TOWN OF SOUTHAMPTON
Department of Community Preservation
24 W Montauk Hwy, Hampton Bays, NY 11946
Ph: 631-287-5720 Fx: 631-728-1920
WWW.SOUTHAMPTONTOWNNY.GOV/CPF

WATER QUALITY IMPROVEMENT PROGRAM

PROPOSAL SUMMARY

Project Applicant: Village of Southampton

Project Title: Phase II Evaluation of Lake Agawam Permeable Reactive Barrier

Project Manager: Gary Goleski

Name	Gary Goleski
Title	Superintendent of Public Works
Organization	Village of Southampton
Address	23 Main Street, Southampton NY 11968
Phone	631-283-0247
Email	ggoleski@southamptonvillage.org

Property Owner (if different from Project Manager organization):

Name	Same
Affiliation	
Mailing Address	
Phone	
Email	

Project Location

Address	Agawam Park
SCTM#(s)	0904015000200022002

Type of Project (check all that apply):

- ☑ **Reduction**
- ☐ **Remediation**
- ☐ **Restoration**

Project Summary: (add text 2-3 Sentences only)

The project is Phase II of a three-phase initiative to develop the information needed to site and design a permeable reactive barrier (PRB) that would provide remediation of groundwater flowing to Lake Agawam.

1. **PROJECT TYPE**
Must meet at least one of the definitions of "Water Quality Improvement Project" per State Law Chapter 551 cited above. Check all that apply.

- ☐ **Wastewater Treatment Improvement Project**
- ☑ **Non-point source abatement and control**
- ☐ **Aquatic habitat restoration**
- ☐ **Pollution prevention**
- ☐ **Operation of Peconic Bay National Estuary Program (Grant Match)**

Note: Monitoring costs are only potentially eligible for CPF funding within Aquatic habitat restoration projects.

2. **PRIORITY AREA(S)**
Priority areas are defined in the Water Quality Improvement Project Plan (WQIPP).

- ☑ **High**
- ☑ **303(d) Impaired**
- ☐ **Medium**
- ☐ **Outside High and Medium priority areas***

*If Outside High and Medium priority areas, explain how the project is relevant to WQIPP goals.

3. **PROJECT DESCRIPTION**

3a. Existing conditions of applicable groundwater/sub-watershed/waterbody and most recent and relevant data available (provide sources).

Lake Agawam is located within the South Shore Estuary Reserve and is included on the 2016 NYS Section 303(d) List of Impaired/TMDL waters. Nitrogen loading occurs predominately through groundwater contamination from sanitary/septic systems. See Attachment 1.

3b. How the proposed solution addresses the issue in the context of Reduction, Remediation and/or Restoration as per the CPF Water Quality Project Plan. Note all remediation and restoration projects must assure that reduction measures are also addressed.

See Attachment 1.

3c. Describe the proposed technology and its demonstrated efficacy in similar settings. May include published data.

See Attachment 1.

3d. How the project supports Town of Southampton, Suffolk County, NYSDEC, Long Island Nitrogen Action Plan (LINAP) or other adopted goals/policies (provide references with pages numbers).

See Attachment 1.

3e. Review the following statements and indicate whether they are applicable to your project. For all "Yes" responses, please indicate how your project addresses the requirements indicated.

Yes	N/A	
☐	☑	**If stormwater system or drainage is proposed:** The project must indicate compliance with the New York State Stormwater Design Manual (2015 and as updated).
☐	☑	**If project is related to farmland**: Describe any Agricultural Stewardship Plan or other long term strategy for Nitrogen abatement.
☐	☑	**If the project is for habitat restoration:** The narrative must address how underlying causes are being ameliorated and expected outcomes for local species populations or other ecological considerations are given.
☐	☑	**If project is a Sewage Treatment Plant (STP) or cluster treatment system:** Fund allocation request is based on cost for reduction of pre-existing conditions and not for purpose of accommodating new density (describe pre-existing density and associated flow (gallons per day) and total projected nitrogen reduction in narrative). Include detailed information on how many homes the system would treat as well as potential for formation of Sewer District, if required by Suffolk County Health Department or Town Law.
☐	☑	**If the project is requesting grant match for the Peconic Estuary Program:** Include information related to funding program source and purpose of application and any relevant items on this checklist. Note: A Town Board resolution will be required in order to encumber matching funds for grant applications.

4. WATER QUALITY BENEFIT

4a. Identify Nitrogen, Pathogen or Pollutant of Concern (POC) including Existing Condition and Target Reduction.

See Attachment 1.

4b. Describe plans for collecting and reporting on water quality over time.

See Attachment 1.

4c. Indicate useful life of proposed technology (must meet or exceed five years).

See Attachment 1.

5. COST FACTORS

5a. Explain how you have confirmed that the proposed budget is reasonable, appropriate and necessary. If available, provide third party estimates or other documentation of how costs were determined.

See Attachment 1.

5b. Describe any matching funds to be provided.

See Attachment 1.

5c. Explain: i. Why project cannot proceed and intended benefits cannot be achieved without external funding. ii. if funds are awarded at a lower level than requested, or if there are cost overruns, explain how the project will proceed.

See Attachment 1.

6. MANAGEMENT, EXPERIENCE, ABILITY

6a. Describe applicant's experience in completing similar projects.

See Attachment 1

6b. Describe community support or opposition to project. If there is opposition, explain how this is to be addressed.

See Attachment 1

6c. Describe any permits needed and time frame/status of approvals. If permits are approved, indicate same.

See Attachment 1

7. MAINTENANCE, MONITORING, EVALUATION

Estimate ongoing maintenance costs and explain how these will be supported. Explain stewardship and monitoring activities planned for ensuring sustainability of the project.

See Attachment 1

8. DURATION OF PROJECT

8a. Provide a projected project timeline. Note: The Committee will only make recommendations for shovel-ready projects that can commence this fiscal year.

