Up to $5,000 in approved Comprehensive Plan Implementation funds for State Geologist/Soil Scientist/Site Evaluator and mapping consultation. The changes will result in new investment and create new taxable value.

Staff Recommended Action: Direct staff to draft amendments consistent with the adopted Comprehensive Plan for consideration by the Planning Board and direct the Planning Board to review proposed amendments, hold Public Hearings on each and forward a recommendation back to the City Council.

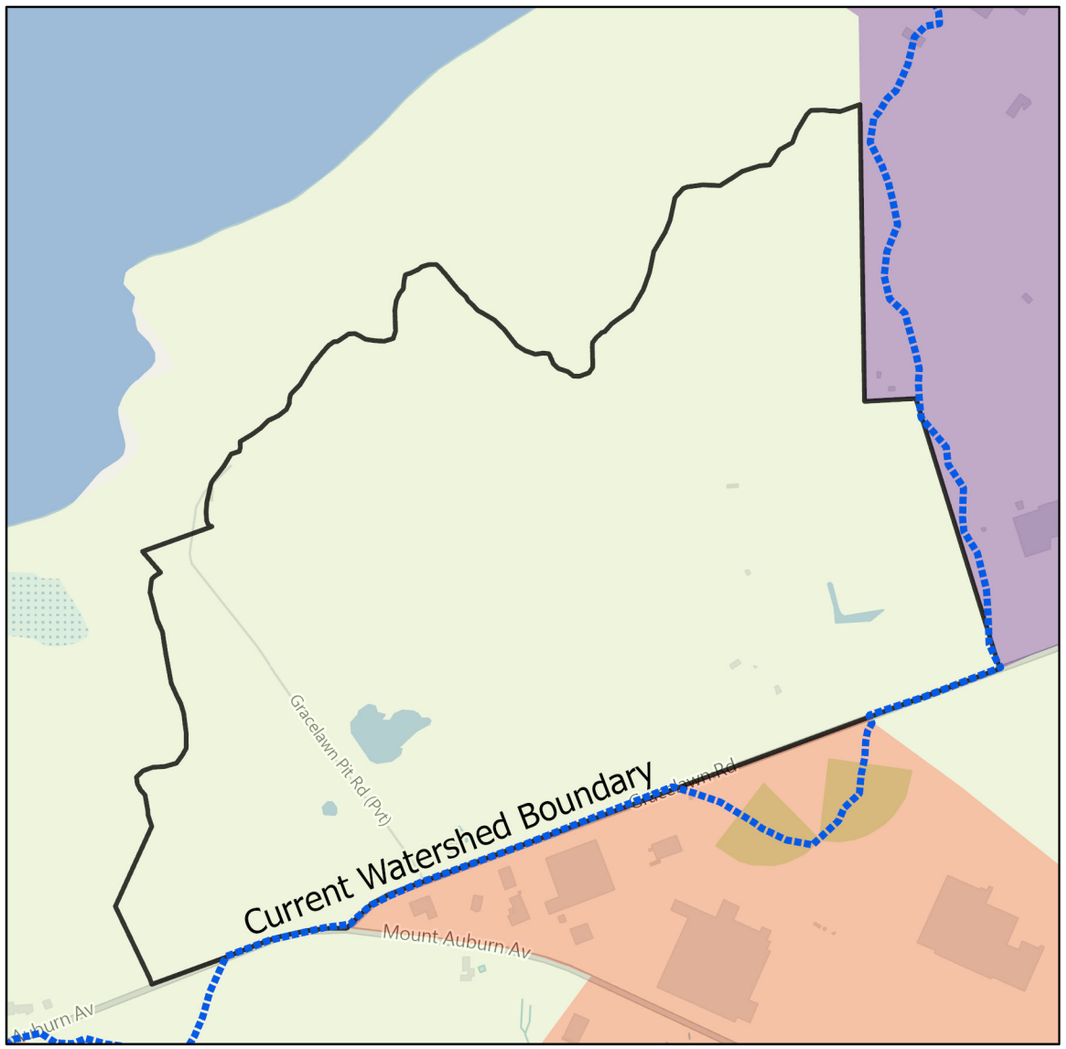
Previous Meetings and History: December 6th Council adoption.

City Manager Comments:

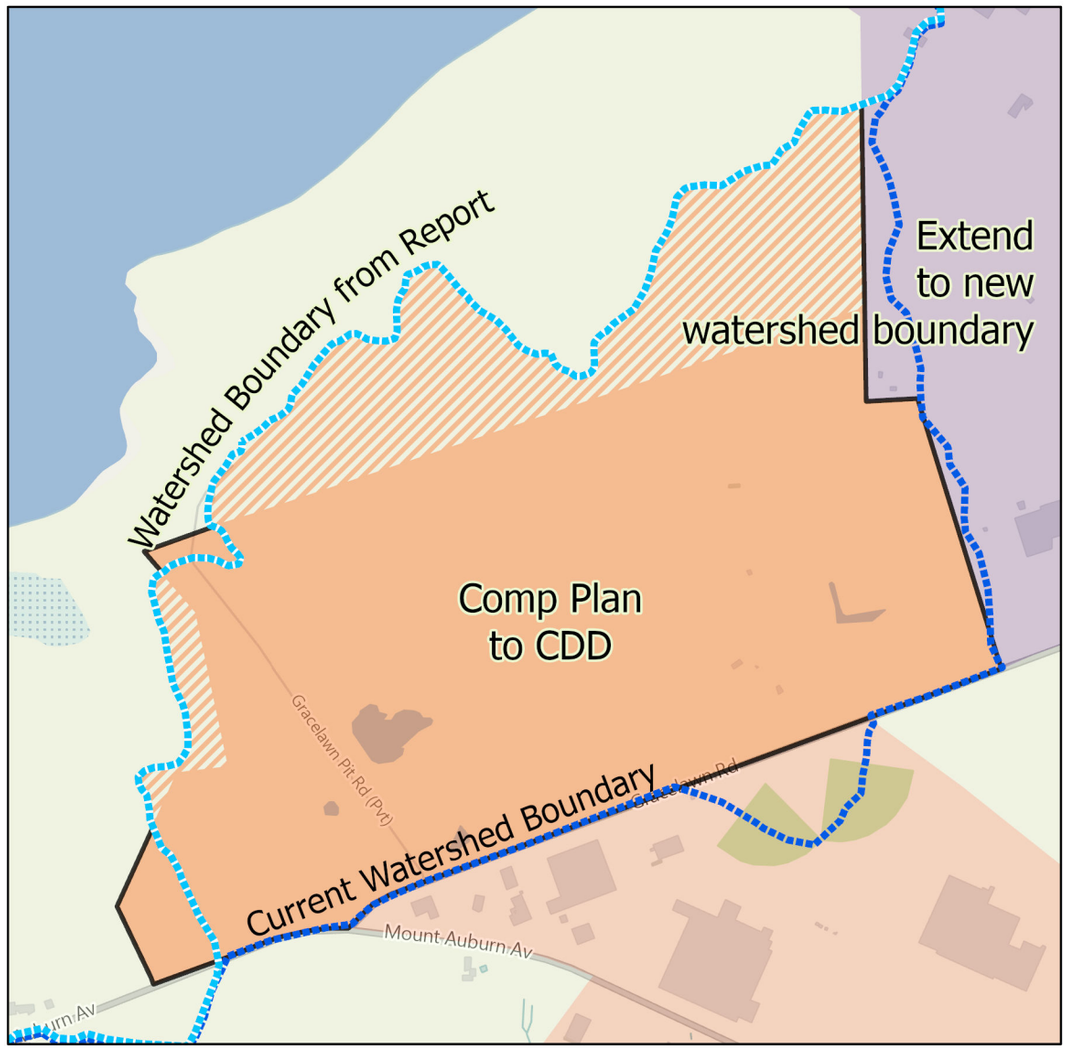
I concur with the recommendation. Signature: Phillip Crowell J.

