

Performance Work Statement (PWS)

for

Application of Technical Approach for Establishing Nitrogen Thresholds and Allowable Loads for Three LIS Watershed Groupings: Embayments, Large Riverine Systems and Western LIS Point Source Discharges to Open Water

U.S. EPA, TSAWP Multiple-Award Contracts
TASK ORDER 0xx

May 31, 2016

Revised June 20, 2016 and August 31, 2016

I. Objective

The objective of this performance work statement (PWS) is to assist EPA in the application and refinement of a technical approach (methodology) for establishing nitrogen thresholds and allowable loads consistent with achieving desired water quality conditions and uses. The work will be organized by three watershed groupings (Embayments, Large Riverine Systems and Western LIS Point Source Discharges to Open Water) in Long Island Sound. This technical approach would then be used to calculate allocations for watersheds, with an initial focus on embayments.

II. Background

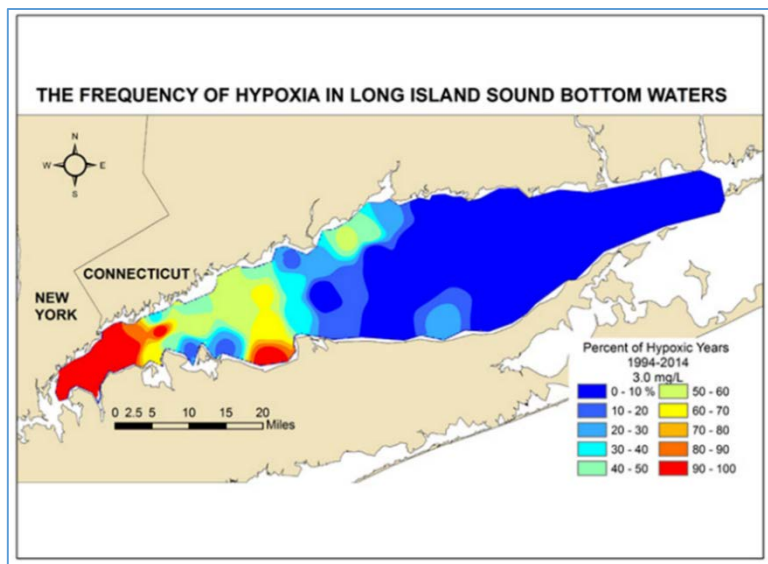


Figure 1. Hypoxia can affect as much as half of LIS.

Hypoxia, defined as dissolved oxygen (DO) levels of less than 3 mg/l, is a common occurrence in Long Island Sound (LIS) bottom waters during the summer, affecting up to half of its area in some years (Figure 1). In LIS, nitrogen is the primary limiting nutrient for algal growth. Impairments linked to excess discharges of nitrogen (N) include harmful algal blooms, low DO, poor water clarity, loss of submerged aquatic vegetation and tidal wetlands, and coastal acidification.

The Long Island Sound Study (LISS) has focused on understanding the drivers to hypoxia and developing tools to support

N management. The LISS developed and, in 1998, adopted a plan entitled Phase III Actions for Hypoxia Management that identified the sources and loads of N to LIS and recommended N reduction targets.

In 2000, Connecticut and New York incorporated these targets into a Total Maximum Daily Load to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound (LIS TMDL). The LIS TMDL

allocated a 58.5 percent N reduction to in-basin sources of enriched N (with a 10 percent reduction allocated to nonpoint sources and the remainder assigned to point sources). In addition, the LIS TMDL identified actions and schedules to reduce N from tributary sources (25 percent reduction to point sources, 10 percent reduction to nonpoint sources) and atmospheric sources (an 18 percent reduction), and to implement non-treatment alternatives (e.g. bioextraction, aeration, etc.) necessary to fully attain DO water quality standards.

Based on monitoring and modeling efforts to this day, current and planned actions by the States are expected to fall short of fully implementing the 2000 TMDL and will be insufficient to address other adverse impacts to water quality in Long Island Sound, and its embayments and near shore coastal waters.

EPA has developed a Nitrogen Reduction Strategy (Strategy)¹ to aggressively continue progress on nitrogen reductions - in parallel with the States' continued implementation of the 2000 TMDL - and achieve water quality standards throughout Long Island Sound and its embayments and near shore coastal waters. The strategy recognizes that more work must be done to reduce nitrogen levels, further improve DO conditions, and address other nutrient-related impacts in Long Island Sound. EPA's Strategy expands the focus of the 2000 TMDL to include other nutrient-related adverse impacts to water quality, such as loss of eelgrass, that affect many of LIS's embayments and near shore coastal waters. Expanding the focus in this way will help restore and protect these important habitats from a range of nutrient-caused impairments, ensuring that water quality standards are achieved in near shore waters as well as supporting the attainment of water quality standards in the open water portion of the Sound.