See Attachment 1

8b. If project is multi-year or phased, provide a breakdown of budget and milestones for each year and phase.

See Attachment 1

9. ATTESTATION

Allocation of CPF funds will not be for the purpose of accommodating new growth, as this is prohibited by State law.

☑ **Check box to certify that funds will not be directed for projects for the purpose of accommodating new growth.**

Signature: _____ **Date** 8/14/2020

10. REQUIRED ATTACHMENTS

Confirm that the following required documents are attached to this application:

- ☑ Photos of existing conditions
- ☑ Location Map
- ☑ State Environmental Quality Review Act (SEQRA) Long or Short Environmental Assessment Form (EAF) (https://www.dec.ny.gov/permits/6191.html)
- ☑ Completed EPA Spreadsheet Tool for Evaluating Pollutant Load (STEPL) **http://it.tetratech-ffx.com/steplweb/** or similar standardized methodology (describe)
- ☑ Project budget (see attached template)
- ☑ Ownership commitment is provided via letter of intent (LOI) for non-municipal owners or municipal resolution for municipal owners

11. OTHER ATTACHMENTS

List other attachments provided, including cost estimates, bids, plans, documentation of matching funds, and other as appropriate to demonstrate project readiness, quality, feasibility, and cost effectiveness.

See Attachment 1.

VILLAGE OF SOUTHAMPTON

PHASE II EVALUATION OF LAKE AGAWAM PERMEABLE REACTIVE BARRIER

ATTACHMENTS

Attachment 1 – Supplemental Narratives

Budget worksheet

Town of Southampton WQIPP Map/Location Map

SEQRA

Southampton Village Resolution

Support Letters

Cost Estimate – CDM Smith

VILLAGE OF SOUTHAMPTON

PHASE II EVALUATION OF LAKE AGAWAM PERMEABLE REACTIVE BARRIER

ATTACHMENT 1
SUPPLEMENTAL NARRATIVES

Lake Agawam existing conditions – harmful algal bloom.

SECTION 3. PROJECT DESCRIPTION

3a. Existing conditions of applicable groundwater/sub-watershed/waterbody and most recent and relevant data available (provide sources).

Lake Agawam is located within the South Shore Estuary Reserve and is included on the 2016 NYS Section 303(d) List of Impaired/TMDL waters.[1] The Lake Agawam Comprehensive Management Plan (2009) identified groundwater outflows as a key contributor of the excess nutrients that have led to hypereutrophic conditions and past fish kills.[2] A 2017 report prepared by Dr. Christopher Gobler of the Stony Brook University Center for Clean Water Technology (CCWT), titled, "Quantifying Nitrogen Loading to from Southampton Village to Surrounding Water Bodies and their Mitigation by Creating a Sewer District," (2017) indicates wastewater from sanitary/septic systems as the main source of nitrogen loading entering the Lake Agawam watershed.[3]

The Lake Agawam Harmful Algal Bloom Action Plan,[4] adopted April 2020, documents the historic frequency and severity of Harmful Algal Blooms (HABs) from 2013-2019:

Year	Earliest Sample Date	Latest Sample Date	Average of BGA Chlorophyll	Average of microcystin	Number of Confirmed	Number of Confirmed with High Toxins
2013	7/15/2013	10/8/2013	48	15	6	3
2014	5/28/2014	10/14/2014	52	14	15	3
2015	5/3/2015	10/22/2015	218	56	15	8
2016	4/27/2016	1/5/2017	1770	150	17	11
2017	5/8/2017	12/26/2017	270	70	15	17
2018	5/7/2018	10/16/2018	4492	316	7	17
2019	6/17/19	10/30/19	1086	1090	18	18

In September 2018, scientists from Stony Brook University reported that a toxic algae bloom in the lake was the densest growth ever recorded in a Long Island water body.[5] Public health warnings have been issued by the Suffolk County Health Department to urge community members, especially children and pets, to avoid the contaminated water.

A Nitrogen Loading Model prepared by Stony Brook University's CCWT indicates that wastewater from sanitary onsite septic systems (groundwater) contribute the majority of nitrogen loading to the lake as shown in the following figure.

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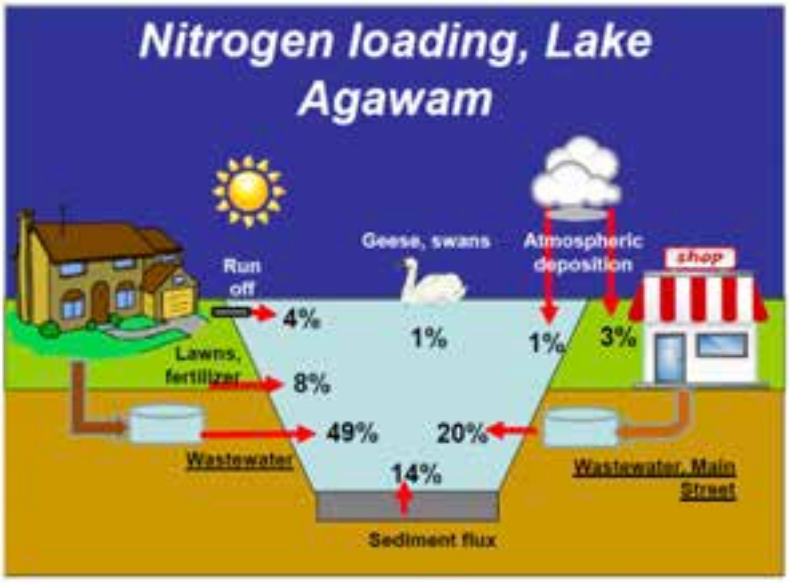
[1] New York State November 2016 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy. https://www.dec.ny.gov/docs/water_pdf/303dListfinal2016.pdf
[2] https://www.southamptonvillage.org/DocumentCenter/View/187/Lake-Agawam-Management-Plan-2009-PDF
[3] https://www.southamptonvillage.org/DocumentCenter/View/188/Lake-Agawam-Water-Quality-Study-Feb-2017PDF
[4] https://www.dec.ny.gov/docs/water_pdf/habapagawam.pdf
[5] http://www.27east.com/news/article.cfm/East-End/570094/Lake-Agawam-Coated-By-Worst-Algae-Bloom-Ever-Recorded-On-Long-Island