Attachments: Comp Plan Update - Future Land Use Chapter Excerpts, Lake Auburn Study Excerpts, full report here:
https://www.auburnmaine.gov/CMSContent/City_Manager/LakeAuburn_FinalReport%20UPDATED.pdf

Gracelawn: Exhibit A



Current Zoning



Proposed Change

Current Watershed Boundary
Watershed Boundary from Report

Recommended Zoning Updates
- Comp Plan to CDD
- Extend to new watershed boundary
- Change Area

Current Zoning
- AG - Agriculture and Resource Protection
- GB - General Business
- RR - Rural Residential
- SR - Suburban Residential

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3 Analysis of Environmental Impacts

This section analyzes the environmental impact of various development and water quality scenarios for the Lake Auburn watershed. The analysis uses a well-documented watershed model paired with in-lake empirical formulas to predict water quality outcomes under each future scenario. This section also reviews recreational threats and opportunities, current forestry practices, and LAWPC's land conservation strategy.

Photo Credit: Sun Journal

Water Quality Modeling

Boundary Change

Based on hydrogeologic studies (E.C. Jordan Co., 1990; Woodard & Curran, 1995; Summit Environmental Consultants, Inc., 2007) of the sand and gravel operations and former City of Auburn landfill along Gracelawn Road, a portion of the existing watershed area was determined to flow away from Lake Auburn in a southerly and easterly direction (Figure 3-1). Groundwater flow studies around the sand and gravel operations showed groundwater flowing south to an unnamed brook in a ravine just south of Mt. Auburn Avenue that flows to the Androscoggin River. Previous analyses of groundwater monitoring well data around the landfill showed low and diminishing levels of leachate indicators on the lakeside compared to increasing levels on the south side away from the lake. The combined properties with sand and gravel operations owned by CLH & Sons, Inc. and Get Er Done, LLC cover 115 acres in the southern portion of the Lake Auburn watershed and are bounded to the north by Lake Auburn and a LAWPC-owned parcel, to the east by a Central Maine Community College-owned parcel, to the south by Gracelawn Road, and to the west by a LAWPC-owned parcel. Based on review of the groundwater contours and 2-ft surface contours, the proposed watershed boundary reduces the watershed area by 148 acres, possibly reducing the original CEI, Inc. (2010) total phosphorus load to Lake Auburn by about 44 kg/yr.

Baseline Model Run

The baseline or "existing conditions" model run was performed using the revised version of the ArcView Generalized Watershed Loading Function (AVGWLF): MapWindow Version 4.6.602 and MapShed Version 1.5.1, available online through the Stroud Water Research Center's Wiki-Watershed. Following MapShed documentation, model files were prepared for input and processing to generate watershed nutrient loading estimates by sub-basin. These sub-basin nutrient loading estimates were run through a simplified version of the Lake Loading Response Model (LLRM) (AECOM, 2009) to account for sub-basin water and nutrient load attenuation, other water and/or nutrient sources such as atmospheric deposition, internal loading, and septic systems, and in-lake factors such as pan evaporation and annual withdrawal for drinking water. The net water and nutrient loads, along with calculated lake characteristics, were used in several well-known empirical formulas to estimate the in-lake total phosphorus concentration of Lake Auburn.

A summary of inputs and assumptions is provided below. Refer to supplemental model documentation for more detail (available through the City of Auburn).

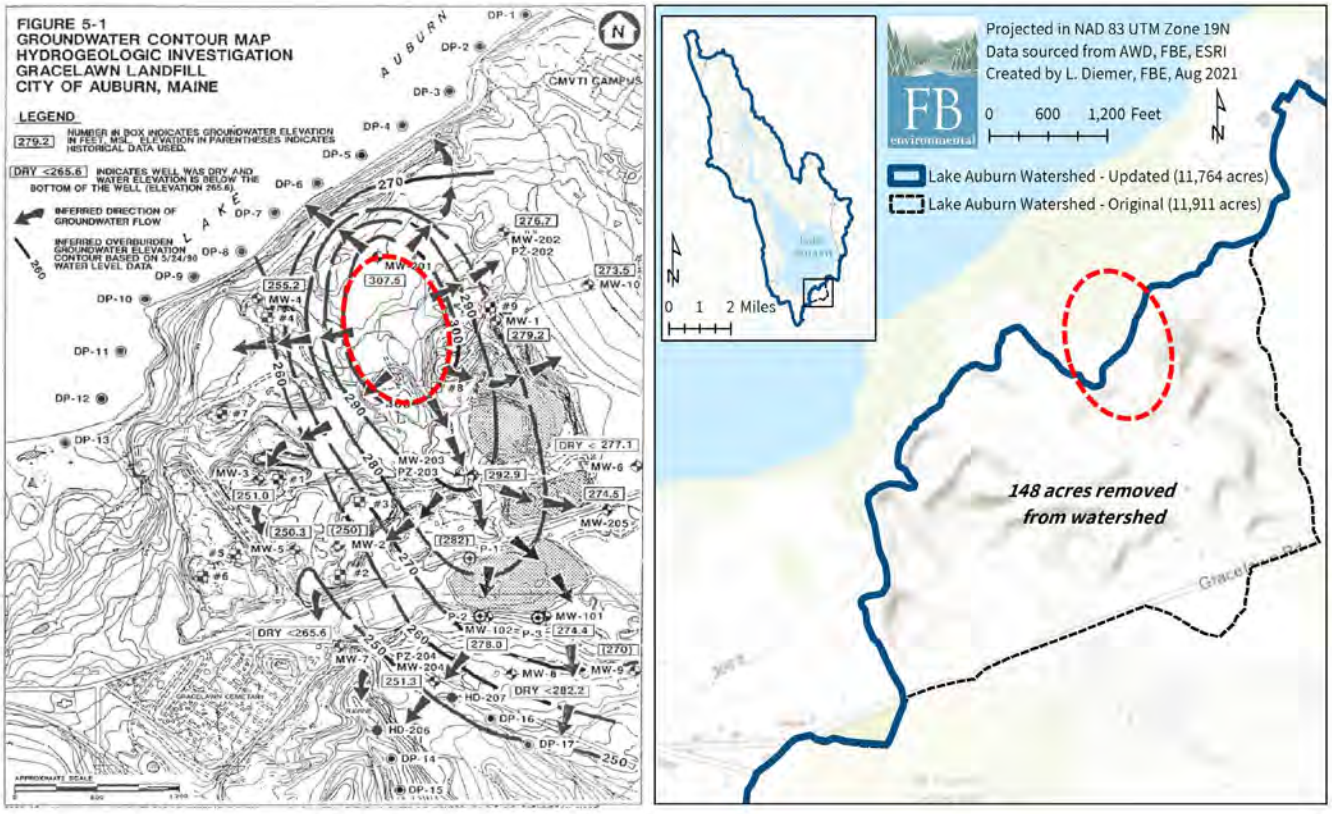
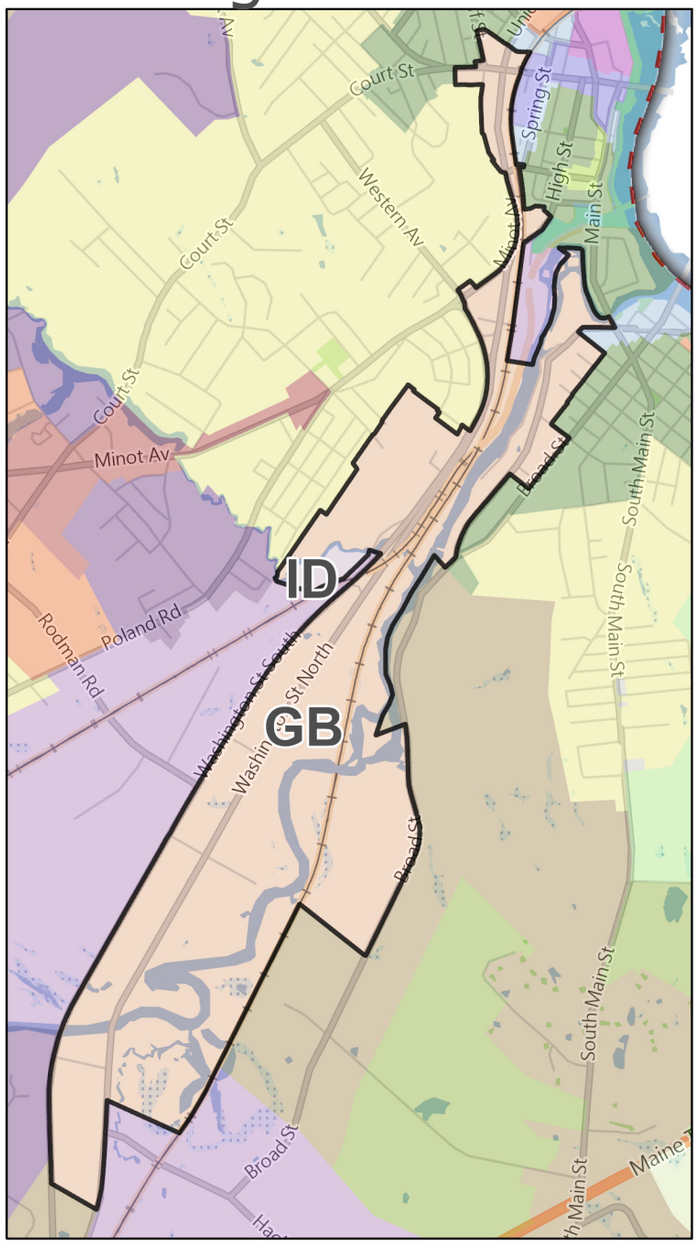


