

## Attachment A

### ARRA 604(b) Work Plan Template TMDL ELEMENTS - STATEMENT OF WORK

The *Awardee* (sub-recipient) will provide watershed planning that supports NYS DEC development of TMDLs (or other restoration plans) for waters impaired by pollutants as listed on the 2008 303 (d) list. Such planning must conform to USEPA guidance<sup>1</sup>, and can be informed by referring to the Water Environment Federation, Third-Party TMDL Development Tool Kit.<sup>2</sup>

TMDLs should be developed in the context of watershed planning to achieve comprehensive ecosystem management and ensure public participation and review.

Eligible funding elements include planning activities, such as:

- a. Identification and description the impaired waterbody, including the impaired designated use, and the pollutant of concern.
- b. Characterization of the watershed and pollutant sources by delineating the watershed, including incorporation of existing sub-delineations by sewersheds; quantifying land use (e. g. GIS mapping of impervious cover) and land management practices; describing hydrologic characteristics; and identifying and locating or modeling<sup>3</sup> loads from all pollutant sources (point and nonpoint).
- c. Description of applicable water quality standards and development of models<sup>3</sup> to tie watershed loads to water quality objectives and targets.
- d. Development of a pollutant allocation scenario for load attributed to current and future nonpoint (non regulated sources), including natural background sources, identified through reasonably accurate estimates via data analysis or water quality simulation modeling<sup>3</sup>.
- e. Support for Department allocation of waste loads to permitted sources.
- f. Assessment of seasonal variation of pollutant loads in meeting water quality objectives.
- g. Monitoring of source loads, and waterbody concentrations, if information is needed, and preparation of a plan for post -TMDL monitoring to show load reduction and attainment of water quality standards.
- h. Development of a TMDL implementation plan, incorporating stakeholder input on the use of green projects and other management practices to reduce loads, achieve water quality standards and meet other natural resource objectives.

---

<sup>1</sup> USEPA, 1991, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001) and subsequent guidance (<http://www.epa.gov/owow/tmdl/guidance.html#tmdl>)

<sup>2</sup><http://www.wef.org/ScienceTechnologyResources/TechnicalInformation/TopicalResourceDocs/ThirdPartyTMDLDev.html>

<sup>3</sup> The model or models must be open source. Data produced from the model should be delivered for statewide or regional use.

The *Awardee* will work closely with the NYS Department of Environmental Conservation (DEC) on the development of these TMDLs so as to ensure the delivery of a final product of the highest quality which meets the expectations of NYS DEC. Because the U.S. Environmental Protection Agency (EPA) Region 2 has final approval authority for TMDLs, their comments and expectations must also be incorporated into the final product, and NYSDEC will consult with EPA at the inception and key points in the TMDL development process.

## **TECHNICAL APPROACH**

In completing this work plan, *Awardee* will work closely with NYS DEC on the following tasks.

### **Task 1 - Modeling Quality Assurance Project Plan**

The *Awardee* will **prepare a Modeling Quality Assurance Project Plan (QAPP)** that describes the technical work to be performed to develop the TMDLs, including the procedures that will be used to ensure that model results used in the TMDL analysis are scientifically valid and defensible while minimizing uncertainty. The QAPP will be developed using a number of EPA guidance documents, including, but not limited to: 1) Guidance for Quality Assurance Project Plans for Modeling (G-5M); 2) Guidance for the Data Quality Objectives Process (QA/G-4); 3) Guidance on Quality Assurance Project Plans for Secondary Research Data; and 4) EPA Quality Manual for Environmental Programs and Requirements for Quality Assurance Project Plans (QA/R-5).

The QAPP will be largely based on the data report and model evaluation report (see Tasks 2a and 2b) and will describe the steps to be followed to achieve the objectives of the modeling analysis and TMDL development. The QAPP will summarize the model selection process, as well as the methods for data compilation and synthesis, model development and calibration, and TMDL development. The measures required to maintain quality assurance (e.g. data entry checking, model review, model testing) will also be outlined.

The **draft Modeling QAPP will be submitted** to for review within three months of the award of the work plan. NYS DEC will provide comments on the draft QAPP within thirty-five days of receipt. The **final QAPP will be submitted** within fifteen days of receiving NYS DEC's comments.