Dr. Gobler's report further specifies external sources as the main source of nitrogen loading entering the Lake Agawam watershed, specifically:

- Wastewater from sanitary/septic systems = 70%
- Fertilizer = 8%
- Atmospheric deposition = 4%
- MS4 drain at the north-end of Lake Agawam = 4%

The following photos depict existing conditions of the lake.

Lake Agawam. Source: Dr. Christopher Gobler.

3b. How the proposed solution addresses the issue in the context of Reduction as per the CPF Water Quality Project Plan.

The proposed project is a feasibility study for a Permeable Reactive Barrier (PRB) to be installed at the north end of Lake Agawam. The purpose of the PRB is to reduce pollutant inputs to the lake by filtering nitrogen from groundwater before it reaches the lake. The technology works by installing filtration media in the flow path of contaminated groundwater. The contaminants react with the media inside the barrier to provide passive bioremediation.

The feasibility study is necessary to ensure that the PRB will be designed and sited appropriately to maximize its ability to capture the highest concentrations of nitrogen. The study has been commissioned by the Stony Brook University Center for Clean Water Technology (CCWT) under the guidance of Dr. Gobler and in coordination with the Village of Southampton and community stakeholders. The study will occur across three phases:

- **Phase I: Preliminary PRB Location Evaluation** – this work has begun and is funded by the Lake Agawam Conservancy (LAC). See attached letters from LAC and Dr. Christopher Gobler.

- **Phase II: Collection and Evaluation of Design Considerations** – the subject of this proposal

- **Phase III: PRB Design** – To be funded by a grant awarded to the CCWT

See attached proposal from the engineering firm CDM Smith for a full description of the study. A summary of the study follows.

Phase 1: Preliminary PRB Location Evaluation. This phase will confirm the presence of high nitrogen concentrations in groundwater upgradient of the lake, and provide preliminary data needed to site locations of monitoring wells in Phase 2. Groundwater samples will be collected to a depth of 160 feet or to the salt water interface, whichever is encountered first. Geoprobes will be used at three locations adjacent to north end of the lake, approximately as shown here.

Phase II -Collection and Evaluation of Design Considerations. This second phase of field investigation will build on analyses performed under Phase I and will develop the information needed to support the PRB design. This is the subject of this CPF request and will be comprised of the following tasks:

- Installation of a three well cluster (three well depths) of 2-inch diameter wells at the approximate center of the proposed PRB location. The wells will provide water level measurements, water quality evaluation, and support slug testing and observation of hydrogeologic characteristics.

- Installation of a three well cluster (three well depths) of 1-inch diameter wells to either side of the 2-inch well cluster. These will provide water level measurements, water quality evaluation and provide insight on variations in hydrogeologic characteristics.

- Installation of four additional one-inch piezometers upgradient of the site to support delineation of the water table upgradient of the proposed PRB and to provide calibration data for the groundwater model.

- Survey of the horizontal and vertical locations of the monitoring wells, and a topographic survey of the proposed PRB site to serve as the basemap for design.

- Vertical survey of the monitoring points will be used to provide water levels with respect to mean sea level; depth to groundwater will be measured on a monthly basis for up to a year. A pressure transducer will be installed in one of the wells to measure short term fluctuations in groundwater levels. The transducer will be purchased for the project and ultimately owned by CCWT. The topographic survey will establish the configuration and depth of the PRB on the design documents.

- Slug testing of the two-inch well cluster to assess hydraulic conductivity of the shallow upper glacial aquifer. Slug testing will be used to estimate the hydraulic conductivity in the vicinity of the proposed PRB; this information will be reflected in the groundwater model and will also help to define the necessary hydraulic conductivity of the PRB to create the preferential pathway for groundwater flow. The first round of water quality sampling will be performed; one set of samples will be collected from the well clusters at the proposed PRB site, along with QA/QC samples, will be collected and transported to

Parameter	Field Analysis	Laboratory Analysis
Depth to groundwater (ft)	X	
Dissolved oxygen (mg/L)	X	
Oxidation-Reduction Potential (ORP)	X	
pH	X	
Temperature	X	
Electrical conductance	X	
Total Kjeldahl Nitrogen (TKN,mg/L)		X
Nitrite (NO_2, mg/L)		X
Nitrate (NO_3, mg/L)		X
Ammonia (NH_4, mg/L)		X
Total Nitrogen (TN, mg/L)		X
Total Phosphorus (P, mg/L)		X
Total Organic Carbon (TOC, mg/L)		X
Calcium Carbonate ($CaCO_3$, mg/L)		X
Sulfate (mg/L)		X
Chlorides (mg/L)		X

Pace Analytical, an ELAP-certified laboratory for analysis according to the parameters summarized in the table at right. Method detection limits for each nutrient will be selected based on published half-saturation constants for growth.

- Development of a local groundwater model to guide PRB geometry, including depth. The groundwater model will be based on the existing Suffolk County South Fork model; depending on the results of the well installation, additional model levels may be added to the model to represent locally important stratigraphic layers found during cluster well installation. The model calibration will be confirmed or updated if necessary, based on water levels measured at the new wells. After the calibration is confirmed, the model will be used to represent the local flow field and to guide PRB design (e.g., location and depth). The contaminant transport model will be used to delineate the path of groundwater discharging through the PRB and ultimately to the Lake.