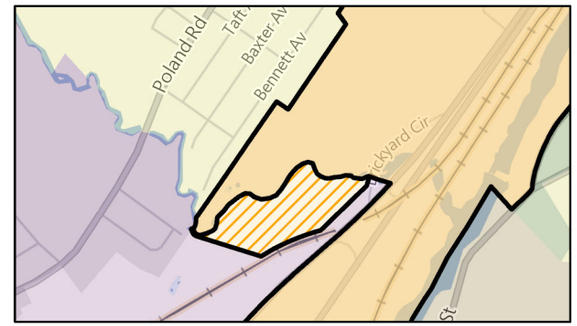
Figure 3-1. Map of groundwater contours developed by E.C. Jordan Co. (1990) (left) compared to map of updated watershed boundary (right). The dotted red circle is provided for ease of reference between the two maps.

Washington Street: Exhibit B



Current Zoning

Proposed Change



Add Parcel 199-052

Recommended Zoning Updates

- Comp Plan to CFBCGD-W
- Add Parcel 199-052

Current Zoning

- AG - Agriculture and Resource Protection
- GB - General Business
- GB II - General Business II
- ID - Industrial
- LDCR - Low Density Country Residential
- MFS - Multi-Family Suburban
- NB - Neighborhood Business
- RR - Rural Residential
- SR - Suburban Residential
- UR - Urban Residential
- T-4.1 - Traditional Mainstreet Neighborhood
- T-4.2 - Traditional Downtown Neighborhood
- T-5.1 - Downtown Traditional Center
- T-5.2 - Downtown City Center
- T-6 - Great Falls Metropolitan
- C/OS - Conservation / Open Space