### **Task 2 – Evaluate All Available Data and Prepare Technical Approach**

Within one month of the award of the work plan, the *Awardee* will participate in a **project coordination and kick-off meeting** with EPA Region 2 and NYS DEC to discuss current data availability and additional data needs. *Awardee* will assist NYS DEC with the identification of agenda items for the meeting. The deliverables produced under Task 2a will be distributed prior to the meeting and used as the basis for discussion. At the meeting, *Awardee* will also discuss preliminary modeling approaches to conducting the TMDL analyses and obtain initial feedback

from EPA Region 2 and NYS DEC on the potential modeling approaches and their overall goal(s) for a model(s) for the TMDLs.

### **Task 2a – Compile and Format Data**

Five types of data are needed for TMDL development: 1) Flow, 2) Meteorological, 3) Water quality, 4) Watershed and waterbody physical parameters, and 5) Sources characteristics. The *Awardee* will **gather all available data and information from previous studies for use in developing TMDLs** for the impaired stream segments utilizing all of the sources identified through consultation with NYS DEC, as well as additional creditable sources of data (e.g., watershed groups); *Awardee* will obtain approval from NYS DEC before contacting any data sources not identified in consultation with NYS DEC.

The *Awardee* will **perform a thorough review** of all of the water quality and physical data gathered for the impaired stream segments. All of the **data will be organized into one Microsoft Excel workbook**. The *Awardee* will utilize an in-house data storage protocol that ensures original data files are preserved. When adding data to the database, *Awardee* will use a **standardized screening process** that ensures **data integrity** during the formatting process and **prevents the inclusion of poor quality data** in the database. The *Awardee* will also generate watershed map(s) for the impaired stream segments.

The *Awardee* will **prepare a data report to accompany the database and watershed map(s), which will be submitted** to NYS DEC within one month of the award of the work plan. The report will identify all data sources, describe the data contained within the database, discuss the quality and quantity of the data (including period of coverage), and identify additional data needs. The report will discuss sufficiency of data for supporting the establishment of TMDLs for each of the impaired stream segments. Within one month after receipt of the data report, NYS DEC will provide comments on the report and provide additional data and/or recommend sources of additional data.

### **Task 2b – Evaluate Models and Determine Best Model to Use**

A critical component of this project is the **proper selection of water quality modeling tools** to develop TMDLs for *phosphorus, dissolved oxygen, and silt/sediment* for the impaired stream segments. The technical modeling approach for TMDL development for the listed waterbodies will be based on the data review and take into account any priority technical, regulatory, and/or site specific conditions identified at the project kick-off meeting.

The data review conducted under Task 2a will aid in the assessment of modeling options. It is **important to maintain a proper compatibility between model complexity and data availability** and knowledge. For example, a more complex watershed model, with a distributed spatial resolution and mechanistic representation of hydrological processes, would likely require more detailed data on flow, land use, topography, and physical characteristics of the sub-basins compared to a simpler, lumped model. Similarly, a receiving water model with a high level of

mechanistic complexity should be supported by adequate spatial and temporal water quality, flow, and loading data to allow for defensible model parameterization. In the absence of comprehensive data, a simpler, or less mechanistic, model may be more appropriate. This type of model would focus on the known processes and make use of available data and local knowledge to the fullest extent possible.

Establishing the **relationship between watershed source loading and in-stream water quality is a critical component** of TMDL development. It allows for the evaluation of management options that will achieve the desired source load reductions. This link can be established through a range of techniques, from qualitative assumptions based on sound scientific principles to sophisticated modeling techniques. This project will likely use a linked watershed-water quality model. The **final proposed modeling strategies will meet all of the objectives** identified in the SOW, as well as additional objectives identified during the project kick-off meeting. *Awardee* will use the following **criteria for model selection**:

- Level of complexity and compatibility with available data;
- Ability to meet all modeling objectives;
- User-friendliness;
- Track record and acceptance in the scientific and engineering communities; and
- Availability of model(s) and model source code.