When the drilling and water quality sampling program is complete, CDM Smith will tabulate the results and document them in a memorandum along with recommendations. Phase II results will be summarized in a technical memorandum that will:

- Summarize and document field work;
- Document any changes to the groundwater model and model calibration;
- Summarize recommendations for PRB design including location, depth, and required minimum hydraulic conductivity.

Phase 3: PRB Design
Conceptual design, 60% design, and 100% (final) design, including technical specifications and associated drawings for bidding and construction of the PRB.

3c. Describe the proposed technology and its demonstrated efficacy in similar settings. May include published data.

A PRB is described by the USEPA[6] as a wall created below ground to clean up contaminated groundwater. A PRB is usually built by digging a long, narrow trench in the path of contaminated groundwater flow. The trench is filled with a reactive material to clean up contamination. The exact construction method and design of the Lake Agawam PRB will be determined by feasibility study.

3d. How the project supports Town of Southampton, Suffolk County, NYSDEC, Long Island Nitrogen Action Plan (LINAP) or other adopted goals/policies (provide references with pages numbers).

NYS DEC Lake Agawam Harmful Algal Bloom Action Plan (2020)
The project is directly responsive to the NYSDEC's HABS Action Plan for Lake Agawam. The plan identifies three primary factors that contribute to HABS in the lake:

[6] https://clu-in.org/download/Citizens/a_citizens_guide_to_permeable_reactive_barriers.pdf

- Nitrogen inputs associated with septic system discharge
- Internal loading of legacy nitrogen from in-lake sediments
- Nonpoint source nutrient inputs from the contributing watershed

Evaluation and installation of a PRB are recommended actions in the Lake Agawam HABs Action Plan. The plan was developed by an interagency team and local steering committee that worked cooperatively to identify, assess feasibility and costs, and prioritize both in-lake and watershed management strategies aimed at reducing HABs in Lake Agawam. The team consisted of representatives from the NYSDEC, Town of Southampton, Southampton Village, Lake Agawam Conservancy, consultants, residents and stakeholders. The team developed a list of priority actions intended to address watershed inputs that influence in-lake conditions that support HABs.

The plan offers three prioritized project lists. Priority List 1 indicates thirteen short-term projects. The proposed project is supported by item 2.b as follows:

> *2. Complete a full-scale groundwater study to assess the sources and levels of pollutants entering Lake Agawam via groundwater intrusion. This study would establish the flow to and from Lake Agawam to better define source nitrogen in groundwater that impacts the Lake. Hydraulic gradient and water quality monitoring wells would be placed in strategic locations at the head of and around the Lake, including multiple depth wells, to determine flow and water quality.*
>
> *a. Coordinate with USGS, or other qualified private entity for implementation of study, including seasonality (i,e., 1 year of study).*
>
> *b. Evaluate installation of permeable reactive barrier.*

Installation of the PRB is recommended as the first priority medium-term action.

Town of Southampton Water Quality Improvement Project Plan (WQIPP):
Project will benefit Agawam Lake, which is located in a High Priority Area as defined in WQIPP maps (p. 53).

Suffolk County Subwatershed Plan[7]
Lake Agawam is discussed as a water body that has experienced freshwater Harmful Algal Blooms (HABs), and is indicated as a Priority 1 subwatershed for nitrogen reduction via wastewater management (p. 2-74). While the Village is actively investigating wastewater management options relating to onsite septic systems, the PRB is a feasible near-term action that will improve water quality.

Suffolk County Water Resources Management Plan[8]
The proposed project supports Nitrogen recommendation 1.15, Seek ways to remediate existing nitrogen pollution and its impacts. Recommendation 1.15.d. specifically calls for installation of PRBs.

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[7] https://suffolkcountyny.gov/Portals/0/formsdocs/planning/CEQ/2020/RevisedComplete%20SWP2-21-20.pdf

[8] https://www.suffolkcountyny.gov/Portals/0/FormsDocs/Health/EnvironmentalQuality/ComprehensiveWaterResourceManagementPlan/Section%209%20Plan%20Implementation.pdf

4. WATER QUALITY BENEFIT

4a. Identify Nitrogen, Pathogen or Pollutant of Concern (POC) including Existing Condition and Target Reduction.

The key POC is Nitrogen in groundwater flows that have been contaminated by onsite septic systems.

The current Waterbody Inventory/Priority Waterbodies List (WI/PWL) assessment for Lake Agawam reflects monitoring data collected in 2015. Lake Agawam is assessed as an impaired waterbody for recreational uses, and stressed for aquatic life uses, due to HABs and nutrients (phosphorus and low dissolved oxygen).

Metrics for POC reduction relative to the PRB will be developed by the engineering firm CDM Smith during the design process.

4b. Describe plans for collecting and reporting on water quality over time.

The CCWT, under the direction of Dr. Gobler, will continue to perform monitoring of Lake Agawam.

4c. Indicate useful life of proposed technology (must meet or exceed five years).

The projected useful life of a PRB in this location is over 20 years.

5. COST FACTORS

5a. Explain how you have confirmed that the proposed budget is reasonable, appropriate and necessary. If available, provide third party estimates or other documentation of how costs were determined.

The proposed budget was prepared by the firm CDM Smith in consultation with Dr. Gobler of CCWT. See attached.

5b. Describe any matching funds to be provided.

$47,400 has been pledged by the Lake Agawam Conservancy for the Phase I PBR study. $66,300 has been awarded to CCWT for Phase III. See letters from LAC and Dr. Gobler.

5c. Explain: i. Why project cannot proceed and intended benefits cannot be achieved without external funding. ii. if funds are awarded at a lower level than requested, or if there are cost overruns, explain how the project will proceed.