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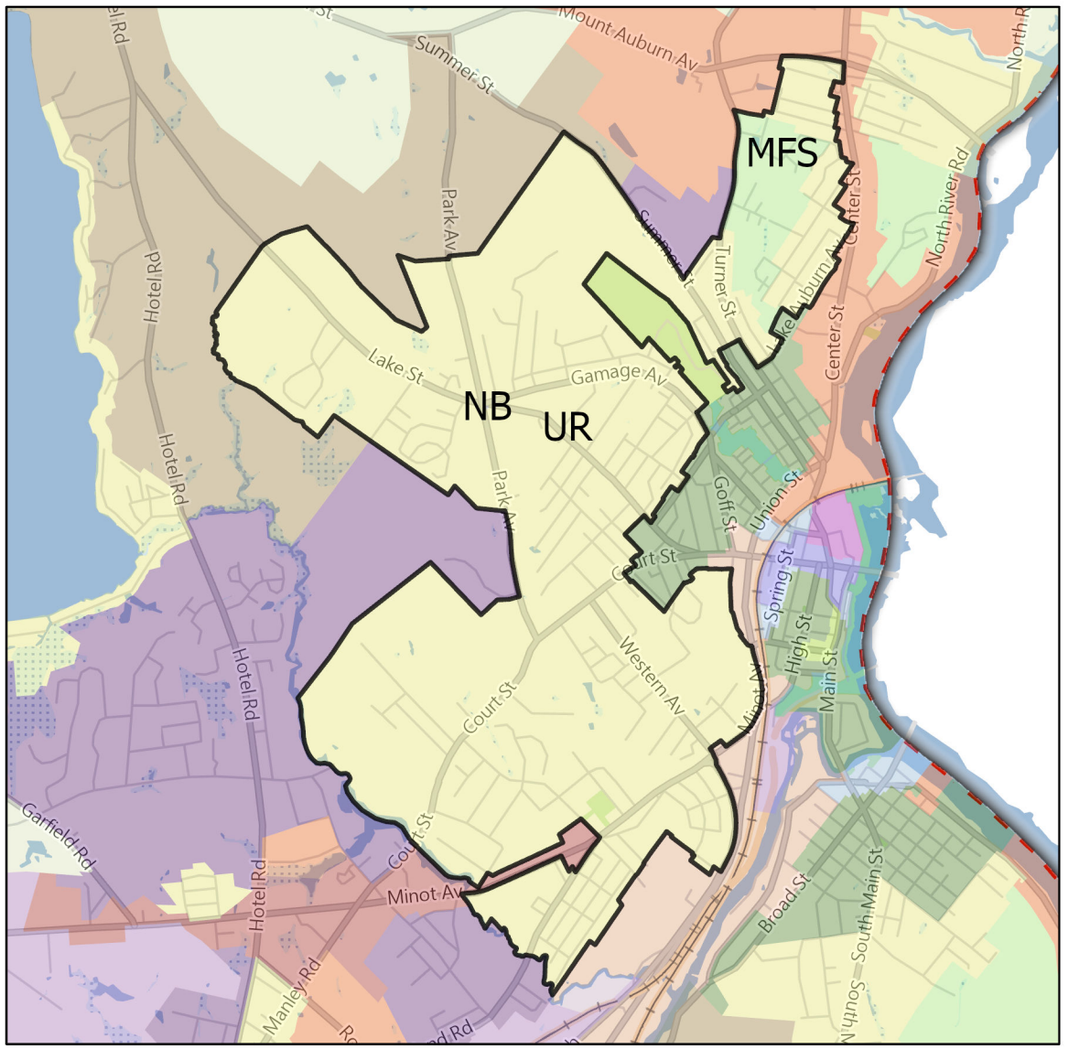
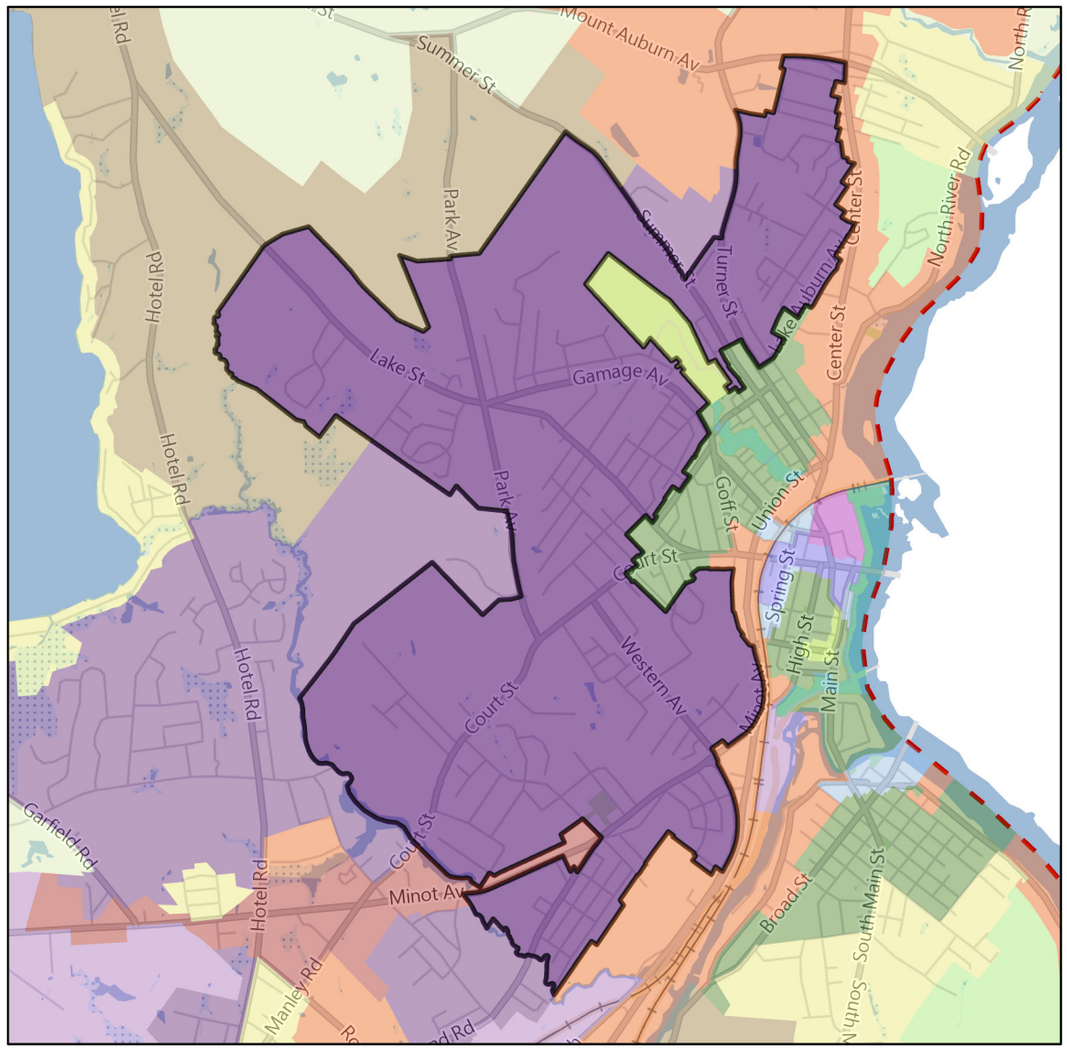
Court Street: Exhibit C



Current Zoning



Proposed Change

Recommended Zoning Updates

Description

- Comp Plan to TNDD
- <all other values>

Current Zoning

- AG - Agriculture and Resource Protection
- GB - General Business
- GB II - General Business II
- ID - Industrial
- MFS - Multi-Family Suburban
- RR - Rural Residential
- SR - Suburban Residential
- UR - Urban Residential
- T-4.1 - Traditional Mainstreet Neighborhood
- T-4.2 - Traditional Downtown Neighborhood
- T-5.1 - Downtown Traditional Center
- T-5.2 - Downtown City Center
- T-6 - Great Falls Metropolitan
- C/OS - Conservation / Open Space

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5 Findings, Synthesis, & Holistic Recommendations

This section draws out key conclusions from the report's preceding Sections 2, 3, and 4 which contain our analyses of the regulatory, environmental, and economic impacts of Lake Auburn as a public drinking water supply. Synthesis and further discussion, along with consideration of examples from comparable water supplies, are also provided for several key conclusions that recur throughout the preceding sections. Lastly, this section puts forth holistic recommendations for the City of Auburn, as well as the broader community of stakeholders, with the aim of promoting water supply protection efforts and initiatives that preserve or improve the balance among regulatory, environmental, and economic impacts.

Photo Credit: Sun Journal

Key Findings

Section 2, Analysis of Regulatory Impacts

We found that the regulatory framework for the protection of Lake Auburn as a water supply can be revised to be more clearly defined, better aligned with the best available science and State and regional norms, and more fairly applied across different land uses and activities. Specific recommendations are described in depth in Section 2, and direct ordinance language revisions are provided in a separate document to the City. A summary of our recommended revisions is outlined below:

- Revise the septic system requirements of the Lake Auburn Watershed Overlay District Ordinance to incorporate the Maine Subsurface Wastewater Disposal Rules, including provisions that allow for mounded leach fields and other State-approved alternative designs where there is not a native, in-situ, 36-inch vertical separation between the bottom of the organic horizon and the bedrock, water table, or other restrictive layer. Refer to Appendix 1.

- Revise the Phosphorus Control Ordinance to clarify that the limit of a project area does not apply to a given land use but to a demarcated limit of disturbance, such that all disturbance within that area is required to meet the erosion and sedimentation controls and other phosphorus controls under a plan required by the Phosphorus Control Ordinance.

- Require timber harvest and agricultural activities to meet the same requirements as other land uses under the Phosphorus Control Ordinance. Currently, timber management and harvesting must be conducted in accordance with a forest management plan prepared and supervised by a registered forester, while agriculture must be conducted in accordance with a soil and water conservation plan approved by the ACSWCD, making these uses effectively exempt from City oversight. Removing the exemption and requiring timber and agriculture to meet the same erosion control standards under the Phosphorus Control Ordinance would ensure that water quality protection is a central feature of any timber harvesting or agricultural activities in the Lake Auburn watershed.

- Develop a clear set of standards for farm management that will be consistently applied to farms in the watershed for the purpose of controlling erosion and limiting the delivery of excess phosphorus from the farm practices to Lake Auburn. One approach is to set a concrete limit on the amount of agricultural activities that are phosphorus-intensive (e.g., commercial raising of livestock, fertilized row crops, manure spreading). It is important to note that water quality is predicted to be much worse across all future scenarios if agricultural land use does not decline as predicted.

