


Impact of Proposed Phase 3 Sewers Nitrogen Credits for Lonnie's and Arey's Ponds

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Michael Giggey, PE, Wright-Pierce



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Overview

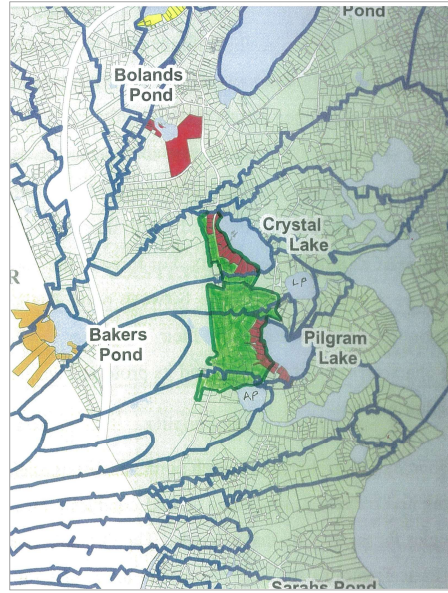
- The WMAC is slated to make recommendations on 8 possible sewer extension projections for Phase 3
- Wright-Pierce memo of September 1, 2022 proposed several evaluative criteria and an initial priority ranking
- Sewers near Lonnie's Pond and Arey's Pond can allow Orleans to address current shortfall in nitrogen removal in Pleasant Bay
- Two of the 8 potential projects could be easily combined
- Expansions of the combined projects should also be considered
- See Wright-Pierce memo dated December 15, 2022

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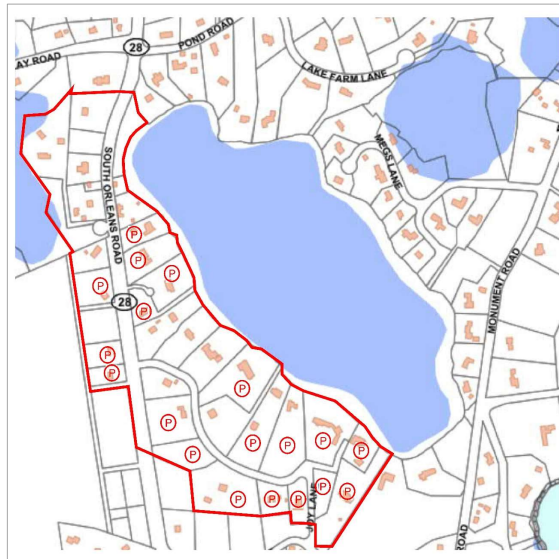
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Location Plan



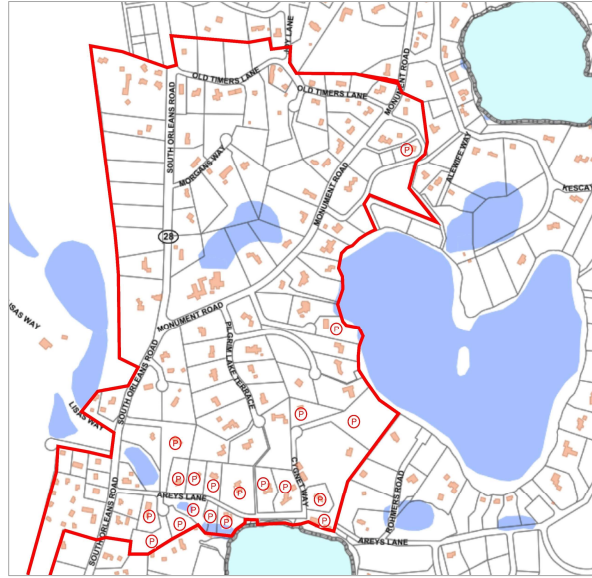
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Crystal Lake Service Area



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Pilgrim Lake Service Area



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Parcels, Water Use and Wastewater Flow

