

**City of Portsmouth
Element C – Nitrogen Reduction Planning**

2022 Annual Reporting to MAAM

**Great Bay Total Nitrogen General Permit
NHG58A002 and Settlement Agreement Between IMA and CLF**

Initiatives at WWTFs

Anticipated Year	WWTF Facility	Season	Description	Estimated Load Reduction Potential (lbs TN)	Costs	2021 Progress Update	2022 Anticipated Progress
Nutrient Load Reduction	Peirce Island & Pease	7-month growing season 2021	Total Lbs. TN = Permitted daily (341 lbs./d) – measured (173.6 lbs./d) = 167.4 lbs./d x 210 days (Apr 1 – Oct 31)	35,154 lbs.		For the full 2021 growing season from April through October, the Peirce Island and Pease WWTFs discharged 35,154 lbs of total nitrogen less than the permitted limit.	
Nutrient Load Reduction	Peirce Island & Pease	7-month growing season – partial 2022	Will be calculated based on the difference of the permitted value (341 lb/d) and the rolling seasonal average value for the month times the number of days in the month for each month of the growing season.	~35,000 lbs.	See Note 1	The City will update this value based on measured water quality as part of the 2023 Annual Report.	Based on the partial 2022 growing season data set and current flow rates, we anticipate that the 2023 nitrogen reduction will be in the range of the estimated load reduction potential shown.
Nutrient Load Reduction	Peirce Island	5-month non-growing season 2021-2022	Total Lbs. TN = [Permitted daily (409 lbs./d) – monthly average TN (lbs./d)]*number of days in the month = lbs for each month of the non-growing season Nov through March.	30,400 lbs.		Through the settlement agreement, the Peirce Island WWTF must achieve a maximum of 8 mg/L TN monthly average during all months of the year, or 409 lb/d at the design flow rate. During the non-growing season the Peirce Island WWTF discharged 30,400 lbs less than the required limit.	
Nutrient Load Reduction	Peirce Island	5-month non-growing season 2022-2023	Total Lbs. TN = [Permitted daily (409 lbs./d) – monthly average TN (lbs./d)]*number of days in the month = lbs for each month of the non-growing season Nov through March.	~30,000 lbs.	See Note 1	The City will update this value based on measured water quality as part of the 2023 Annual Report.	Based on the partial 2022 non-growing season data set and current flow rates, we anticipate that the 2023 nitrogen reduction will be in the range of the estimated load reduction potential shown.

Notes:

1. Full nutrient load reduction cannot be determined until the season of note is complete.

Planned Structural BMPs

Anticipated Year	Project	Description	Estimated Load Reduction Potential (lbs TN/yr)	Costs	2021 Progress Update	2022 Anticipated Progress
2022	Islington Street Compete Streets – Phase II	This project will include full roadway reconstruction (sidewalk, curb, grass strip, roadway and utilities) from the Dover Street intersection to the intersection with Congress/Maplewood Streets (5,000 linear feet). The work will include sewer separation with separated stormwater being redirected through water quality units upstream of the Brewster and Cabot Streets stormwater outfalls to North Mill Pond. The project may cause a net increase in the volume of stormwater discharged to the North Mill Pond but will reduce volume and # of combined sewer overflow events during wet weather. Nitrogen levels and overall loads are generally higher in CSO discharges than in stormwater. Opportunities to treat roadway runoff are being incorporated including tree box filters. The overall stormwater catchment area served by this project is approximately 6.4 acres.	TBD, See Note 1	Preliminary Design: ~\$250,000 Final Design: \$289,900 Bidding and Construction Engineering: \$700,000 Construction: ~\$9.2M	The final design contract for this project was executed in August 2021 and funding for bidding phase and construction were approved by the City Council in August 2021.	Permitting and final design will be completed in 2022 which will be followed by bidding, award and 2023 construction provided there are no unforeseen interruptions in the progress of work.
2024	Peeverly Hill Road Reconstruction	This project will include full roadway reconstruction from the intersection with Middle Road to the intersection with West Road (5,000 linear feet). The work will include construction of a new sidewalk from Middle Road to Mirona Road on the north side of the roadway (3,600 linear feet) and construction of a new 8 to 10-ft wide shared use path from Middle Road to Banfield Road on the south side of the roadway (3,400 linear feet). Curbs will be added to the roadway and stormwater will be re-routed through a planned stormwater gravel wetland that will discharge to the headwaters of Sagamore Creek. The overall stormwater catchment area served by this project is approximately 17 acres.	TBD, See Note 1	Engineering Study & Preliminary Design: \$412,000 Permitting and ROW: TBD Final Design and Bidding: TBD Construction Engineering: TBD Construction: TBD	The project is under review to determine the layout details and in particular pedestrian accommodations for sidewalks and/or shared use paths. By the end of this calendar year it is anticipated the project will be in the ROW portion of work. Costs will be determined based on final layout.	Final design will be completed in 2023 which will be followed by bidding, award and construction provided there are no unforeseen interruptions in the progress of work.
2023	Willard Ave Sewer Separation	This project will include full roadway reconstruction (sidewalk, curb, grass strip, roadway and utilities) along Willard Avenue from the intersection with Marston Street to the intersection with Lafayette Road, Ash Street from the intersection with Willard Avenue to Orchard Street and Orchard Street (2,000 linear feet). The work will include sewer separation with separated stormwater being redirected through water quality units near Parrott Avenue upstream of the stormwater outfall to South Mill Pond. The project may result in a net increase in overall stormwater discharge to the South Mill Pond but will reduce the volume and frequency of combined sewer overflow events during wet weather. Nitrogen levels and overall loads are generally higher in CSO discharges than in stormwater. The overall stormwater catchment area served by this project is approximately 3.4 acres.	TBD, See Note 1	Preliminary Design: \$200,750 Final Design: ~\$400,000 Bidding and Construction Engineering: \$600,000 Construction: ~\$5.4M	The preliminary design contract for this project was executed in June 2021.	Permitting and final design will be completed in 2022 which will be followed by bidding, award and construction provided there are no unforeseen interruptions in the progress of work.
2023	Union Street Sewer Separation	This project will include full roadway reconstruction (sidewalk, curb, grass strip, roadway and utilities) along Union Street from the Middle Street intersection to the State Street intersection (1,000 linear feet). The work will include sewer separation with separated stormwater being redirected to the stormwater system on Middle Street that discharges through water quality units near Parrott Avenue upstream of the stormwater outfall to South Mill Pond. The project may increase the overall stormwater discharge to the South Mill Pond but will remove stormwater from the combined sewer collection system thus reducing combined sewer overflow events during wet weather. Nitrogen levels and potential overall loads are generally higher in CSO discharges than in stormwater. The overall stormwater catchment area served by this project is approximately 1.9 acres.	TBD, See Note 1	Preliminary Design: \$200,750 Final Design: ~\$400,000 Bidding and Construction Engineering: \$360,000 Construction: ~\$3.24M	The preliminary design contract for this project was executed in June 2021.	Permitting and final design will be completed in 2022 which will be followed by bidding, award and construction provided there are no unforeseen interruptions in the progress of work.