- Adjust the agricultural buffer strip requirement in the Lake Auburn Watershed Overlay District Ordinance to improve its effectiveness. Recommended adjustments include widening the buffer to 75 or 100 feet, requiring the buffer to be vegetated, and requiring the buffer to be located downgradient of all agricultural activities, perpendicular to the direction of overland flow, in all areas of the watershed (as opposed to requiring buffers only for agricultural activities that are adjacent to surface water).

- Update the Lake Auburn Watershed Overlay District Ordinance to reflect the revised watershed boundary, reducing the existing watershed boundary by 148 acres in the Gracelawn Road area.

- Incorporate low impact development requirements for single family residential development on the 1- and 3-acre lots allowed in the Lake Auburn watershed by way of referencing the Maine Stormwater Management Design Manual, Volume 2. The use of low impact development can help to limit the impacts of stormwater runoff and associated erosion and pollutants from sites. The standards as they apply to a water supply watershed are presented below:

  - » Disturbance on an individual lot must be less than 15,000 square feet (including building, driveway, walkways, lawn area, construction access, and grading).

  - » A minimum natural vegetated buffer must be maintained downgradient of all developed areas on the lot. This buffer shall be 50 feet wide if naturally forested or 75 feet wide if maintained as a natural meadow.

  - » No more than 7,500 square feet of impervious cover is located on the property.

  - » A minimum of 40 percent of the lot area must be maintained as an undisturbed natural area. If the existing land has been disturbed by prior activities, a natural vegetated buffer and/or undisturbed natural area may be proposed through restoration and revegetation.

Section 3, Analysis of Environmental Impacts

We found that Lake Auburn water quality in the last decade had reached a tipping point, whereby nuisance algae blooms were becoming more frequent and were threatening the filtration waiver. The partial alum treatment conducted in 2019 significantly reduced the

in-column total phosphorus concentration and locked in a portion of the sediment-bound phosphorus, effectively resetting the system and giving the water districts additional time to ramp up watershed protection and nutrient reduction efforts. We also found that projecting current status quo conditions into the future (i.e., the "Business As Usual" scenario) resulted in Lake Auburn once again reaching a tipping point by 2100, even with the assumption that the in-column total phosphorus concentration and sediment-bound phosphorus would be repeatedly reset by an alum treatment every 10 years (see discussion in Section 2 about this assumption for further context). Modeled predictions for the other future scenarios where the regulatory framework is adjusted to allow more development in the Auburn portion of the watershed results in greater water quality degradation and a higher risk of blooms, ultimately triggering the need for a filtration plant in the "Maximum Development Allowing Building on LAWPC Lands" scenario. The use of low impact development techniques has a small positive effect on water quality in these future scenarios but does not ameliorate the high risk of frequent algae blooms. Taken together, the future scenarios show that Auburn alone does not have the land use control tools to stave off water quality decline in Lake Auburn; sustained collaboration with the upper watershed municipalities is essential to achieve the needed phosphorus load reductions over the remainder of the 21st century.

Section 4, Analysis of Economic Impacts

We found that expanding development in the Lake Auburn watershed provided minimal overall net economic benefit when accounting for the benefits and costs of all affected stakeholders, including the City of Lewiston who would otherwise carry the additional costs of watershed protection and water treatment through the existing cost sharing agreement in order for the City of Auburn to benefit from increased property tax revenues. In other words, the increased net benefits to the City of Auburn would be mostly or entirely offset by increased net costs to AWD and LWD customers, resulting in negligible net economic benefit to the communities served by Lake Auburn. This reallocation of benefits and costs among all affected stakeholders for the future scenarios highlights important questions of equity and fairness, which were raised during the process of producing this report and conversing with key community representatives. We emphasize that the costs associated with addressing declining water quality are costs to all water users and that the risk of incurred costs that are higher than our conservative estimates is very real.

Synthesis & Discussion

In summary, our analyses determined that Lake Auburn is nearing its assimilative capacity for nutrient load (even with the partial alum treatment) and cannot handle much more additional nutrient load without diminishing water quality and its associated benefits. We found no net environmental, economic, or social benefit supporting expansion of development in the Lake Auburn watershed. Instead, we recommend that low impact development strategies are incorporated into existing zoning standards and required for all future development and redevelopment projects in the Auburn portion of the watershed. We also recommend that the other four headwater towns of Turner, Minot, Hebron, and Buckfield also incorporate low impact development requirements on future development projects. Lake Auburn cannot maintain excellent water quality in the future without the full participation of the other watershed towns. More development cannot be allowed in the Auburn portion of the watershed even with low impact development requirements implemented in Auburn. Even if reduced development through conservation or other means is achieved in the headwater towns, any additional development in Auburn has an outsized negative impact since its drainage area goes directly to the lake. It is also important to understand that a filtration plant does not allow for greater development of the watershed because the filtration plant only treats extracted drinking water for the consumer and does not treat in-lake water quality for recreation and for meeting State criteria for designated uses.

> We found no net environmental, economic, or social benefit supporting expansion of development in the Lake Auburn watershed.

Below, we present further discussion on three important topics: regulation of septic systems, environmental risk and uncertainty, and comparable water utilities.

Regulation of septic systems: The regulatory and environmental analyses examined multiple issues surrounding septic systems and their contributions of phosphorus to Lake Auburn. At first glance, there may appear to be a contradiction between 1) the recommended ordinance revision from the regulatory analysis (Section 2) that the septic design standard should be revised in such a way that will allow previously non-buildable sites to become buildable and 2) the conclusion from the environmental analysis (Section 3) that Lake Auburn will arrive at a tipping point of declining water quality by 2100 even in the absence of any pro-development changes (i.e.,

the "Business As Usual" scenario). Indeed, our buildout analysis determined that more than 100 additional new homes could be built in the watershed if the septic system siting requirement for 36 inches of suitable in-situ soil were revised.

To address this apparent contradiction, we argue that the septic design standard should be judged not only by its adherence to the best available science but by its simplicity, straightforwardness, and fairness. The key questions are: does the existing septic design standard accomplish its stated purpose of regulating septic systems effectively for water quality protection, or is its water quality benefit primarily in its de facto restriction of buildable areas in the watershed? Are there improvements that could be made to achieve the stated goal? With our recommended revision, we aim to have the septic design standard achieve its stated purpose of effectively regulating both new septic system construction and replacement/reconstruction of existing septic systems as they age out, so that septic systems with alternative technologies and innovative phosphorus controls can be phased in. Restrictions on developable land are better left to base and resource protection zoning than to septic design standards.

The project team also noted in conversations with multiple Lake Auburn stakeholders a concern about an unintended consequence of the requirement in the current ordinance for 36 inches of suitable in-situ soil to site a septic system. The concern is that this requirement for deep, native soils has led to the preferential siting of some septic systems on deep formations of sand and gravel aquifer, which provide some of the only suitable sites in the watershed with the requisite depth to bedrock, water table, or other restrictive layer. While our team did not conduct any field assessments, witness this condition firsthand, or review any documentation of this condition, we agree with the premise that these sand and gravel formations should not be considered suitable sites for septic systems, at least without the importation of suitable reactive soils for nutrient and pathogen processing that the recommended ordinance revisions would allow. Adopting the Maine State standards while preserving the minimum 36-inch vertical separation would alleviate the potential for this unintended consequence.