The Strategy is organized by the three customized watershed groupings: Embayments, Large Riverine Systems and Priority Western LIS Point Source Discharges to Open Water. Common to each grouping is the need to:

- develop nitrogen thresholds that will translate the narrative water quality standard into a numeric target,
- identify where nitrogen watershed loading results in threshold exceedances, and
- assess options for the load reductions from point and nonpoint sources that would be needed to remain below thresholds.

Nitrogen loads will need to be customized for each watershed grouping and a specific allocation proposed for priority embayments/subwatersheds. Customizing the application of nitrogen thresholds for each grouping recognizes their distinct watershed and receiving water characteristics.

¹ The NRS is available at: <http://longislandsoundstudy.net/issues-actions/water-quality/nitrogen-strategy/>

III. Performance Work Statement

Task 0: Work Plan and Budget Development

The Contractor shall prepare a detailed work plan and budget response to the following work scope describing its proposed approach to completing all of the tasks in this PWS. Its response shall include a description of all assumptions and contingencies made by the Contractor, a proposed schedule including a list of deliverables with due dates and schedule for deliverables, an estimated budget, and special reporting requirements (if any). The Contractor's response will include a description of proposed staff and the number of hours and labor classifications proposed for each task.

This Task Order includes work to be conducted in two terms: a **Base Period** (September 30, 2016 through September 29, 2017) and an **Option Period 1** (September 30, 2017 through March 27, 2018 (contract vehicle expiration). Work to be conducted in the Base Period includes: Task 1, Task 2 and Task 3 for Primary Tier Watershed Groupings. Work to be conducted in Option Period 1 includes: Task 1B (as appropriate) and Task 3B for completion of work not conducted in the Base Period for Primary Tier Watershed Groupings, and the Secondary Water Shed Groupings. Additional clarification is provided in Section IV and Table 1 (Schedule and Deliverables).

Task 1: Project Management and Administration

This task includes subtasks related to administration, management and coordination of the project.

EPA's Project Team will consist of:

- **Leah O'Neill**, EPA Region 1, Project Team Leader (oneill.leah@epa.gov; 617.918.1633)
- **Mark Tedesco**, EPA LIS Office, Project Technical Lead (tedesco.mark@epa.gov; 203.977.1542)
- **David Pincumbe**, Project Technical Advisor (pincumbe.david@epa.gov; 617.918.1695)
- **Bob Nyman**, Project Technical Advisor, (nyman.robert@epa.gov; 212.637.3809)

The Project Team will be coordinating with multiple stakeholders, including, but not limited to, the Connecticut Department of Energy and Environmental Protection (CTDEEP), New York State Department of Environmental Conservation (NYSDEC), Massachusetts Department of Environmental Protection (MassDEP), New Hampshire Department of Environmental Services (NHDES), Vermont Department of Environmental Conservation (VTDEC), New England Interstate Water Pollution Control Commission (NEIWPCC), Connecticut River Watershed Council (CRWC), other local watershed groups, and additional partners where appropriate as determined by Project Team Leader.

The Project Team Leader will convene a Technical Advisory Group to consist of qualified stakeholders that will assist the Project Team. A primary responsibility of the Project Team Leader will be coordinating with all stakeholders. The Contractor shall provide assistance to the Project Team Leader as generally described herein.

All correspondence (emails, reports, etc.) shall be addressed to the members of the Project Team, but directed to the attention of the Project Team Leader; the Project Team Leader will be responsible for forwarding all correspondence to the Project Team. **Ray Cody** will serve as the Task Order Contracting Officer Representative (TOCOR; formerly, Task Order Project Officer (TOPO)). Except as provided (e.g., Task 2: QAPP), the Contractor shall copy (i.e., cc) the TOCOR on all correspondence.

Provisions for Deliverables are generally set forth under Section 4.0 of Attachment 1 of the *Technical Support for Assessment and Watershed Protection (TSAWP) PWS*. To the extent the following is not inconsistent with Section 4.0, EPA intends to provide any and all formal reports produced under this contract for public dissemination, in whole or in derivative documents, as appropriate. The Contractor shall always provide draft versions of any spreadsheets, calculations or reports. EPA and its stakeholders may review and comment on draft deliverables / submittals. If so, then the Contractor shall incorporate any such comments into a final version(s). For communiques and reports, the Contractor shall use standard computer software (e.g., Adobe Acrobat, MS Word, MS Excel, MS PowerPoint). All other software (e.g., computer models) must utilize publically-available non-proprietary code. In addition, software application files, if delivered to the Government, must conform with Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794(d)).² Refer to <http://www.section508.gov/>, Section (c) under C-1 of the TSAWP Multiple Awardee Contract and Sections 2.5.3.4 and 4.3.7 of Attachment 1 of the TSAWP PWS.