Sub-watershed	Developed Parcels	Metered Water Use, gpd	Wastewater Flow, gpd	Avg. Water Use per Parcel, gpd
Crystal Lake	26	2,920	2,774	112
Pilgrim Lake	43	6,033	5,713	140
Lonnie's Pond	35	4,487	4,263	128
Subtotal	104	13,440	12,768	
MtgHouse Pond	13	1,320	1,254	102
Town Cove	7	5,084	4,830	726
Upper River	5	651	618	130
Arey's Pond	25	2,814	2,673	113
Total	154	23,309	22,143	124
			Cape-wide avg.	169

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Nitrogen Loads and Credits

Sub-watershed	Developed Parcels	N Load Credit, kg/yr	Avg. N Credit per Parcel, kg/yr
Crystal Lake	26	7	0.27
Pilgrim Lake	43	33	0.77
Lonnie's Pond	35	139	3.97
Subtotal	104	179	
MtgHouse Pond	13	43	3.31
Town Cove	7	166	23.7
Upper River	5	21	4.20
Arey's Pond	25	87	3.48
Total	154	496	2.20
		<i>Excl. lakes</i>	4.0
		<i>Cape avg.</i>	5.5

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Per-Parcel Nitrogen Credits

	Lonnie's and Arey's Watersheds	Cape Cod Average	Year-Round Family of Four	Single Occupant
Water Use, gpd	124	169	250	80
Nitrogen Load, kg/yr				
Unattenuated	4.0	5.5	8.2	2.6
Attenuated by lake	2.0	2.7	4.1	1.3

Not all of load reduction upgradient of lakes benefits Lonnie's loading

Crystal Lake 15% of GW leaving lake goes to Lonnie's

Pilgrim Lake 35% of GW leaving lake goes to Lonnie's

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Computation of Credits, ignoring growth

Loadings and Credits, kg/yr	Lonnie's Pond		Arey's Pond	
	Orleans	Brewster	Orleans	Brewster
Total removal target	284	14	113	29
Prior credits (shellfish harvest)	96	0	0	0
Remaining target	188	14	113	29
Current layout credit	188		92	
Discounted for prior growth	179		87	
Shortfall	9	14	26	29
Equiv. Orleans homes	2	4	6	8

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Computation of Credits, considering growth

Loadings and Credits, kg/yr	Lonnie's Pond		Arey's Pond	
	Orleans	Brewster	Orleans	Brewster
Total removal target,	284	14	113	29
Prior credits (shellfish harvest)	96	0	0	0
Remaining target	188	14	113	29
Allowance for future growth	66	4	28	10
Future target with growth	254	18	141	39
Discounted layout credit	179		87	
Shortfall	75	18	54	39
Equiv. Orleans homes	19	5	13	10

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Conclusions

- **Current Phase 3 layout addresses much of Orleans' commitment in two sub-watersheds**
 - Lonnie's 95% (of remaining)
 - Arey's 77%
- **Adding homes to current layout may easily meet needs in Orleans**
- **Opportunity exists to also address Brewster's needs**
- **Options**
 - Meet current Orleans need without growth---add 8 homes
 - Meet full Orleans need with 20% growth---add 32 homes
 - Meet future needs of both towns with growth—add 47 homes

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Way Forward

- **Determine service area growth since 2006 (MEP report) and refine "credit discount"**
- **Lay out further sewerred areas to address watershed permit shortfalls**
 - Just Orleans
 - Orleans and Brewster
- **Decide how much new growth to plan for**
- **Start discussions with Brewster**

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THANK YOU

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Project Location



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Simplified Implementation Plan, kg/yr removal commitments

	Brewster	Chatham	Harwich	Orleans	Total
Years 1 to 5	1,281	247	2,872	514	4,914
Years 6 to 10	118		1,565	4,204	5,887
Years 11 to 15	118	3,408		1,581	5,107
Years 16 to 20	118	1,597		675	2,390
After Year 20	236	7,807	103		
Total Removal Goal	2,262	4,076	4,399	6,980	17,717

Towns have already made some changes to this schedule