Environmental risk and uncertainty: The risk of deteriorating water quality threatening Lake Auburn's ability to remain a high quality public drinking water supply is a throughline of this entire study. In its simplest terms, risk is the probability of a negative outcome, though the severity of the negative outcome in question is usually included when evaluating that risk. A high risk of a minor inconvenience (e.g., the risk of getting caught in traffic if leaving downtown Boston by car at 5:00 PM on a business day) requires minimal forethought, while a low risk of major damage (e.g., the risk of a flood destroying private or public infrastructure from a hurricane or Nor'easter) requires extensive planning and preparation. Uncertainty is the degree to which the risk cannot be quantified, due to a number of factors, such as insufficient data about existing conditions, insufficient predictive models for the future, and inherent randomness in nature. It is difficult but possible to predict with reasonably low uncertainty the risk of an outcome that has occurred before (e.g., an algae bloom in Lake Auburn). It gets much more difficult to predict the risk of a particular outcome (e.g., a filtration waiver violation in Lake Auburn) if that outcome has never occurred before, because the data and predictive models have not been tested against that outcome in the real world. In this situation, the uncertainty surrounding such an outcome remains relatively high even with excellent data and predictive models.

This study examined Lake Auburn's risk of negative water quality outcomes now and in the future under various scenarios, though with considerable uncertainty due to a number of confounding or unknown factors. However, we can say with certainty that all additional development raises the risk of water quality degradation, whether due to phosphorus loading, pathogens from subsurface wastewater disposal, emerging contaminants such as pharmaceuticals and personal care products, etc. Even if the increased risk resulting from any individual parcel-scale decision is small, the aggregate impact of thousands of individual decisions over the coming decades is what matters.

From a risk management perspective, the entire spectrum of outcomes should at least be understood, including the least probable, most negative outcome (i.e., the worst-case scenario). The worst-case scenario would be that Lake Auburn's water quality would deteriorate past the point of useful public drinking water supply. Phosphorus enrichment to the point of having uncontrolled algae blooms every year, with cyanobacteria and associated cyanotoxins, would be the most likely condition of such a worst-case scenario. If this unlikely but highly undesirable scenario were to occur, Auburn and Lewiston would be forced to consider other alternatives that previously would not have been seriously deliberated, such as drawing upon the Androscoggin River for drinking water. The cost of this worst-case scenario was not evaluated in our economic analysis because our environmental models do not predict conditions to deteriorate to that degree under the chosen scenarios. But in managing environmental risk, this unlikely but highly undesirable outcome should be included in the overall picture of Lake Auburn's possible future.

Comparable water utilities: Comparison of Lake Auburn and LAWPC/AWD/LWD with other water sources and utilities is illustrative of their strengths, weaknesses, and projected future needs (Table 5-1). Lake Auburn's key

Table 5-1. Lake Auburn and comparable water supply lakes and ponds in Maine.

Waterbody	Water Utility	Waterbody Surface Area (acres)	Watershed Area (acres)	Communities Served	Watershed Communities	Filtration Waiver?
Lake Auburn	Auburn Water District	2,277	9,651	Auburn, Lewiston, Poland	Auburn, Turner, Minot, Hebron, Buckfield	Yes
China Lake	Kennebec Water District	3,939	16,704	Waterville, Winslow, Fairfield, Benton, Vassalboro, Maine Water Company - Oakland	Vassalboro, China, Albion	No
Sebago Lake	Portland Water District	29,992	234,000	Portland, South Portland, Westbrook, Falmouth, Cumberland, Cape Elizabeth, Gorham, Windham, Scarborough, Raymond	24 municipalities (Androscoggin, Cumberland, Oxford counties)	Yes
Floods Pond	Bangor Water	635	4,600	Bangor, Eddington, Hampden, Hermon, Orrington, Clifton, Veazie, Hampden Water District	Otis, Clifton	Yes

comparables are China Lake, which supplies the Kennebec Water District (KWD) serving Waterville and surrounding communities; Sebago Lake, supplying the Portland Water District (PWD); and Floods Pond, used by Bangor Water, an independent water utility, to serve Bangor and surrounding communities.

China Lake is nearly double the size of Lake Auburn, with a 3,939-acre lake surface and a nearly 17,000-acre watershed, but the lake divides into two basins nearly equal in size, the west basin and the east basin. The KWD has a water supply in-take located in the west basin, where the shoreline is mostly under KWD control and managed as water supply protection land. The east basin is nearly all under private ownership and has much more shoreline development. The China Lake Outlet Stream, the only outlet of the entire lake, is in the west basin at the dam in Vassalboro. Considered by itself, the west basin is very similar to Lake Auburn in terms of shoreline and watershed management - mostly forested, under public water utility control, with universal restrictions on swimming and bodily contact but with limited recreational fishing allowed. Like Lake Auburn, China Lake serves one community within the lake watershed (Vassalboro) and several communities outside its watershed (Waterville, Winslow, Fairfield, Benton, and the Maine Water Company in Oakland), while the upper watershed towns of China and Albion do not use KWD water.

The key difference between China Lake and Lake Auburn is that China Lake has experienced algae blooms nearly every summer since the 1980s. Blooms were more severe through the 1980s and 1990s, and since the early 2000s, there have been some trends of improvement, including coldwater fish species survival. Since 1993, KWD has filtered the drinking water supply using a granular activated carbon filtration system capable of producing up to 12 MGD, though current demand stands at 3 MGD. The plant was constructed in the early 1990s for a cost of roughly $25 million. According to KWD Superintendent Roger Crouse, P.E., if water quality were to decline significantly from its current stable state, such as increased algae blooms and turbidity, KWD would have to change their operations to handle the lower quality in-take water (R. Crouse, pers. comm). The carbon filters would need to be backwashed more frequently, and the additional backwash water would need to be accommodated somehow in the existing lagoons or else the lagoons would need to be expanded at significant cost. The alum dose used to pretreat the water before filtration would also need to be raised. The key takeaway is that decreased in-take water quality at a filtration plant taxes the system, raises the volume of the waste stream, and adds significant cost and complexity to the treatment process, meaning that water supply managers cannot forgo water quality protection efforts simply because a filtration system is in place.

Sebago Lake is the public drinking water supply source used by the PWD to supply Portland, South Portland, Westbrook, and surrounding Greater Portland communities - roughly one sixth of Maine's population. The lake is roughly 10 times the size of Lake Auburn, with a surface area of nearly 30,000 acres and a watershed area of 235,000 acres. Sebago is the deepest lake in New England at 316 feet at its deepest point. Like Lake Auburn, Sebago Lake qualifies for a filtration waiver owing to a history of excellent water quality. The existing disinfection plant has a production capacity of 54 MGD and currently experiences a demand of 22 MGD. With such a large water supply lake, the capacity of the plant will be exceeded long before any concern of safe yield from the lake arises.

Land use in the Sebago Lake watershed is largely composed of private forestlands. The PWD owns 2,500 acres (or about 1% of the watershed), with 800 acres of mostly shoreland designated as 'No Trespassing' and 1,700 acres of land designated as free for public access for many forms of recreation. Another 28,000 acres are owned or

managed by land trusts. The water supply in-take is at the far southern extent of the lake in the Lower Bay. A 3,000-foot 'No Trespassing' zone surrounds the in-take, and no bodily contact is allowed within two miles of the in-take. Boating, fishing, snowmobiling, and ice fishing are allowed within the 2-mile limit but not within the 3,000-foot limit. Overall, the restricted area is very similar in size and structure to that of Lake Auburn (with the exception that the on-ice activities are not allowed on Lake Auburn). Taking Sebago Lake as a whole, however, the major difference with Lake Auburn is that Sebago's Lower Bay comprises a small fraction of the overall lake, the rest of which has no special swimming or boating restrictions for water supply.