For the **watershed runoff model**, the model must be able to simulate the loading and delivery of phosphorus and sediments from the target watersheds. Watershed loadings are closely tied to hydrology and land use practices, therefore, adequate hydrological representation must be included in the model. Explicit assessment of watershed pollutant sources will also be required. The ability to adequately delineate the watersheds spatially will be an important screening criterion. A model that can incorporate the impacts of urban, rural, and agricultural practices in the watershed is also desirable. For the **receiving waterbody model**, both phosphorus and water column sediments should be considered “non-conservative.” Therefore, in addition to simulating the physical transport mechanisms, some representation of system kinetics and physical exchanges will be required. For example, uptake of dissolved phosphorus by phytoplankton (free-floating algae), periphyton (attached algae), and macrophytes have a significant effect on the amount of phosphorus in stream segments. Likewise, suspended sediments are impacted by vertical settling and resuspension. These processes will also need to be simulated in the stream segment water quality model.

**Ease of use** of the model(s) will be an important screening criterion. Since the models will be used for TMDL analyses that will be presented to the public (for comment), a **visually appealing** model with easily edited inputs and **illustrative output capabilities** is preferable. **Compatibility with GIS** software is also desired. The selected model(s) will need a **proven track record** and be accepted by EPA and the scientific community. Public domain models with open source code

are required as models. Finally, NYS DEC's comfort level with the model(s) will also be considered.

The Awardee shall become familiar with the modeling options identified in initial discussion with NYSDEC and conduct a limited review of the models. NYS DEC has experience with AVGWLF (ArcView Generalized Watershed Loading Function, <http://www.avgwlf.psu.edu/>) and successor models, as the potential models for this project.

The **AVGWLF models provide** the ability to simulate sediment and nutrient loadings from watershed with variable-size source areas. It has algorithms for calculating septic system loads, and allows for the inclusion of point source discharges. It is a continuous simulation model, which uses daily time steps for weather data and water balance calculations. Monthly calculations are made for sediment and nutrient loads, based on the daily water balance accumulated to monthly values. AVGWLF can be developed to model an entire watershed or can be divided into subwatersheds to provide greater spatial resolution. A possible option for a linked watershed-water quality model is AVGWLF and [*an in-stream water quality model*]. The use of AVGWLF would cut down on time associated with extensive model calibration, as compared to the process for more complex models.

Although a preliminary review has identified AVGWLF and an [*in-stream water quality model*] as two of the models well-suited for this work plan's effort, the *Awardee* will still **conduct a thorough review of all modeling options**, by comparing the advantages and disadvantages of using other models against AVGWLF and an *in-stream water quality model*. The *awardee* will evaluate all modeling options and propose the best model(s) based on a number of pre-established criteria (taken from the SOW and established through discussion with EPA and NYS DEC), including the models' appropriateness for the TMDL given the amount and type of available data. *Awardee* will **prepare a model evaluation report and make recommendations for the most appropriate modeling approach**. The report will include summary tables and examples of graphical output for the recommended model(s).

The **selection of suitable TMDL endpoints** is another important factor that will be addressed in the model evaluation report. In the report, *Awardee* will recommend the TMDL endpoints or suggest methods for developing endpoints. The endpoints will be quantifiable (daily, and other appropriate timeframe) targets for the pollutants that relate to the waterbody impairments. The model evaluation report will also discuss **plans for addressing data gaps**. Some of the data gaps may not require sampling; instead, coordination with local governments, agencies, and watershed groups may help with the gathering of the missing data. Also, the models will likely serve as a tool for estimating data where gaps exist.

The **model evaluation report will be submitted to** NYS DEC within six weeks of the award of the work plan. The report will include: a summary of modeling options (including advantages/disadvantages), model recommendations, proposed TMDL targets, and plans for addressing data gaps. Within two weeks after receipt, NYS DEC will provide comments on the report and approval of the recommended modeling approach (or identify additional approaches) and TMDL targets.