The Village has invested and continues to invest substantial funding to complete numerous water quality improvement initiatives throughout the Village over the past 10+ years. Becase its funding needs far outweigh available local resources, the Village has attempted to leverage Suffolk County, Community Preservation Fund (CPF), NYS, local, and other sources whenever possible. If funds are not awarded by CPF, or are awarded at a lower level than

requested, the project may be delayed due to the need to identify alternate sources of funding. Due to the budgetary impacts of the COVID-19 pandemic, other external County or State funding sources are uncertain at this time.

If cost overruns occur, these will be the responsibility of the Center for Clean Water Technology. The Village's commitment to the feasibility study is limited to the projected project cost detailed in this proposal. However, in the interest of seeing the project through to completion, the Village will continue to partner with CCWT to minimize the impact of cost overruns whenever possible.

6. MANAGEMENT, EXPERIENCE, ABILITY

6a. Describe applicant's experience in completing similar projects.

Gary Goleski, Superintendent of Public Works, will perform the role of Project Manager. He has a degree in Public Sector Management from Cornell University and has been with the Village for more than 25 years. His educational and experiential background make him well qualified to oversee successful implementation of the proposed project.

Under Mr. Goleski's direction, the Village has successfully administered several Suffolk County and CPF water quality grant awards in compliance with County and CPF requirements. Mr. Goleski will provide direction and oversight to the Village's grants coordinator who will assist with administration and grant compliance activities.

The project will be coordinated with the Stony Brook University Center for Clean Water Technology (CCWT), whose core mission is to marshal the public and private-sector resources of New York State and beyond to develop water quality restoration and protection technologies. For the purpose of this project, CCWT will partner with the Village by acting as technical experts, and will conduct all water quality monitoring. CCWT has designed and installed PRB's that remove more than 90% of nitrogen from groundwater before it discharges into surface waters and as such will work with the engineering consultant to bring similar solutions to Lake Agawam.

6b. Describe community support or opposition to project. If there is opposition, explain how this is to be addressed.

The Village and the Lake Agawam Conservation Association invested in preparing the Lake Agawam CMP which documented the Lake's ongoing water quality issues and provided evidence based recommendations for corrective action. The CMP received broad public support. More recently, the Village partnered with DEC, Town, CCWT and community stakeholders to develop the HABs action plan, which was also strongly supported by the community.

No community opposition to this project has been recorded.

See attached support letter from LAC.

6c. Describe any permits needed and time frame/status of approvals. If permits are approved, indicate same.

As a planning project, no permits are required. Permitting requirements for the PRB will be addressed during the design process.

7. MAINTENANCE, MONITORING, EVALUATION
Estimate ongoing maintenance costs and explain how these will be supported. Explain stewardship and monitoring activities planned for ensuring sustainability of the project.

The design process will encompass maintenance, monitoring and evaluation needs for the PRB. These costs will be supported by the Village following implementation.

Stewardship, monitoring, enforcement protocols: To comply with CPF requirements, a plan for data collection and reporting will be established in cooperation with the Town should CPF funds be awarded. Existing ongoing water quality monitoring efforts will be leveraged to support his requirement.

8. DURATION OF PROJECT

8a. Provide a projected project timeline.

- **Phase I: Preliminary PRB Location Evaluation** – this work has begun and is expected to be completed by October 30, 2020.

- **Phase II: Collection and Evaluation of Design Considerations** – the expected duration is five (5) months, beginning November 2020 and completing by March 31, 2021.

- **Phase III: PRB Design** – To begin April 2021, and be completed by November, 2021.

8b. If project is multi-year or phased, provide a breakdown of budget and milestones for each year and phase.

See 8a.

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COMMUNITY PRESERVATION FUND (CPF) WATER QUALITY IMPROVEMENT PROGRAM BUDGET PROPOSAL

PLANNING/ENGINEERING/DESIGN	Town CPF Request	Matching Funds Committed	Matching Funds Pending	Estimated Total Project Costs
In-house labor (provide separate sheet with calculations)				
Task 1-	$-	$-	$-	$-
Task 2-	$-	$-	$-	$-
Task 3-	$-	$-	$-	$-
Task 4-	$-	$-	$-	$-
Task 5-	$-	$-	$-	$-
Task 6-	$-	$-	$-	$-
	$-	$-	$-	$-
In House Labor Total	**$-**	**$-**	**$-**	**$-**

Materials/Supplies				
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
Materials/Supplies Total	**$-**	**$-**	**$-**	**$-**

Contractual Services				
Professional Engineering – Phase I	**$-**	**$47,400**	**$-**	**$47,400**
Professional Engineering – Phase II	**$134,250**	**$-**	**$-**	**$134,250**
Professional Engineering – Phase III	**$-**	**$66,300**	**$-**	**$66,300**
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
	$-	**$-**	**$-**	**$-**
Contractual Services Total	**$134,250**	**$-113,700**	**$-**	**$247,950**

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ENGINEERING TOTAL	$-	$-	$-	$-
CONSTRUCTION AND SITE IMPROVEMENTS	**Town CPF Request**	**Matching Funds Committed**	**Matching Funds Pending**	**Estimated Total Project Costs**
In-house labor (provide separate sheet with calculations)				
Task 1-	$-	$-	$-	$-
Task 2-	$-	$-	$-	$-
Task 3-	$-	$-	$-	$-
Task 4-	$-	$-	$-	$-
Task 5-	$-	$-	$-	$-
Task 6-	$-	$-	$-	$-
	$-	$-	$-	$-
In House Labor Total	$-	$-	$-	$-

Equipment/Materials/Supplies				
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
Equipment/Materials/Supplies Total	$-	$-	$-	$-

Contractual Services				
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
	$-	$-	$-	$-
Contractual Services Total	$-	$-	$-	$-