Sebago Lake and its watershed are located many miles away from the service areas of the PWD. This geographical separation means that the communities served by PWD have no ability to enact land use controls on the lakeshore or in the watershed, unlike the situation in Lake Auburn where the City of Auburn can use its zoning ordinances to enact protections for the shorefront and watershed. It is likely that this lack of control over Sebago Lake's upper watershed has spurred the PWD to focus on cooperation with land trusts and private forestland owners to conserve tracts of land. As an example, PWD Environmental Services Manager Paul Hunt told the project team that the PWD is part of a partnership, Sebago Clean Waters, that seeks to raise the total amount of land conserved (and managed at least partly for water supply protection) from the current 12% of the watershed to 25% in the next 15 years (P. Hunt, pers. comm).

In all the examples considered, the authorities in charge of water supply protection emphasize the need to maintain shoreline control as much as possible, to conserve key water supply lands, and to tightly regulate recreation, regardless of current water quality.

Floods Pond in Otis, Maine has been the public water supply source for Bangor Water, the independent water district that serves Bangor and surrounding communities since 1959. At 635 acres of surface area, surrounded by a 4,600-acre watershed in Otis and neighboring Clifton, Floods Pond is less than half the size of Lake Auburn. Maximum depth is similar at 133 feet. Like Lake Auburn, Floods Pond also qualifies for a filtration waiver owing to its historically excellent water quality.

Land use in the Floods Pond watershed is largely controlled by Bangor Water, which owns or holds landowner agreements to manage 4,500 acres or more than 99% of the watershed land area. There is no public access to Floods Pond, which is home to a native population of Arctic char (Salvelinus alpinus), a coldwater fish species closely related to both salmon and lake trout that has been used by the Maine Department of Inland Fisheries and Wildlife to establish coldwater fish populations in other Maine lakes. Fishing, boating, and swimming are prohibited, as are hiking, wildlife viewing, and hunting in posted areas that include the entire shoreline.

The geography of Floods Pond as a water supply resembles China Lake more than Lake Auburn. The vast majority of Bangor Water customers are in downstream communities (Bangor, Eddington, Hampden, Hermon, and Orrington), while the protected shoreline and watershed areas are in upstream communities that do not use the water. (A small portion of Clifton is served by Bangor Water.) Bangor Water controls nearly all the Floods Pond watershed in Otis and Clifton, 4,500 acres total and more than LAWPC controls in the Lake Auburn watershed. Recreational activities are also much more restricted at Floods Pond than at Lake Auburn. Floods Pond provides a useful comparison point at the more restrictive end of the spectrum that puts the lost tax revenues and recreational opportunities at Lake Auburn in perspective.

To summarize, these comparisons with other water supply lakes demonstrate that the protections surrounding Lake Auburn do not exceed those of China Lake, Sebago Lake, or Floods Pond. The restrictions on recreational opportunities at Lake Auburn are similar to those at other drinking water supplies, including filtered and unfiltered water sources. Similarly, land use restrictions within the Lake Auburn watershed are far from the most prohibitive among the examples discussed, with only 20% of the watershed held or managed as water supply land compared to 99% of the Floods Pond watershed. In all the examples considered, the authorities in charge of water supply protection emphasize the need to maintain shoreline control as much as possible, to conserve key water supply lands, and to tightly regulate recreation, regardless of current water quality.

Holistic Recommendations

1. We recommend that the City of Auburn not seek to ease the current resource protection zoning or

consider rezoning portions of the watershed for increased density (e.g., village node-style development). Increased density and new opportunities for residential development are better suited to other areas of Auburn outside of the Lake Auburn watershed, preferably areas already served by sanitary sewer (for the benefit of nearby water resources such as the Androscoggin River). This recommendation is based on two key findings of this study that are fully elaborated in Section 3:

- Lake Auburn and its watershed are already at or near the key environmental thresholds of 10 parts per billion annual average total phosphorus and 75% forested watershed land cover; and
- The future scenario models showed that easing restrictions on further development in the Lake Auburn watershed would set the lake on a path toward deteriorating water quality, regardless of the beneficial effects of requiring low impact development techniques and without obvious management strategies to combat further declines in water quality.

2. We recommend that the Planning Board and City Council take up our recommended ordinance revisions and, if acceptable in their current form, adopt them. If not acceptable in their current form, the recommended revisions should be reworked and made more practicable but not watered down or fundamentally changed in their intent or effect. These recommended changes represent a move toward simpler, more transparent, more evenly applied regulations that are based on the best available science. These recommended revisions are fully elaborated in Section 2 and in a separate document to the City.

3. We recommend that the City of Auburn share the findings of Section 4, Analysis of Economic Impacts, with all partners and stakeholders so that the accounting of aggregate economic impacts of the existing conditions and various future scenarios are used as the basis for an open, transparent, and thoughtful public discussion of the fairness, equity, and sustainability of the current cost sharing and benefit allocations, as well as practical ways forward. This recommendation is based on the key finding that any net benefits to the City or Auburn residents and taxpayers from expanded residential development in the Lake Auburn watershed would be counterbalanced by additional costs to Lewiston and its residents and taxpayers, in the form of increased costs associated with mitigating declining water quality and decreased benefits from recreation. These findings are fully elaborated by Section 4 of this report. As a next step in this planning process, we recommend that a scenario be modeled and run through a benefit cost analysis that meets the target water quality goal for Lake Auburn, which was not possible in the future scenarios modeled in this study when considering Auburn-only changes to regulations and management approaches. Developing a scenario that meets the water quality goal may require several iterations. The scenario should likely expand the existing Lake Auburn Watershed Overlay District to the upper watershed towns, require implementation of low impact development techniques on new development watershed-wide, and account for septic design standard changes.

4. We recommend that the City of Auburn, City of Lewiston LWD, AWD, and LAWPC fully support collaborative work with local governments, land trusts, private landowners, and other potential partners in the upper Lake Auburn watershed (Turner, Minot, Hebron, and Buckfield) to control development and limit phosphorus loading. Historically, LAWPC has been an active player in fostering collaborative action between the local governments, with representation from the upper watershed towns. This recommendation is based on the key finding from this study that Auburn alone cannot accomplish sufficient phosphorus load reductions to prevent deteriorating water quality in Lake Auburn, but will require active participation from the upper watershed towns. This finding is fully elaborated in Section 3.

5. We recommend completing a comprehensive review and gap analysis of current water quality monitoring efforts carried out by both AWD and Bates College in the Lake Auburn watershed. Identify gaps based on weaknesses and assumptions for the model. From the review and gap analysis, devise a robust long-term water quality monitoring plan and annual cost estimate for Lake Auburn. We also recommend that 1) the AWD hire a full-time, dedicated data management technician for improved management, access, and analysis of collected water quality data; 2) the AWD and LWD continue collaboration with Bates College on student-assisted monitoring; and 3) LAWPC consider creating a technical science advisory board to establish or maintain key local, State, and regional partnerships that can help to provide regular review and guidance on water quality issues.