## **Task 2c – Provide TMDL Development Schedule and Determine Current and Future and Monitoring Needs for Impaired Stream Segments**

Based on information obtained during the data review, *Awardee* will prepare a technical brief to accompany the data report (see Task 2a) that outlines a plan and schedule for completing the impaired stream segment TMDLs. The technical brief will be distributed prior to the project kick-off meeting. The schedule will be discussed at the meeting and adjusted as necessary. *Awardee* will compare data availability against required modeling input data needs and group the impaired stream segments based on the sufficiency of data to support TMDL development for each impaired stream segment. The technical brief will identify the impaired stream segment groupings, as follows:

- 1. Group 1: Sufficient Data for TMDL** – Stream segments for which sufficient physical characteristics and water quality data are available and TMDL development can commence immediately. Draft TMDLs will be submitted by no later than *insert date*.
- 2. Group 2: Insufficient Data for TMDL** – Stream segments for which additional stream and/or water quality data are needed in order to develop TMDLs. Under the direction of NYS DEC, single-site samples will be collected for up to ## of these stream segments (see Task 2d). Should there happen to be more than ## streams in this group, *Awardee* will prioritize stream segments for sampling according to those for which data collection would more likely result in the development of a TMDL. Partial Draft TMDLs for these stream segments will be submitted by no later than *insert date*.
- 3. Group 3: Substantially Incomplete Data for TMDL** – Stream Segments that require significant additional monitoring in order to proceed with TMDL development. Even though monitoring for these streams will not be a part of the scope of this work plan, the *Awardee* will **prepare a monitoring plan to collect the data necessary to complete the TMDLs for these stream segments**. The monitoring plan will be a stand alone document, which will be submitted to NYS DEC within three months from the start of the work plan.

## **Task 2d – Sampling Plan and Monitoring Quality Assurance Project Plans for Group 2 Stream Segments**

The *Awardee* will prepare a sampling plan and monitoring QAPP for up to ## of the stream segments in Group 2 (see Task 2c). The plan will include a monitoring schedule that will allow for the completion of TMDLs for the Group 2 stream segments by no later than , building in extra time to deal with delays in sampling on account of weather or laboratory processing of samples. The QAPP will be based on EPA guidance documents for monitoring QAPPs and will describe the steps and techniques to be followed, both in the field and in the laboratory, to achieve the objectives of the monitoring plan.

The **monitoring plan and QAPP will be submitted** to EPA and NYS DEC for review within three months of the award of the work plan. EPA and NYS DEC will provide comments on the

plan and QAPP within 45 days after receipt. The final monitoring plan and QAPP will be submitted within fifteen days of receiving NYS DEC's comments.

### **Task 3 – Stream Measurement and Limited Water Quality Measurements**

*Awardee* **will carry out the monitoring plan.** The detailed monitoring plan will be submitted as part of Task 2d; however, preliminary plans for sampling and measurement include:

1. Number of stream segments - maximum of *insert ##*.
2. Number of visits per segment *insert ##*.
3. Field measurements
  - Combined GPS and depth sounding for stream morphology.
4. Samples and laboratory analyses
  - Locations *insert ##*
  - Parameters - total phosphorus, nitrate nitrogen, ammonia nitrogen, chlorophyll **a**, total suspended solids, and turbidity.
5. Schedule - as necessary to meet overall project timeline goals.
6. QAPPs - prepared for laboratory and sampling activities, prior to initiation of sampling.

The *Awardee* **will implement the monitoring plan** to collect data necessary to complete TMDLs for Group 2 segments. However, **should it be decided that NYS DEC will collect the additional sampling data** (instead of the *Awardee*), *Awardee* **is prepared to work with NYS DEC** to ensure all necessary data are collected as outlined in the monitoring plan.

### **Task 4 – Prepare TMDL Reports and Administrative Record**

The *Awardee* will adhere to all EPA and NYS DEC guidance, policies, and methodologies for developing the TMDL reports. *Awardee* will **develop the TMDL reports in a manner consistent with NYS DEC's existing Small Lakes TMDLs**. TMDL reports will include color maps that depict a delineation of each impaired stream segment's contributing watershed and associated land uses. The maps will also show monitoring station locations and any significant discrete sources of pollutant loading.