Provisions for invoicing are generally set forth under Section G of the TSAWP Multiple Award Contract, entitled LOCAL CLAUSES 1552.232-70 SUBMISSION OF INVOICES (JUN 1996) DEVIATION. To the extent the following is not inconsistent with Section G, then to ensure timely administration, invoices shall be submitted promptly within the first week of each calendar month. Invoices shall be directed to the TOCOR. The TOCOR will distribute as appropriate to the Project Team Leader and/or the Project Team for review and consideration, as appropriate. Invoices shall, among other things, summarize the Contractor's work for the billing month, project anticipated work for the next billing period(s), identify and anticipate any problems that may impact the project or its schedule, and specify and identify the billable hours and other direct costs on a Task and Subtask basis. In its response to this PWS, the Contractor may add one or more specific Subtasks or line items under this Task for its general administration of the project.

Subtask 1A. Kickoff Meeting

The contractor shall initiate a project kick-off meeting with the project team at EPA's Long Island Sound Office (LIS Office) located at Stamford Government Center, 888 Washington Boulevard; Suite 9-11, Stamford, CT 06904-2152.³ For this meeting and because of the scope and complexity of the project generally, the Contractor shall presume travel, lodging, logistics and coordination for managerial and technical personnel at a full day meeting. For this meeting, EPA will make available any additional technical references or other supplemental data or information that may assist the Contractor.

² In 1998, Congress amended the Rehabilitation Act of 1973 to require Federal agencies to make their electronic and information technology (EIT) accessible to people with disabilities. The law applies to all Federal agencies when they develop, procure, maintain, or use electronic and information technology. Under Section 508, agencies must give disabled employees and members of the public access to information that is comparable to access available to others.

³ Directions to EPA's LIS Office: <http://longislandsoundstudy.net/about/contact-us/directions/>

A week following this meeting, the contractor shall summarize its understanding of the project kick-off meeting (e.g., action items; scheduling adjustments) and transmit these by email to the EPA Project Team Leader for distribution to the Project Team.

Subtask 1A Deliverables

- Kickoff meeting within one (1) month of Task Order issuance.
- Kickoff meeting summary (incl. action items, scheduling adjustments, etc.) within one (1) week of kickoff meeting.

Subtask 1B. Conference Calls, Meetings and Project Team Support

Following the Kickoff Meeting, the contractor shall provide for monthly conference calls (as needed) to keep the project team updated as to the status of the project. These calls may utilize EPA's teleconferencing facilities and EPA can provide teleconferencing details to the Project Team in advance of each call.

The Contractor shall provide presentation materials and present routine summaries of its progress to the Technical Advisory Group. The Contractor shall include under this Subtask provisions for four (4) full day meetings, including travel, lodging, logistics and coordination for managerial and technical personnel.

The contractor shall briefly summarize its understanding of each conference call (e.g., action items; scheduling adjustments) and/or meeting and transmit these by email to the Project Team Leader for distribution to the Project Team and Technical Advisory Group.

It is possible that the calls and/or meetings could generate a need to respond to, or otherwise address, comments from the Project Team and/or the Technical Advisory Group. It is presumed that some if not all comments would provide technical direction but it may be necessary for the Project Team Leader to respond in a formal manner. In such cases, the Contractor will provision to provide a reasonable LOE to assist the Project Team Leader and the Project Team to develop formal responses to comments that may be received from the Technical Advisory Group and/or other Stakeholders.

Subtask 1B Deliverables

- Monthly Conference Calls
- Monthly Conference Call Summaries
- Four (4) full-day Meetings, including presentations
- Project Team support for Stakeholder outreach

Task 2: Development of Quality Assurance Project Plan (QAPP)

Quality assurance requirements and guidance provisions are generally set forth under Section 2.6 of Attachment 1 (PWS) of the TSAWP, and more specifically under Section 2.6.3.

Although this Task Order does not currently entail the collection of empirical data, because the project entails the assessment and manipulation of existing ambient water quality data and water quality modeling outputs for decision making, for this Task, the Contractor shall develop a Quality Assurance

Project Plan (QAPP) for the project which will require submittal to the TOCOR and Project Team Leader, and eventually to EPA's Regional Quality Assurance Unit (QAU) for approval.

The QAPP will require approval prior to, or as near to initiation of project activities as possible. However, it is anticipated that development of a QAPP may depend on the Contractor's Literature Review (Subtask 3A below). Consequently, the Contractor shall begin consideration and development of the QAPP upon initiation of the project or as soon thereafter as possible but before QA/QC work-related actions. This QAPP shall be provided to EPA in draft within three (3) months of the Project Kickoff Meeting (coincident with Subtask 3A Deliverable).

Once the Contractor has developed a draft of the QAPP, it shall submit the draft QAPP to the EPA Project Team Leader and the TOPO who will coordinate review from the Project Team (as appropriate). Any comments developed from the review will be incorporated by the Contractor into a final QAPP for submittal by the EPA Project Team Leader to the QAU.