ENGINEERING TOTAL	$134,250	$-113,700	$-	$247,950

Total Project Cost	$247,950
Total CPF Funds Requested	$134,250

Applicant matching funds committed	$113,700
Applicant matching funds pending approval (e.g. grant request submitted pending determination)	$-

Source of matching funds	Amount
Lake Agawam Conservancy	$47,400
CCWT – Grant award from NYS Smart Cities	$66,300

Town of Southampton CPF Water Quality Improvement Project Plan

VILLAGE OF SOUTHAMPTON

Project Location
Agawam Lake

High Priority Area
Medium Priority Area
NYS DEC 303d Impaired Waterbodies (2014)
Protected/ Public Parcels

0 1,850 3,700 7,400 Feet

N
W E
S

Suffolk County Real Property Tax Service
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Prepared By:The Town of Southampton Dept of Geographic Information Systems Date: 7/5/2016 - MAP ID: 2514

VILLAGE ENVIRONMENTAL PLANNER
23 Main Street
Southampton, NY 11968
(631) 283-0247

NELSON, POPE & VOORHIS, LLC
70 Maxess Road
Melville, NY 11747
(631) 427-4665

MEMORANDUM

To: Jesse Warren, Mayor and Village Trustees
cc: Brian T. Egan, Esq., Village Attorney
From: Kathryn J. Eiseman, AICP
Date: August 11, 2020
Re: **Phase II Permeable Reactive Barrier Study for Lake Agawam**

Based upon our review of the proposed action referenced above and the scope of work provided by CDM Smith dated March 27, 2020, the action involves Phase II of a study to further identify environmental conditions for the purposes of determining the design of a Permeable Reactive Barrier (PBR) to protect water quality in Lake Agawam. SEQRA regulations were reviewed and based on the following subsection of Part 617, **the proposed second phase of the study may be classified as a Type II Action**, and therefore, does not require review under SEQRA at this time.

> *6 NYCRR Part 617 (SEQR), Subsection 617.5(24: Information collection including basic data collection and research, water quality and pollution studies, traffic counts, engineering studies, surveys, subsurface investigations and soils studies that do not commit the agency to undertake, fund or approve any Type I or Unlisted action*

Please note that this assessment is for Phase II of the study only. Although the current action is considered a Type II action, the implementation of the project does not fall under SEQRA's definition of green infrastructure which would otherwise make implementation of the water quality improvement structure a Type II action:

> "Green infrastructure" means practices that manage storm water through infiltration, evapotranspiration and reuse including only[1] the following: the use of permeable pavement; bioretention; green roofs and green walls; tree pits and urban forestry; storm water planters; rain gardens; vegetated swales; downspout disconnection; or storm water harvesting and reuse.

NPV recommends that further assessment be made once the PRB has been designed and its exact size and location identified to 1) determine if the implementation project is an Unlisted or Type I action, and 2) provide the necessary information needed to conduct an environmental assessment as necessary.

[1] emphasis added

Village of Southampton

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STATE OF NEW YORK)
ss:
COUNTY OF SUFFOLK)

This is to certify that the following is a true, accurate, and complete copy of a resolution which was adopted by the Board of Trustees of the Village of Southampton on August 13, 2020. The original of this resolution is on file in the Clerk's office in Village Hall, 23 Main Street, Southampton, N.Y. 11968.

RESOLVED, that the Board of Trustees hereby declares the Village of Southampton's commitment to carry out the following projects subject to funding approval by the Town of Southampton Community Preservation Fund (CPF), and approves submission of requests for funding to CPF for the following projects:

Old Town Pond Green Infrastructure
Permeable Reactive Barrier Phase II Feasibility Study
Village-Wide Watershed Management Plan

On a roll call vote the resolution was unanimously approved.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Village of Southampton this 14th day of August, 2020.

Russell A Kratoville
Village Administrator
Incorporated Village of Southampton

LAKE AGAWAM
CONSERVANCY

August 17, 2020

Southampton Town Water Quality Advisory Committee

Dear Committee members:

On behalf of the Lake Agawam Conservancy, we write to provide our strong support for the Village of Southampton's grant application to the CPF Water Quality Improvement Program for the PRB site characterization at Lake Agawam Park. The Conservancy is a registered 501(c)(3) nonprofit made up of local residents whose mission is to protect and preserve the water quality and ecosystem of Lake Agawam.

This freshwater lake is the heart and soul of the Village and its humble beginnings as the 'Town Pond' is connected to the very beginning of the Southampton Colonial settlement prior to the birth of America. Over the years, this precious jewel has been compromised by nitrogen and phosphorus inputs from sanitary systems and lawn chemicals throughout its large watershed along with stormwater pathogens and pesticides.

Lake Agawam is now in dire need of remediation. The Lake drains directly into the Atlantic Ocean- another important natural and recreational resource.

Through the Harmful Algal Bloom (HAB) Task Force, the Conservancy has been working together with the Village of Southampton, the Town Trustees, and the NYSDEC to formulate several near term and long-term priorities and action items that will help restore Lake Agawam. One of the main priorities identified by the Task Force is to prevent the intensity and duration of cyanobacterial blooms from occurring in the Lake, especially since the *microcystin* toxin that is a byproduct of this deteriorated system can have serious health consequences.

To demonstrate our commitment, the Conservancy has funded the placement of a real-time telemetry buoy in Lake Agawam in order to monitor water quality and have a tool for measuring success. As a private match to the Village's application, the Conservancy will fund for $47,400 Phase I of the PRB Study (monitor well drilling and placement) so that the PRB site characterization component can proceed in the hopes that the PRB can be installed in the short term.