#### **Task 4a – Grouping of stream segments and pollutant sources**

Following selection of the appropriate modeling approach and approval of the modeling QAPP, the *Awardee* will initiate TMDL development for the stream segments. As a first step in developing the TMDLs, the *Awardee* will **identify the major sources of pollutants** for each of the impaired stream segments. This process relies on available data, previous studies of the watershed, and published literature values. Potential point sources include permitted facilities that discharge effluent directly into the lakes, as well as urban stormwater runoff. Nonpoint sources can be characterized as either direct or indirect sources based on how the phosphorus and/or sediment are delivered to the lake. Potential indirect sources include phosphorus deposited on the land surfaces in the watershed and available for transport to the lakes in runoff, while potential direct sources include failing septic systems.

Following the source identification, *Awardee* will organize the stream segments into groups for the TMDL report, with groupings based on watershed, geography, or parameter(s) of concern. The final decision on groups will be made prior to commencement of modeling. *Awardee* will **prepare a technical memo with the recommended TMDL groupings and summaries of identified sources of pollutants**, along with the rationale for the groupings. The memo will be submitted to NYS DEC by no later than five months from the start of the work plan.

#### **Task 4b – Partial Draft TMDL Reports**

The *Awardee* will **apply the selected modeling methodology and calculate existing loadings, TMDLs, and margins of safety (MOS) for each stream segment**. The *Awardee* will characterize current conditions in the systems, quantify point and nonpoint source loadings, and **determine the reductions necessary to meet the water quality targets. Draft TMDLs will be submitted** to NYS DEC by no later than 10 months from the start of the work plan (**Group 1 stream segments**), and no later than 14 months from the start of the work plan (**Group 2 stream segments**).

The **partial draft TMDL reports** will document and present: existing loadings; the proposed TMDL, and MOS (in a summary table with WLA and LA left blank); and TMDL allocation options and scenarios. In addition, the reports will include descriptions of the watersheds, water quality problems, potential pollutant sources (including sources which were evaluated and not found to be significant contributors), water quality standards/endpoints, data (including sources) used in the analyses, and loading patterns. The reports will summarize the technical approach and clearly document all modeling assumptions, calculations, and limitations. Graphical summaries will supplement the narrative where appropriate.

NYS DEC will provide comments within 45 days of receiving the partial draft, incorporating public review of the partial draft.

#### **Task 4c –Draft TMDL Reports**

The *Awardee* will **apply the NYS DEC comments on partial draft to the selected modeling methodology and calculate existing loadings, TMDLs, wasteload allocations (WLAs), load allocations (LAs), and margins of safety (MOS) for each stream segment.** TMDL allocations will likely be developed under the critical conditions specified for the impaired stream segments (e.g., following rainfall events). The *Awardee* will characterize current conditions in the systems, quantify point and nonpoint source loadings, and **determine the reductions necessary to meet the water quality targets.**

The **draft TMDL reports will include all TMDL elements** outlined in a format that follows the NYSDEC TMDLs for Small Lakes. The reports will document and present: existing loadings; the proposed TMDL, WLA, LA, and MOS (in a summary table); and TMDL allocation options and scenarios. In addition, the reports will include descriptions of the watersheds, water quality problems, potential pollutant sources (including sources which were evaluated and not found to be significant contributors), water quality standards/endpoints, data (including sources) used in the analyses, and loading patterns. The reports will summarize the technical approach and clearly document all modeling assumptions, calculations, and limitations. Graphical summaries will supplement the narrative where appropriate. The *Awardee* will also describe, in the TMDL reports, how the minimum requirements of an approvable TMDL were addressed and met (e.g., consideration of MOS, consideration of seasonality and critical conditions, total loading capacity of the system, and load allocations to point and nonpoint sources in such a way to achieve water quality standards) and why the allocations to point and nonpoint sources are reasonable and defensible. Finally, all appropriate references will be included in the TMDL reports.