Because the project contemplates application of a technical approach for establishing nitrogen thresholds and allowable loads which may implicate an iterative process of refinement, the QAPP may require periodic adjustment to account for modifications arising from iteration. In its development of a LOE for this Task, the Contractor shall incorporate as a separate line item an LOE contingency in anticipation of such modification. Refer to Section 2.6.3.6 of Attachment 1 (PWS) of the TSAWP.

Pertinent EPA Region-specific QAPP guidance and models (i.e., templates) include:

- **General:** EPA Guidance for Quality Assurance Project Plans (EPA QA/G-5), December 2002, EPA/240/R-02/009,
- **Modeling (e.g., TMDL):** EPA New England Draft Generic Modeling Quality Assurance Project Plan and Quality Assurance Checklist
- **Use of Secondary Data:** EPA New England QAPP Guidance for Projects Using Secondary Data
- **Data Review:**
 - EPA New England Environmental Data Review Program Guidance (2013)
 - EPA New England Environmental Data Review Supplement

For modeling, refer also to: <https://www.epa.gov/quality/design-and-implementation-new-tools-quality-assurance-modeling>

Task 2 Deliverables

- Draft QAPP for submittal to EPA Region 1 QAU (3 months after Kickoff Mtg)
- Incorporation of modifications to QAPP to support approval of QAPP by QAU

Task 3: Application and Refinement of Technical Approach

To reiterate, the objective of this work is to assist EPA in the refinement and application of a technical approach (methodology) for establishing nitrogen thresholds and allowable loads for three watershed groupings (Embayments, Large Riverine Systems and Western LIS Point Source Discharges to Open Water) in Long Island Sound. This technical approach would then be used to calculate allocations for watersheds, with an initial focus on embayments.

EPA Region 1, Region 2, and EPA's LIS Office have outlined the technical approach to be used for developing nitrogen thresholds and allowable loads for each of the watershed groupings. The steps – or 'algorithm' - for this technical approach are as follows:

A. **Summarize** nitrogen loads (watershed loading and embayment area normalized loading) and sources from each coastal embayment from Vaudrey et al. 2016 ⁴ and other technical assessments (e.g., the Nature Conservancy, and those developed through the Long Island Nitrogen Action Plan (LINAP) and the 2016 Suffolk County Sub-watersheds Wastewater Plan). [All LIS embayments]

The source data and location where the data may be obtained include, but may not be limited to the following:

- Vaudrey research (Excel N load model attached as **Appendix A**)
- The Nature Conservancy
<http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Documents/TNC%20REPORT%20-%20Modeling%20nitrogen%20source%20loads%20on%20the%20north%20shore%20of%20LI%2003-01-2016.pdf>
- LINAP <http://www.dec.ny.gov/lands/103654.html>
- USGS <http://waterdata.usgs.gov/ct/nwis/rt>

B. **Summarize** flow, TN load, and TN concentration for all regulated point source discharges including wastewater treatment plant discharges, major industrial point source discharges, and MS4 stormwater discharges. For some sources, particularly MS4 stormwater discharges, where measured values are not available, apply estimates. [*Entire LIS Watershed, for this step, the Contractor shall consider all the MWWTPs identified in Attachment B3*]

The source data and location where the data may be obtained are as follows:

- Data compiled from NPDES ICIS database and states: **LIS CT-NY WWTP Summary.xlsx** (attached as **Appendix B1**)
- Data submitted by state to EPA for progress under TMDL: **LIS TE WLA Master File.xlsx** (attached as **Appendix B2**)
- Large, Direct Discharging Wastewater Treatment Facilities (a.k.a. Municipal Waste Water Treatment Plants (MWWTP); Pollution Control Facilities (WPCF)) discharging to the open waters of LIS. These WPCF's are identified on the EPA Region 1 GIS map, along with other pertinent information, including per-MWWTP design flow and TMDL (lbs/day). (attached as **Appendix B3**)
- MS4 sources
<https://www.epa.gov/npdes/urbanized-area-maps-npdes-ms4-phase-ii-stormwater-permits>
- Industrial discharge information

⁴ Vaudrey et al. (in prep) Comparative analysis and model development for determining the susceptibility to eutrophication of Long Island Sound embayments - final technical report. Appendices include embayment portfolios. Report to Connecticut Sea Grant. Long Island Sound Study Research Program.

<https://www3.epa.gov/enviro/facts/pcs-icis/search.html>

C. **Summarize** tributary nitrogen loads using published monitoring and modeling results.⁵
[Large Riverine only]

The source data and location where the data may be obtained are as follows:

- USGS data
 - Cited in footnote 5 (Mullaney, J.R., 2016) and at <http://ct.water.usgs.gov/>
 - USGS monitoring estimates for the CT River is http://www.neiwppcc.org/neiwppcc_docs/USGS%20CT%20River%20Monitoring%20Report.pdf
 - USGS maintains two monitoring stations (Essex and Old Lyme) in the brackish waters of the lower CT River and Long Island Sound to collect water quality data including temperature, salinity, specific conductance, pH, and dissolved oxygen. Refer to: http://waterdata.usgs.gov/ct/nwis/uv/?site_no=01194750&agency_cd=USGS and http://waterdata.usgs.gov/ct/nwis/uv/?site_no=01194796&agency_cd=USGS
- System-wide Eutrophication Model (SWEM) model outputs for nearshore waters and embayments, and <http://swem.uconn.edu/>
- NE SPARROW Model: <http://nh.water.usgs.gov/projects/sparrow/>
- ArcView GIS Generalized Watershed Loading Function (AVGWLF) Model: <http://www.neiwppcc.org/iwr/waterqualitytool.asp>
 - Or to link to the tool directly is: <http://www.mapshed.psu.edu/>
 - Dr. Evans AVGWLF work is http://neiwppcc.org/neiwppcc_docs/CT%20River%20Cost-Benefit%20Final%20Report.pdf

D. **Summarize** existing water quality data (nutrients and primary response variables) from the following sources, including but not limited to: [All watershed groupings]

- CT Department of Energy and Environmental Protection http://www.ct.gov/deep/cwp/view.asp?a=2719&q=325532&depNav_GID=1654
- EPA National Coastal Assessment <https://www.epa.gov/national-aquatic-resource-surveys/ncca>
- Long Island Sound Integrated Coastal Observing System <http://lisicos.uconn.edu/index.php>
- Suffolk County <http://www.suffolkcountyny.gov/Departments/HealthServices/EnvironmentalQuality/Ecology/MarineWaterQualityMonitoring.aspx>
- NY City Department of Environmental Protection http://www.nyc.gov/html/dep/html/harborwater/harborwater_quality_survey.shtml
- Interstate Environmental Commission <http://www.iec-nynjct.org/>

⁵ Mullaney, J.R., 2016, Nutrient, organic carbon, and chloride concentrations and loads in selected Long Island Sound tributaries—Four decades of change following the passage of the Federal Clean Water Act: U.S. Geological Survey Scientific Investigations Report 2015–5189, 47 p., <http://dx.doi.org/10.3133/sir20155189>

- Dr. Gobler, Stony Brook University (<http://data.news12.com/long-island/data/water/quality/>)
<http://data.news12.com/long-island/data/water/quality/>
- System-wide Eutrophication Model (SWEM) model outputs for nearshore waters and embayments
<http://swem.uconn.edu/>
- Datasets from local watershed groups. ⁶

E. **Relate** tributary loads to areas of influence using both SWEM outputs and other work (e.g. Dr. Whitney, University of Connecticut ⁷ (<http://cprime.uconn.edu/nsfcareer/>) to track how waters from the major rivers are distributed throughout LIS. [*Large Riverine and Western LIS*]

- SWEM: <http://swem.uconn.edu/>
- University of Connecticut: <http://cprime.uconn.edu/nsfcareer/>

F. **Compare** both N loading rates and N concentrations to LIS Chlorophyll *a* (Chl *a*) concentrations using both water quality data and model outputs. [*All watershed groupings*]

- i. Assess relationship between N and Chl *a*.
- ii. Identify N conditions that would result in Chl *a* levels supportive of light levels suitable;
 - a. to restore eelgrass habitat to 2000 acres to meet LIS CCMP target goal
 - b. to support eelgrass where it historically occurred
- iii. If system is macroalgae dominated, relate nitrogen to macroalgae and identify levels of nitrogen suitable to eliminate use impairment for macroalgae

G. **Recommend** nitrogen thresholds for all watershed groupings. For specific embayments consider designated uses, flushing rate, and embayment area in setting thresholds. In recommending thresholds for Long Island Sound, consider the applications of: [*All watershed groupings*]

- i. Existing thresholds across the region and LINAP thresholds under development.
- ii. LIS-specific thresholds based on relationship between Chl *a* and N (based on F above).

Examples of nitrogen thresholds developed for other programs include:

- <http://www.oceanscience.net/estuaries/index.htm>
- <http://www.tbepetech.org/committees/nmc/97-consolidated-recommendations-for-tampa-bay-estuarine-numeric-nutrient-criteria-recommendations><http://www.helcom.fi/baltic-sea-action-plan>
- Latimer, J.S. S.A. Rego. (2010). Empirical relationship between eelgrass extent and predicted watershed-derived nitrogen loading for shallow New England estuaries. *Estuarine, Coastal and Shelf Science*. 90: 231-240.
- Vaudrey, J. M. P. (2008) Establishing Restoration Objectives for Eelgrass in Long Island Sound, Part I: Review of the Seagrass Literature Relevant to Long Island

⁶ Alonzo, J. et al 2013, Evaluation of Current Community-Based Monitoring Efforts and Recommendations for Developing a Cohesive Network of Support for Monitoring Long Island Sound Embayments. pdf

⁷ Access to certain source data may be obtained from third parties only at cost. The Contractor shall consider any third party costs to obtain, use or otherwise obtain access to existing data.