The Conservancy recognizes that the ongoing inputs to Lake Agawam are of the utmost concern and have sponsored educational programs for local landscapers and homeowners to reduce the use of toxic landscape chemicals. In addition, we are planning an aggressive campaign to replace conventional sanitary systems with Innovative/Alternative denitrification systems, but we need the PRB to provide an important stopgap while the Village creates a sewer district and homeowners upgrade their systems. The Conservancy has also funded the installation of a bioswale at the south end of the Lake to filter stormwater prior to its entry into the Lake.

We are committed to these types of aquatic restoration initiatives for this waterbody but need the Town's CPF partnership with us and the Village/Trustees in order to truly bring this ecosystem back to life. Funding from the CPF Water Quality Program is important as it shows a local commitment that is responsive to our efforts and helps us to raise additional funds to continue this important work. We therefore respectfully request your recommendation for CPF funding of the Village's application.

Thank you for your consideration,

Robert Giuffra, President
Lake Agawam Conservancy, Inc.

LAKE AGAWAM CONSERVANCY

10 August 2020

Gary J. Goleski
Superintendent
Department of Public Works
Village of Southampton
Phone: 631-283-4269

Dear Gary,

This letter is to affirm that on July 31st, 2020, Lake Agawam Conservancy sent a check to CDM Smith for $47,400 to begin (Phase I) of the groundwater and permeable reactive barrier study of Lake Agawam. Moreover, I have secured a grant from New York Smart Cities Innovation Partnership to fund phase III of the study. As such, the Village is responsible for funding phase II of the study as proposed by CDM Smith. It would seem CPF funds would be an ideal solution for funding that aspect. Good luck with your application.

Sincerely,

Christopher J. Gobler, Ph.D.
Science Advisor, Lake Agawam Conservancy
Professor, School of Marine and Atmospheric Sciences, Stony Brook University
Southampton, NY 11968
631-632-5043,
Christopher.gobler@stonybrook.edu

CDM Smith

60 Crossways Park Drive West, Suite 340
Woodbury, New York 11797
tel: 516 496-8400

March 27, 2020

Village of Southampton, Lake Agawam Conservation Association
Care/of:
Dr. Christopher Gobler
Director, Center for Clean Water Technology
Advanced Energy Research & Technology Center
Stony Brook University
1000 Innovation Road, Suite 100
Stony Brook, NY 11794

Subject: Lake Agawam – Revised Proposal to Evaluate Proposed Permeable Reactive Barrier

Dear Dr. Gobler:

Camp Dresser McKee & Smith (CDM Smith) is pleased to provide this proposal to develop the information required to site and design a permeable reactive barrier (PRB) in the park on the north side of Lake Agawam. Based on previous experience at other potential PRB locations, CDM Smith proposes to conduct the evaluation in phases to confirm that the location is suitable for PRB siting based on site-specific groundwater quality and hydrogeologic characteristics before investing significant resources in PRB site assessment and design.

Phase I – Preliminary PRB Location Evaluation

The objective of the Phase I investigations is to confirm high nitrogen concentrations in groundwater upgradient of the lake, to site locations for monitoring wells and identify the required depth of the PRB.

Phase I would consist of:

- Project kick-off meeting and coordination
- Based on regional groundwater model simulations indicating that the groundwater flow from developed areas upgradient of the Lake Agawam Park may have a strong vertically downward gradient, vertical profiles of groundwater quality will be developed to a depth of 160 feet below grade or the salt-water interface, whichever is encountered first. Groundwater samples will be collected in ten-foot increments to a depth of 160 feet. Three profiles will be collected across the span of the proposed location of the PRB; from west to east.

- Up to f 48 samples (16 from each profile) will be collected utilizing Geoprobe direct push rods. Land, Air, Water Environmental Services, Inc. (LAWES) a local WBE driller, will conduct the profiling under the supervision of D. B. Bennett Engineering

- Samples will be collected and transported to Pace Analytical, an ELAP-certified laboratory for nitrate analysis. Field parameters will also be measured at each profile depth (Table 1). One duplicate sample will be collected for each profile for quality assurance.

Table 1 Groundwater Screening Parameters

Parameter	Field Analysis	Laboratory Analysis
Dissolved oxygen (mg/L)	X	
Oxidation-Reduction Potential (ORP)	X	
pH	X	
Temperature	X	
Specific conductance	X	
Nitrate (NO_3, mg/L)		X

Measured concentrations of nitrate will be used to confirm that the location is appropriate for siting a PRB and to identify the depth(s) where the highest nitrogen concentrations are found. Before Phase II is initiated, the data should confirm that the PRB should be capable of removing a significant portion of nitrogen from the groundwater prior to discharge to the Lake. The extent of nitrogen removal will depend on the nitrogen concentrations and the PRB design will be based on the depth of elevated nitrogen. CDM Smith will present water quality results and discuss PRB options at a meeting with the Center for Clean Water Technology (CCWT) and other collaborators (to be determined by CCWT)

If nitrate concentrations support the need for a PRB at this location, the project will proceed to Phase II for additional data collection for design. The estimated cost to complete Phase I is $47,400. Phase I is anticipated to be completed within two months of notice to proceed.

Phase II – Collection and Evaluation of Design Considerations

If the water quality results and observation of subsurface hydrogeologic properties indicate that the Lake Agawam Park location would be appropriate to site a PRB, the second phase of field investigation will be initiated to develop the information needed to support the CCWT's design. Phase II would include:

- Installation of a three well cluster (three well depths) of 2-inch diameter wells at the approximate center of the proposed PRB location. The well cluster will serve four purposes:

- Water level measurement to assess vertical gradients and to provide groundwater model calibration points;
- Water quality evaluation to assess nitrogen and other constituent concentrations and the variation in nitrogen concentrations with depth;
- Slug testing, and
- Observation of hydrogeologic characteristics (sediment cores).