Anticipated Year	Project	Description	Estimated Load Reduction Potential (lbs TN/yr)	Costs	2021 Progress Update	2022 Anticipated Progress
2023	Fleet Street Sewer Separation	<p>This project will include full roadway reconstruction (sidewalk, curb, roadway and utilities) along Fleet Street from the Court Street intersection to the intersection with Hanover Street (1,000 linear feet). The work will include sewer separation with separated stormwater being redirected through an upsized existing outfall and a new water quality unit near Maplewood Avenue upstream of the stormwater outfall to North Mill Pond. The project may result in a net increase in overall stormwater discharge to the North Mill Pond but will remove stormwater from the combined sewer collection system thus reducing combined sewer overflow events during wet weather. The overall stormwater catchment area served by this project is approximately 4 acres.</p> <p>The project limits may expand to include an area of Congress Street from Fleet Street to Maplewood Avenue (540 linear feet) and Vaughan Mall from Congress Street to Hanover Street (450 linear feet). The scope of work and ultimate discharge of separated stormwater would be the same as described above for the Fleet Street work. The overall stormwater catchment area served by this additional area is approximately 1.6 acres.</p>	TBD, See Note 1	<p>Preliminary Design: \$288,350 75% Final Design: \$242,000 100% Final Design: TBD Bidding and Construction Engineering: ~\$600,000 Construction: ~\$6M</p>	The preliminary design for this project is underway and a contract was executed for 75% design in August 2021.	Permitting and final design will be completed in 2023 which will be followed by bidding, award and construction provided there are no unforeseen interruptions in the progress of work.
2022	Corporate Drive Road & Drainage Upgrade	The City is working on two phases of work to improve drainage on Corporate Drive. The first phase which is currently being constructed seeks to improve the drainage flow through swales adjacent to Corporate Drive through swale improvements and culvert modifications.. The second phase includes roadway reconstruction, stormwater quality unit installation and selective drainage improvements along Corporate Drive from Rye Street to Grafton Road (6,000 linear feet). The overall stormwater catchment area served by this project is approximately 5 acres.	TBD, See Note 1	<p>Phase 1 Preliminary Design: \$60,000 Phase 1 Final Design: \$75,300 Phase 1 Bidding and Construction Engineering: ~\$60,000 Phase 1 Construction: ~\$600,000 Phase 2 Preliminary Design: \$101,300 Phase 2 Final Design: \$71,800 Phase 2 Bidding and Construction Engineering: TBD Phase 2 Construction: TBD</p>	Phase 1 preliminary design is complete and final design is underway for bidding the fall 2021. Phase 2 final design is underway for bidding in the spring 2022.	Construction of Phase 1 is under way and construction of phase 2 is anticipated to be completed in 2023.
2021	Gravel wetland /Bioretention System at DPW/Recreation Fields	New gravel wetland treating ~ 25 acres of 2021 existing IC area with WQv = 0.18" N Rem Eff = 33%; Bioretention system w/ internal storage reservoir treating ~ 51.8 acres of existing IC	406	<p>Design: \$70,000 Construction: \$630,000</p>	Final completion of the construction project for the gravel wetland/bioretention system was complete in early 2021.	Project was completed in 2021.
By 2025	Potential Future BMPs on Municipal Lands	The City has initiated a City-wide analysis to identify potential feasible stormwater BMP retrofit locations on City owned property for planning purposes. The results of this ongoing study will be used to assess the potential feasibility and cost-effectiveness of constructing stormwater BMP retrofits to achieve additional nitrogen load reductions as either standalone projects or as part of future facility upgrades of municipal properties. This study may also review certain select private properties that have a high amount of impervious cover and available space. This information will be utilized for outreach as applicable to private property owners.	TBD	<p>Study: \$70,500 City Owned Projects: TBD Other Projects: TBD</p>	The study will be completed in 2021. Once the study is complete the City will develop a prioritized list of projects for City owned areas and identify potential opportunities in other land ownership areas.	Implement identified projects for City owned areas. Conduct additional steps to advance feasible projects in other land ownership areas.

Notes:

1. Engineering design for these planned road/drainage system improvements are in the early phase or have not yet begun. As a result, the potential stormwater nitrogen discharge cannot be determined. The feasibility for stormwater treatment will be evaluated as part of the design efforts.