6. Given its high probability of causing a filtration waiver violation, a swimming area will likely not be feasible for Lake Auburn at any time unless State and federal authorities sign off. If a swimming area were to be re-instituted at Lake Auburn, we provide many actions that would need to take place to ensure that the area does not contribute to water quality degradation. Refer to Swimming in Section 3.

7. Allowance of only small watercraft restricted to areas away from the in-take should continue, and improved stabilization techniques at vehicle and pedestrian access points along the lake shoreline should be implemented, along with clear and effective barriers to foot and vehicle access.

8. We recommend that the LAWPC coordinate with local youth conservation groups or AmeriCorps to perform annual maintenance of trails and install best practices that limit erosion of trails, especially those sections nearest the lake. In addition, surveying how much horse manure may be found on the trails to inform a reconsideration of horseback riding near the lake is recommended, as manure can be a significant nutrient source in sufficient quantities. Finally, it is recommended that the City acquire permanent recreational trail easements to LAWPC properties with trails for guaranteed public access in the future.

9. We recommend developing a comprehensive natural resource management plan for LAWPC lands that focuses firstly on drinking water protection and secondly on wildlife habitat protection if in the interest of public water supply protection, with multiple management options offered. We also recommend developing natural resource inventories for all LAWPC lands to map critical streams (perennial and intermittent), wetlands, vernal pools, cover types, rare, threatened, and endangered species present, etc. to include in individual natural resource management plans that set management objectives and methods to achieve water resource and wildlife habitat protection for each LAWPC parcel. If timber harvesting continues in the Lake Auburn watershed on LAWPC or private lands, then we recommend a series of actions to minimize forestry impacts to water quality. Refer to Forest Management in Section 3.

10. We recommend that LAWPC work with local conservation groups and land trusts to purchase land in the watershed outside of Auburn. We also recommend that LAWPC consider putting all their properties into permanent conservation. These properties are currently protected under the LAWPC by-laws but provide no higher-level legal protection from future development if said by-laws were to be revoked.

Photo Credit: Sun Journal

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Appendix 2

Current Septic Design Standard

Auburn Zoning Ordinance Section 60-952(f)(1): Subsurface absorption areas shall not be permitted on sites on which the highest seasonal groundwater table, bedrock or other impervious layer is less than 36 inches below the bottom of the organic horizon. Not less than 24 inches of suitable soil shall be present below the bottom of the subsurface absorption area. The bottom of such subsurface absorption area shall not be less than 12 inches below the bottom of the organic horizon measured from the lowest point on the subsurface absorption area.

The Implication: Local standards within the Lake Auburn Watershed Overlay District limit development on a significant portion of the watershed by effectively prohibiting the use of innovative and alternative septic system and leach field designs to meet the 'depth to constraining layer' requirement. These innovative and alternative designs are otherwise allowed by the State and can achieve comparable or better nutrient removal than a traditional system and leach field.

Recommended Septic Design Standard

The Recommendation: Maintain a requirement for a minimum depth of 36 inches above the constraining layer (groundwater or bedrock), while allowing the use of State-approved alternative septic system and leach field designs that meet statewide standards.

This can be achieved by referencing the Maine Subsurface Wastewater Treatment Rules (10-144 CMR 241), with the exception that the required depth to the constraining layer would be at least 36 inches (specified by updating Table 4-F, Minimum Permitting Requirements and Minimum Design Requirements). Because the State rules already provide for the use of such alternative designs such as mounded leach fields and drip distribution systems, as well as other proprietary systems, these would be allowed in the Lake Auburn watershed as well.

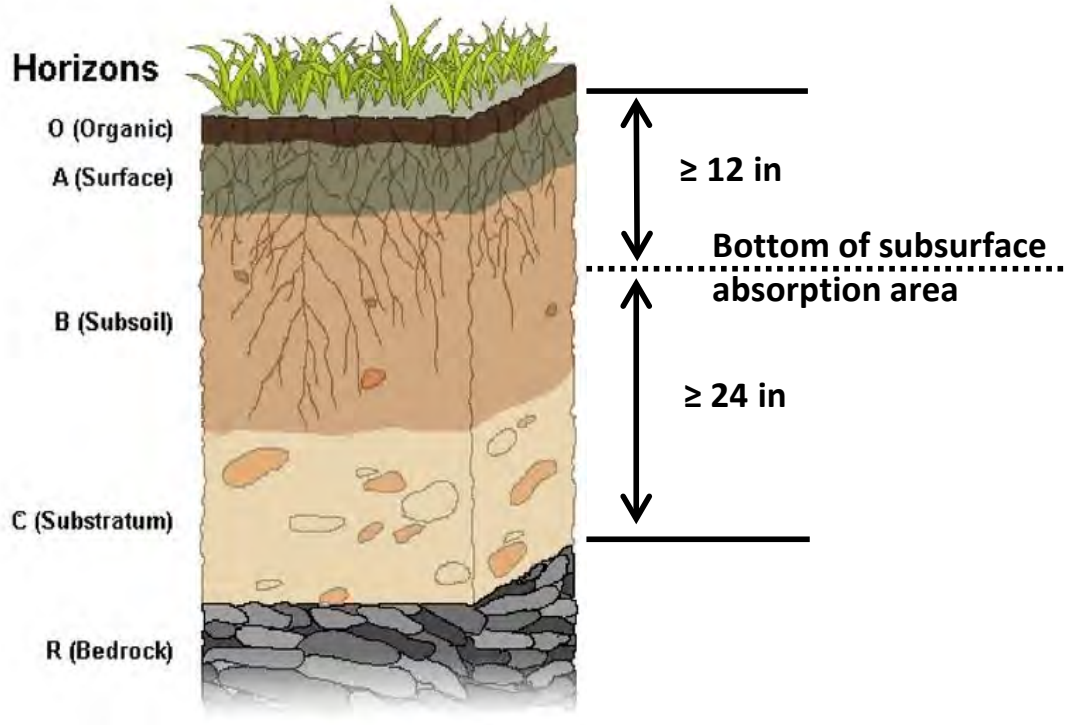

Image Credit: File:SOIL PROFILE.png by Hridith Sudev Nambiar at English Wikipedia.

ORDER 05-01032022

City Council Order

IN CITY COUNCIL

ORDERED, that the City Council direct staff to draft amendments consistent with the adopted Comprehensive Plan for consideration by the Planning Board and direct the Planning Board to review proposed amendments, hold Public Hearings on each and forward a recommendation back to the City Council on the following four amendments:

a. **Gracelawn area;** 148 acres from Agriculture and Resource Protection to Commercial Development District (CDD). Approximately, 37 acres are not shown as CDD in approved FLU mapping, but the council did approve utilizing the Auburn Lake Watershed Study. In that study they suggested moving the watershed boundary out and a result from that, we are suggesting moving the proposed CDD boundary out to match the new watershed boundary another 37 +/- acres as intended.

b. **Washington Street Area;** 716 acres from General Business to Commercial Formed Based Code Gateway Development District. Approximately 9.63 acres were not included in the FLU mapping. But approved in the order by the council for the approval of the specific lot PID 199-052.

c. **Court Street/City Core of Urban Residential Area;** 1,687.41 acres of Urban Residential to Traditional Neighborhood Development District Areas.

d. **Subsurface Wastewater Disposal in the Lake Auburn Watershed**; Maintain a requirement for a minimum depth of 36 inches above the limiting factor/constraining layer (groundwater or bedrock), while allowing the use of State-approved alternative septic system and leach field designs that meet statewide standards.