- Installation of a three well cluster (three well depths) of 1-inch diameter wells to either side of the 2-inch well cluster. The well clusters will serve three purposes:
  - Water level measurement to assess vertical gradients and to provide groundwater model calibration points;
  - Water quality evaluation to assess nitrogen concentrations upgradient and downgradient of the proposed PRB (Table 2). Water quality samples will be collected during a baseline and these wells will ultimately be incorporated into long term monitoring plans, and
  - Observation of variation in hydrogeologic characteristics.
- Installation of four additional one-inch piezometers upgradient of the site to support delineation of the water table upgradient of the proposed PRB and to provide calibration data for the groundwater model.
- Survey of the horizontal and vertical locations of the monitoring wells, and a topographic survey of the proposed PRB site to serve as the basemap for design (Phase III). The topographic survey will include the area within a 100-foot radius of the PRB and the top of casing and coordinates for monitoring wells will also be surveyed.
- Vertical survey of the monitoring points will be used to provide water levels with respect to mean sea level; depth to groundwater will be measured on a monthly basis for up to a year. A pressure transducer will be installed in one of the wells in the Park to measure short term fluctuations in groundwater levels. The transducer will be purchased for the project and ultimately owned by CCWT. The topographic survey will establish the configuration and depth of the PRB on the design documents.
- Slug testing of the two-inch well cluster to assess hydraulic conductivity of the shallow upper glacial aquifer. Slug testing will be used to estimate the hydraulic conductivity in the vicinity of the proposed PRB; this information will be reflected in the groundwater model and will

also help to define the necessary hydraulic conductivity of the PRB to create the preferential pathway for groundwater flow.

- The first round of water quality sampling will be performed; one set of samples will be collected from the well clusters at the proposed PRB site, along with QA/QC samples, will be collected and transported to Pace Analytical, an ELAP-certified laboratory for analysis according to the parameters summarized in Table 2 below. Method detection limits for each nutrient will be selected based on published half-saturation constants for growth.

Table 2 Groundwater Sampling for Phase II

Parameter	Field Analysis	Laboratory Analysis
Depth to groundwater (ft)	X	
Dissolved oxygen (mg/L)	X	
Oxidation-Reduction Potential (ORP)	X	
pH	X	
Temperature	X	
Electrical conductance	X	
Total Kjeldahl Nitrogen (TKN,mg/L)		X
Nitrite (NO_2, mg/L)		X
Nitrate (NO_3, mg/L)		X
Ammonia (NH_4, mg/L)		X
Total Nitrogen (TN, mg/L)		X
Total Phosphorus (P, mg/L)		X
Total Organic Carbon (TOC, mg/L)		X
Calcium Carbonate ($CaCO_3$, mg/L)		X
Sulfate (mg/L)		X
Chlorides (mg/L)		X

- Development of a local groundwater model to guide PRB geometry, including depth. The groundwater model will be based on the existing Suffolk County South Fork model; depending on the results of the well installation, additional model levels may be added to the model to represent locally important stratigraphic layers found during cluster well installation. The model calibration will be confirmed or updated if necessary, based on water levels measured at the new wells. After the calibration is confirmed, the model will be used to represent the local flow field and to guide PRB design (e.g., location and depth). The

contaminant transport model will be used to delineate the path of groundwater discharging through the PRB and ultimately to the Lake.

When the drilling and water quality sampling program is complete, CDM Smith will tabulate the results and document them in a memorandum along with recommendations. The draft memorandum will be discussed via net-meeting with CCWT.

Phase II results will be summarized in a technical memorandum that will:

- Summarize and document field work;
- Document any changes to the groundwater model and model calibration;
- Summarize recommendations for PRB design including location, depth, and required minimum hydraulic conductivity.

The cost of Phase II is estimated at $134,250 based on estimated well depths of approximately 100 feet below grade. The cost may be updated following Phase I, after a better understanding of water quality and PRB concepts are obtained.

Phase III – PRB Design

The design task includes three phases: conceptual design, 60% design, and 100% (final) design. It is assumed that CDM Smith's scope of work includes development of technical specifications and associated drawings for the construction of the PRB. Front-end documents and bidding are not included. The design documents will include the location and dimensions of the PRB, the installation method, and the components and mixture ratios to be used for the PRB media. One conference call with the Village and the Lake Agawam Conservation Association is included following 60% design. One meeting is included with the Village and the Lake Agawam Conservation Association following 100% design. In attendance at the meeting will be the project manager (Dan O'Rourke), technical advisor (Mary Anne Taylor) and the project engineer (Kimberly Kaster); the project's lead practitioner will participate by phone.

The cost of phase III is estimated to be $66,300.

Assumptions
The project costs and schedule estimates assume that:

- All existing groundwater and surface water quality data will be made available;
- Access to the proposed PRB location will be provided for well drilling, sampling, slug testing and surveying;

- Drill cuttings will be raked into the ground at the site, and the water generated during well development and slug testing will be discharged to the ground surface (but far enough away to avoid impacting water levels and slug test results). Disposal of drill cuttings by a waste contractor is not included.

Cost and Schedule

The cost to complete Phase I of this evaluation is estimated to be $47,400 and it is anticipated that the initial Phase I evaluation can be completed within two months of contract execution.

The estimated cost to complete Phase II of this evaluation is estimated to be $134,250 and it is anticipated that it can be completed within five months of contract amendment execution.

The estimated cost to complete Phase III of this evaluation is estimated to be $66,300 and it is anticipated that it can be completed within eight months of contract amendment execution.

It should be noted that without knowledge of the specific PRB system, these preliminary costs will require some adjustment but are not expected to increase or decrease by more than 15%.

Thank you for the opportunity to continue to participate in this very interesting project. Please feel free to contact Mary Anne Taylor at (516)-496-8400 if you have any questions or need additional information.

Sincerely,

Keith F. Kelly, P.E.
Partner
Camp Dresser McKee & Smith

cc: B. Brown
D. O'Rourke
M. Taylor