Non-Structural BMPs

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Anticipated Year	Project	Description	Estimated Load Reduction (lbs TN/yr)	Costs	2021 Progress Update	2022 Anticipated Progress
Ongoing	Street Sweeping	City sweeps all streets monthly, 8 months of the year with High Efficiency Regenerative Vacuum Sweeper on 105 centerline miles and an estimated 345 acres of area.	70	Mostly Staff Time – Actual costs are being developed	City continues to sweep streets on a monthly schedule from April through November. Collected 150 tons of dry material from July 2020 through June 2021 (City FY 21).	Continue to sweep using available equipment. Sweeping will be substantially more than minimum MS4 permit requirement.
Ongoing	Leaf Litter Management	City provides weekly curbside leaf litter pickup for residential areas (~80% of City).	250	Part of operations budget	City collected 2,211 tons of yard debris including leaf litter from July 2020 through June 2021 (City FY 21). Collection occurs on a weekly schedule year round.	Continue to collect yard debris as described.
Ongoing	Catch Basin Cleaning	City cleans approximately 25% of the total catch basins each year and in accordance with MS4 requirements.	80	Part of operations budget	City has dedicated staff and equipment for CB cleaning. 550 CBs were inspected and/or cleaned and removed 115 tons of dry material from July 2020 through June 2021 (City FY 21).	City will continue to clean CBs in accordance with MS4 requirements
2021	Regulations	City adopted new Site Plan Regulations in Jan 2021 requiring new & redevelopment disturbing 15,000 sq ft or more area to treat stormwater using SWA recommendations.	215	Part of operations budget	Require compliance with new site plan regulations.	Continue to require stormwater regulations as part of development
Before 2021	Impervious Disconnection	City has installed at least 18 tree filters, 4 rain gardens, converted ~ 0.5 mile of road shoulder and 0.3-acres of parking lot at Four Tree Island to porous pavement; IC disconnect ~ 3 acres.	45	TBD	The City has taken part in previous efforts to control stormwater runoff and improve water quality. The projects were completed by the City directly and in partnership with other watershed stakeholders. The work was completed prior to 2021.	Projects were completed prior to 2021.
Ongoing	Liquid Biological Soil Amendment Program	City switched to a compost tea to fertilize its recreational fields; Results in an application rate of 0.7 lbs. N /1000 sf or ~30% less than a more typical application rate of at least 1 lb. /1000 sf.	570	Staff time plus \$1,100	City continues to use compost tea as a nutrient supplement for soil and plants in place of synthetic fertilizers.	City will continue to use compost tea as a nutrient supplement for soil and plants. Budget \$2,500 to expand compost tea program.
Ongoing	Fertilizer Bans and Reductions	Supporting a statewide ban of high nitrogen synthetic fertilizers.	TBD	TBD	City is tracking statewide action and will determine support based on the details of the action to be taken.	City is tracking statewide action and will determine support based on the details of the action to be taken.
Ongoing	Fertilizer Outreach and Education Program	Provide and promote landscaping for water quality initiatives and programs.	TBD	Staff time plus \$2,500	City distributed 5400 postcards promoting greener landscape management.	Continue outreach
Ongoing	Pet Waste Outreach and Education Program	Provide pet waste management educational materials with every dog license. Produce multimedia educational campaigns.	TBD	Staff time plus \$350	City distributed PREP messaging to every registered dog owner. Produced a video promoting pet waste management.	Continue outreach
Ongoing	Leaf and Yard Waste Outreach and Education Program	Promote proper leaf and yard waste management.	TBD	Staff time plus \$350	Yard waste messaging will be mailed out in the fall.	Continue outreach
2021	Water Has a Memory & Think Blue Exhibit	Collaborative exhibit with Strawberry Banke Museum in Portsmouth. The goal of the new exhibit “Water Has A Memory: Preserving Strawberry Banke at Portsmouth from Sea Level Rise,” created in collaboration with the Strawberry Banke Museum and the City, is to inform and engage visitors of all ages to understand the problems and learn proactive ways to adopt local, regional, national and international initiatives to address sea level rise and take measures to “Think Blue!” about water resources. This exhibit includes a history of the City’s water, wastewater and stormwater infrastructure. The “Think Blue!” portion of the exhibit engages visitors with suggestions for things they can do to with their own property to protect water quality such as installing rain barrels, rain gardens, porous materials and other actions.	TBD	\$10,000	The exhibit will be launched in August 2021 and will continue for the year.	This exhibit will continue and expand in 2022 and the coming years.