- Sound. Department of Marine Sciences, University of Connecticut. Final Grant Report to the Connecticut Department of Environmental Protection, Bureau of Water Protection and Land Reuse and the U.S. Environmental Protection Agency. Cooperative Agreement: LI-97107201, CDFA#66-437 (UCONN FRS#542190). 64pp.
- Vaudrey, J. M. P. (2008) Establishing Restoration Objectives for Eelgrass in Long Island Sound, Part II: Case Studies. Department of Marine Sciences, University of Connecticut. Final Grant Report to the Connecticut Department of Environmental Protection, Bureau of Water Protection and Land Reuse and the U.S. Environmental Protection Agency. Cooperative Agreement: LI-97107201, CDFA#66-437 (UCONN FRS#542190). 64pp.
 - Harding, L.M. et al. (2014). Scientific Bases for Numerical Chlorophyll Criteria in Chesapeake Bay. *Estuaries and Coasts*. 37:134-148.
 - State of New Hampshire Department of Environmental Services. 2009. Numeric Nutrient Criteria for the Great Bay Estuary.
http://des.nh.gov/organization/divisions/water/wmb/wqs/documents/20090610_estuary_criteria.pdf
 - Benson, JL, Schlezinger, D, Howes, BL. 2013. Relationship between nitrogen concentration, light, and *Zostera marina* habitat quality and survival in southeastern Massachusetts estuaries. *Journal of Environmental Management*. Volume 131: 129-137.
 - Howes, BL, Samimy, R, Dudley, B. 2003. Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators Interim Report. Prepared by Massachusetts Estuaries Project for the Massachusetts Department of Environmental Protection.
[http://yosemite.epa.gov/OA/EAB_WEB_Docket.nsf/Verity%20View/DE93FF445FFAD1285257527005AD4A9/\\$File/Memorandum%20in%20Opposition%20...89.pdf](http://yosemite.epa.gov/OA/EAB_WEB_Docket.nsf/Verity%20View/DE93FF445FFAD1285257527005AD4A9/$File/Memorandum%20in%20Opposition%20...89.pdf)

- H. **Estimate** reduction levels by prioritized watersheds necessary to meet LIS-specific, regional, and developing LINAP thresholds. [**All watershed groupings**]
- i. Where threshold is N load based, compare current loads to threshold loads & identify reductions.
 - ii. Where threshold is N concentration-based, asses SWEM or other suitable model outputs to identify load reductions to achieve nitrogen loading threshold.
 - iii. Summarize existing model outputs or reports on estimating residence time for coastal embayments (e.g. Dr. Whitney, University of Connecticut
(<http://cprime.uconn.edu/nsfcareer/>))
 - a. Residence time estimates not available for all embayments, where available it should be used to adjust allowable nitrogen loading thresholds.
 - b. Where it is not available thresholds should be applied without consideration for residence time.
- I. **Propose** allocations among categories of nitrogen sources for Primary Tier Embayments (Base Period) and Secondary Tier Embayments (Option Period 1) (as described in Subtask 3.B), distinguishing between regulated and nonregulated sources. [**Embayments only**]

Subtask 3A. Literature Review

For this Subtask and in order to facilitate the Contractor's understanding of the above-referenced technical approach and development of the Task 2 QAPP, the Contractor shall undertake a comprehensive literature review of the technical references provided herein, and other related references that EPA may provide (e.g., at the Project Kickoff Meeting) and/or which the Contractor in its professional judgment may recommend for the project.

The Literature Review will not only help the Contractor better understand the project objectives but perhaps clarify the science underlying the technical approach, identify data gaps and/or matters requiring future empirical data collection, and/or other matters or issues not at this time transparent but which an independent critical review could afford to the Project and Project Team.

The Contractor shall summarize its Literature Review in a detailed Literature Review Memorandum (LRM). Because of its potential significance in helping to aid or otherwise provide context for the project, then for its development of a LOE and technical approach including cost for this task, the Contractor shall assume to provision for a comprehensive literature review and development of a detailed LRM.

Subtask 3A Deliverables

The LRM shall be provided in draft within three (3) months of the Subtask 1A Kickoff Meeting, coincident with the Task 2 QAPP deliverable.

Subtask 3B. Application of Technical Approach to Priority Waters within Watershed Groupings

Based in part on its Literature Review in Subtask 3A and following approval of the QAPP by the QAU, for this Subtask the Contractor shall provision to work cooperatively with EPA and its Stakeholders to apply the technical approach to derive N thresholds and propose allowable load allocations for a number of priority waters within each of the three watershed groupings, as follows:

Primary Tier Watershed Groupings (Base Period)

Embayments

There are roughly 110 coastal subwatersheds (i.e., embayments) to LIS. However, EPA has identified a small subset of priority embayments.⁸ These priority embayments are:

Connecticut

- Stonington Harbor / Pawtucket River
- Saugatuck Estuary
- Norwalk Harbor
- Mystic Harbor
- Niantic Bay
- Farm River

⁸ For this Subtask, the Contractor shall consider all the priority watersheds sequentially in the order presented.

