

Date: **March 8, 2023**

Project No.: **20985**

To: **Orleans Wastewater Management Advisory Committee (WMAC)**

From: **Mike Giggey**

Subject: **Orleans Wastewater Management Planning
Nitrogen Load Reduction Progress in Pleasant Bay Sub-Watersheds**

Now that a strategy has been developed to proceed with Phase 3 of the sewer system, the WMAC should start serious planning for updating the nitrogen removal plan for the Pleasant Bay watershed. This memo is intended to set forth the Town's overall commitment under the Pleasant Bay Watershed Permit and to estimate progress to date.

Orleans' Commitment Under the Pleasant Bay Watershed Permit

The Watershed Permit presents estimates of the nitrogen load removals needed to accomplish water quality goals in the Bay and allocates the responsibility to the four towns in the watershed. The overall removal requirement is about 17,700 kg/yr, and Orleans' share is about 7,000 kg/yr.

Orleans contributes nitrogen loads to 10 Pleasant Bay sub-embayments. The 10 sub-watersheds are listed in Table 1, attached, along with Orleans' share of required load removals. The largest removals are required in Meetinghouse Pond, Pochet Neck and Pleasant Bay sub-watersheds.

Orleans' Progress—To Date and Planned

Table 1 shows estimated nitrogen removals in each of the Pleasant Bay sub-watersheds for the Phase 2 and Phase 3 sewer projects (as currently planned), and for the Lonnie's Pond shellfish harvesting project (underway). Phase 1 of the sewer project did not directly address Pleasant Bay needs, although it provides treatment capacity for future Pleasant Bay projects.

The shellfish harvest represents 1% of the overall nitrogen removal requirement. If Phases 2 and 3 are completed as currently planned, an additional 31% of the overall requirement will have been achieved. The nitrogen removals that will be provided by the Meetinghouse Pond sewer project represent the lion's share of Orleans' investment to date toward Pleasant Bay water quality restoration.

Choice of Technologies

When the Targeted Watershed Management Plan (TWMP) was prepared, Orleans projected that about 4,700 kg/yr nitrogen removal could be accomplished by shellfish harvesting and on-site denitrification systems. The remainder of the commitment was associated with Meetinghouse Pond sewers and a 25% credit for residential fertilizer controls. Those projections reflected the work of OWQAP and did not consider more recent knowledge about the capabilities of PRBs and the limitations of on-site denitrification.

Projected Milestones

The plan set forth in the TWMP called for Orleans to complete the following percentages of its overall commitments for nitrogen removal:

- End of Year 5 (2023) 7%
- End of Year 10 (2028) 68%
- End of Year 15 (2033) 90%
- End of Year 20 (2038) 100%

If Phase 3 of the sewer project is completed by 2028, as currently planned, then Orleans will have accomplished 32% of its overall commitment by Year 10, compared to the 68% anticipated when the Watershed Permit was issued.

Growth

Although no estimate has been made for additional load removals associated with growth, it is implicit in the Permit that each town will remove 100% of its nitrogen load increase since the 2006 MEP report. It is clearly an important goal to estimate growth and update a removal plan accordingly.

This memo is intended to provide the framework for updating the CWMP with respect to Pleasant Bay. It is important that the WMAC understand the commitments made in the Watershed Permit, the progress attained to date, and the magnitude of the work to be done.

ORLEANS WASTEWATER MANAGEMENT PLANNING

Table 1

Progress toward Pleasant Bay Permit Requirements

Loads in kg/yr

Sub-watershed	Permit Load Removal	Load Removals by Sewer Phase					Load Removal Remaining
		Phase 1	Shell. Harv.	Phase 2	Phase 3	Total	
Meetinghouse Pond	1,876	-	-	1,689	34	1,723	153
Lonnie's Pond	284	-	96	-	240	336	(52)
Arey's Pond	113	-	-	-	-	-	113
River--Upper	375	-	-	152	-	152	223
River--Lower	518	-	-	2	-	2	516
Namequoit River	348	-	-	-	-	-	348
PahWah Pond	413	-	-	-	-	-	413
Quanset Pond	227	-	-	-	-	-	227
Pochet Neck	1,569	-	-	30	-	30	1,539
Pleasant Bay aggregate	1,257	-	-	-	-	-	1,257
Total by Phase	6,980	-	96	1,873	274	2,243	4,737
cumulative			96	1,969	2,243		
Percent Completion		-					
per phase			1%	27%	4%		68%
cumulative			1%	28%	32%		

Notes

Credit for residential fertilizer control not included (241 kg/yr)
 Growth since 2006 not considered