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Anticipated Year	Project	Description	Estimated Load Reduction (lbs TN/yr)	Costs	2021 Progress Update	2022 Anticipated Progress
Ongoing	Septic System Outreach and Education Program	Participate and promote NHDES Septic Smart Week. Send septic smart information to private septic system owners.	TBD	TBD	Participate in and promote NHDES Septic Smart Week. In the fall, will mail residents with septic systems “Get Pumped” Brochure produced by NHDES.	Continue outreach

Notes:

- The nitrogen load reduction values represent general estimates based on the methods and assumptions included in the generic load reduction template spreadsheet provided by the UNH Stormwater Center for municipal use in preparing Element C of the Adaptive Management Plan with some minor adjustments to reflect City specific conditions especially with respect to fertilizer use and IC disconnection.

Other Efforts: Summary of Other Innovative Efforts/Pilot Programs

Anticipated Year	Project	Description	Estimated Load Reduction (lbs TN/yr)	Costs	2021 Progress Update	2022 Anticipated Progress
2022	Sewer Extension to Sagamore Creek Area (approx. 88 homes)	Assume 50% are connected in the planned extension area, which are in the areas to the north and south of Sagamore Creek at Sagamore Avenue.	260	Design: \$530,000 Bidding and Construction Engineering: \$330,000 Phase 1 Construction: ~\$3.2M Future phases: Up to ~\$8.3M	This City recently received bids on this project and the costs exceeded the available funding limit. It has been proposed the project will be repackaged so that construction can begin within the funding limit as Phase 1. Future phases of this project may extend the total additional costs for construction engineering and construction to as much as \$8.4M. The total project costs will be dependent upon future funding approved by the City Council and decisions related to cost sharing for work to construct the service from the house to the edge of the right-of-way.	Additional phases of work as approved. See summary in 2021 Progress Update.
Ongoing	Atmospheric Load Reduction based on more current air quality data	UNH SC/NHDES suggests atmospheric N load has decreased by ~14%; GBNNPS study estimated delivered atmospheric N Load for Portsmouth = 18,618 lbs/yr.	2,610	\$0	City will be tracking this reduction along with NHDES and the UNH Stormwater Center.	City will be tracking this reduction along with NHDES and the UNH Stormwater Center.
2021	Land Protection in Bellamy Reservoir	City purchase of conservation easement for land adjacent to Bellamy Reservoir targeted for development – prevents additional stormwater and septic loads.	1,010	~\$1 Million (50% grant from NHDES DWGTF)	City purchased two conservation easements totaling ~180 acres of land adjacent to Bellamy Reservoir.	Continue efforts
2025	Explore Long-term Sustainable Funding Mechanisms	The City previously conducted a stormwater utility feasibility study that was completed in 2011 but it did not gain approval by City Council to move forward at that time. The City plans to revisit the feasibility of stormwater utility.	TBD	TBD	City is revisiting the timing of this initiative in light of the new Great Bay Total Nitrogen General Permit and ongoing MS4 requirements.	2022 efforts will be dependent upon the determined approach to revisiting this initiative.
2021	Tracking Post-Development Stormwater Treatment BMP Inspection and Maintenance (I&M) Activity	The City is taking the lead in managing and administrating a project being funded by and in collaboration with various communities that are part of the Seacoast Stormwater Coalition to develop methods to assist communities in tracking post-development I&M activity for stormwater BMPs on private property that were approved through local site plan regulations and related ordinances. The goal is to ensure that the long-term stormwater treatment performance is maintained through I&M activity and the potential pollutant load reduction credits particularly for redevelopment projects can be tracked and accounted for perhaps through the NHDES/UNH SC PTAP system or an equivalent process. This project builds off an initial pilot study conducted as a student Capstone project done in conjunction with the UNH Engineering Department and UNH Stormwater Center.	TBD	Staff Time	The target completion date is December 2021.	Implement program tracking I&M activity for stormwater BMPs on private property.