- Southport Harbor / Sasco Brook

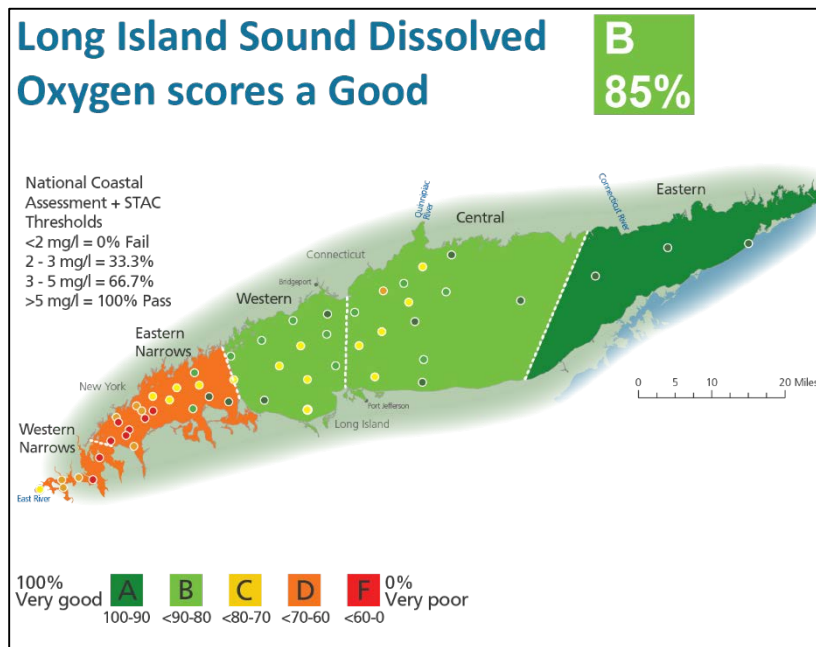
*New York*⁹

- Northport-Centerport Harbor Complex
- Port Jefferson Harbor
- Nissequogue River
- Stony Brook Harbor
- Mt. Sinai Harbor

Large Riverine Systems

There are three major tributaries representing the large riverine watersheds of the LIS. These are the Connecticut, Housatonic and Thames Rivers.

For this Subtask, the Contractor shall consider the Connecticut River.



Western Long Island Sound

This is the open water areas defined by the Long Island Sound Report Card as the Eastern Narrows and Western Narrows in the western Long Island Sound. This includes the areas shown in Figure 2 and described at <http://ecoreportcard.org/report-cards/long-island-sound/> under the regions tab.

For this Subtask, the Contractor shall consider the Western Long Island Sound as defined above.

Secondary Tier Watershed Groupings (Option Period 1)

EPA has identified a small subset of watersheds as a secondary priority tier. These secondary tier watersheds, to be considered in the following sequential order, are:

Large Riverine

- Housatonic River
- Thames River

⁹ Note: Some of this work will be closely coordinated with an ongoing technical assessment from NYDEC under a separate funding source and work scope. However, the available information from NYDEC should at a minimum be considered as part of the Subtask 3A Literature Review. Refer to NYDEC Long Island Sound Nitrogen Action Plan: <http://www.dec.ny.gov/lands/103654.html>

Embayments

- Mamaroneck River
- Hempstead Harbor
- specific areas adjacent to the Northport/Centerport Harbor Complex (Huntington Bay, Lloyd Harbor, Duck Island Harbor)
- Oyster Bay – Cold Spring Harbor Complex
- Manhasset Bay
- Pequonnock River
- Byram River, CT
- Sasco Brook
- New Haven Harbor

EPA has chosen the above-referenced priority and secondary tier watersheds in part because it anticipates this Subtask will require a collaborative process of iterative refinement where application of the technical approach to the very first one or few of the priority watersheds will require more substantial effort, and that once the technical approach becomes refined, application of the technical approach to later watersheds can proceed in an increasingly efficient manner.

EPA proposes that scheduling deliverables under this Subtask consistent with the above-referenced ‘learning curve’. Consequently, we propose results of applying the technical approach to be provided in draft according to the schedule provided in Table 1.

For this Subtask, which constitutes the bulk of the substantive work for this Task Order, the Contractor shall provide an estimated LOE and cost for applying the algorithm to each of the priority watersheds in order to develop and present a per-watershed unit cost.¹⁰ This LOE and cost information will be used to estimate work for potential future work phases. EPA appreciates the differences between and among watersheds and MWWTP dischargers, and the uncertainty associated with such estimation. For this reason, the Contractor may present the watershed LOE and cost as a per-watershed LOE and cost *range*; such an approach may better accord with the Deliverables set out in Table 1.

The final results of the project will likely be used, in part, for EPA decision making. Although the requested deliverables may be presented in a letter report format with appendices, it is presumed the bulk of the deliverables will be data and the results of data analysis and manipulation (i.e., modeling input / output). The deliverables may also include the Contractor’s recommendations, if any. In any event, the deliverables must be in the form of a clear and comprehensive presentation to facilitate review by the Project Team and stakeholders, and to support an administrative record for decision making.

Subtask 3B Deliverables

Refer to Table 1.

¹⁰ For the 117 MWWTP’s, this would be presented as a per-MWWTP LOE and cost range.

IV. Schedule and Deliverables

The schedule outlined below in Table 1A (Base Period) and 1B (Option Period 1) is based on the presumption that the work will occur over a period of approximately one (1) year, with deliverables keyed to completion of the Subtask 1A Kickoff Meeting. EPA understands and presumes the Contractor may likely propose a different schedule based on its understanding of the work scope, but one that is nonetheless consistent with completion in fall of 2017 (Base Period) and March 2018 (Option Period 1).

Table 1. Schedule and Deliverables (Base Period)

| TASK | DELIVERABLE | DATE DUE TO EPA |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Task 0: Work plan and Budget Development | Work plan and budget | Work plan within 30 days of receipt of Task Order (TO) |
| | Progress and financial reports | Monthly. |
| Task 1: Project Management and Administration - | | |
| Subtask 1A: Kickoff Mtg | Kick-off meeting between EPA and Contractor, Meeting Summary | Within 1 month of TO issuance. Meeting Notes within 1 week of Kickoff Mtg |
| Subtask 1B: Conference Calls, Meetings and Project Team Support | Conference Calls | Monthly |
| | Meetings | Four (4) in-person meetings including presentations by the contractor |
| | Project Team Support | As Needed Provision |
| Task 2: QAPP | Draft QAPP | Within three (3) months of Task 1A Kickoff Meeting |
| | Project Team support for development of final QAPP submittal to QAU. See Section 2.6.3.1 of Attachment 1 (PWS) to TSAWP | As Needed Support |

| | | |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Task 3: Refinement and Application of Technical Approach - | | |
| Task 3A: Literature Review | Literature Review Memo | Within three (3) months of Task 1A Kickoff Meeting |
| Task 3B: Application of Technical Approach to Priority Waters within Each Watershed Grouping | Draft summary of embayment loading | Two (2) months of QAPP approval |
| | Draft summary of regulated point source discharges | Two (2) months of QAPP approval |
| | Draft summary of tributary loading | Two (2) months of QAPP approval |
| | Draft summary of water quality data | Three (3) months of QAPP approval |
| | Draft results for relative tributary and WLIS load | Four (4) months of QAPP approval |
| | Draft results for comparing both N loading rates and N concentrations to LIS Chlorophyll a (Chl a) | Five (5) months of QAPP approval |
| | Draft results for nitrogen thresholds for all prioritized embayments and watershed groupings | Six (6) months of QAPP approval |
| | Draft necessary reduction levels for all prioritized embayments and watershed groupings | Six (6) months of QAPP approval |
| | Draft proposed allocations for all prioritized embayments | Seven (7) months of QAPP approval |
| | Finalize results for all priority tier watersheds | Twelve (12) to fourteen (14) months from Task Order initiation (refer to Option Period 1) |

Table 1B. Schedule and Deliverables (Option Period 1)

| TASK | DELIVERABLE | DATE DUE TO EPA |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Subtask 1B: Conference Calls, Meetings and Project Team Support | Conference Calls | Monthly |
| | Meetings | Four (4) in-person meetings including presentations by the contractor |
| | Project Team Support | As Needed Provision |
| Task 3B: Application of Technical Approach: Completion of Priority Tier Watershed Groupings (as needed) and Secondary Tier Watershed Groupings | Finalize results for priority tier watersheds (as needed) | One (1) to two (2) months of initiation of Option Period 1 |
| | Draft summary of large riverine and embayment loadings | One (1) month of initiation of Option Period 1 |
| | Draft summary of tributary loading | Two (2) months of initiation of Option Period 1 |
| | Draft summary of water quality data | Three (3) months of initiation of Option Period 1 |
| | Draft results for relative tributary and WLIS load | Four (4) months of initiation of Option Period 1 |
| | Draft results for comparing both N loading rates and N concentrations to LIS Chlorophyll a (Chl a) | Five (5) months of initiation of Option Period 1 |
| | Draft results for nitrogen thresholds for all prioritized embayments and watershed groupings | Six (6) months of initiation of Option Period 1 |
| | Draft necessary reduction levels for all secondary prioritized embayments and watershed groupings | Six (6) months of initiation of Option Period 1 |
| | Draft proposed allocations for all secondary prioritized embayments | Six (6) months of initiation of Option Period 1 |
| Finalize Results for all priority watersheds | Six (6) months of initiation of Option Period 1 | |

V. Technical Contacts

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VI. References

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