**Draft TMDLs will be submitted** to NYS DEC by no later than 14 months from the start of the work plan (**Group 1 stream segments**), and no later than 18 months from the start of the work plan (**Group 2 stream segments**). The draft TMDL reports will be provided in multiple electronic forms. (Microsoft Word and Adobe Acrobat PDF, the latter broken in segments no larger than 1 MB for webposting); NYS DEC will provide comments on the draft TMDLs within 4 weeks of receipt. *Awardee will revise the TMDLs* and submit them to NYS DEC by no later than 4 weeks after receiving comments. If upon review, EPA Region 2 and/or NYS DEC require additional modifications, *Awardee* will address those issues prior to public notice. The **final (ready for public notice) TMDLs** will be submitted to NYS DEC by no later than 16 months from the (Group 1 stream segments) and no later than 20 months from the start of the work plan (Group 2 steam segments).

The *Awardee* will **provide NYS DEC with all computer programs** used for TMDL development and data analysis, along with user's manuals and program documentation. The *Awardee* will also provide (in electronic format if possible) all references used as part of the development of the TMDLs, including: scientific articles, reports, text books; data collected and used; e-mail, letters, faxes, and other correspondence related to the TMDLs; and modeling tools and modeling input and output data sets. The *Awardee* will also **prepare and submit to NYS DEC, an electronic library of the administrative record** for each TMDL. The electronic library of the administrative record will include all materials used and relied upon to prepare the

TMDLs, including all applicable data files, model input files, a working version of any model(s) used, and copies of all references used in developing the TMDLs.

#### **Task 4d –Complete TMDL Reports**

Following the public comment period, *Awardee* will work with NYS DEC to prepare a response to summary, and upon NYS DEC direction, revise the TMDL analysis and document, if necessary to accommodate the response to public comment.

#### **Task 5 – Provide Training to NYS DEC (Technology Transfer)**

The *Awardee* will develop and **conduct a hands-on model training workshop** for approximately 25 attendees at the NYS DEC office, in Albany, NY. The *awardee* will submit a detailed agenda for the training to the NYS DEC Work plan Manager (TOM) for review at least 1 month prior to the workshop. The final agenda will be provided to all attendees two weeks prior to the workshop.

The training will be conducted at least two weeks prior to the end of this work plan (tentatively during the month of). The workshop will extend 2 full days. *Awardee* will work with NYS DEC to secure meeting space and computers and coordinate for any further services needed (e.g., internet access). *Awardee* will prepare a training handbook for all participants, which will include presentations, related handouts, case study examples, and all other awardee-developed material. A copy of the models will be included (on CD-ROMs) in the handbook.

#### **Task 6 – Support Public Involvement and Comment on Proposed TMDLs**

Under the direction of NYS DEC, the *Awardee* will **assist NYS DEC in conducting two public meetings on the TMDL**. The first will be when the source assessment and estimation of target and required load reductions have been completed and the TMDL document has been partially drafted, and will be aimed at confirming the analysis and receiving input on the load allocations and implementation plan. The second meeting will be held when a complete draft of the TMDL has been prepared, during the public comment period.

Under the direction of NYS DEC, the *Awardee* will **assist NYS DEC in the preparation of the response to comments** document for the TMDLs. Upon receipt of comments (and instructions from EPA for response), *Awardee* will complete the responses and return them to NYS DEC within two weeks of their receipt.

#### **Task 7 – Manage and Report Task and Financial Progress**

*Awardee* will **attend a one-day kick-off meeting** at the start of this project. From there on, *Awardee* will **communicate regularly with NYS DEC** throughout the period of this project,

primarily by e-mail and telephone conversations. *Awardee* will **organize conference calls** with EPA Region 2 and NYS DEC (as needed) to discuss the status of the project. Within five days of any conference calls, *Awardee* will prepare and submit to EPA Region 2 and NYS DEC, a written summary of the call.

*Awardee* will submit (as a PDF attached to an email) **written monthly progress reports** to the NYS DEC by the 20<sup>th</sup> of each month. Progress reports will identify activities performed for the reporting month and their associated costs organized according to the tasks and cost categories established in the final technical approach. Progress reports will identify key milestones achieved and deliverables completed during the reporting period. Progress reports will also discuss progress in meeting modeling quality assurance targets, adherence to the schedule, highlight problems encountered or items which need attention (including information on events that may affect the project schedule and progress towards meeting deadlines), and identify the next month's tasks. The reports will also include descriptions of data needs required to perform all necessary TMDL analyses (as outlined in the technical approach) and deadlines associated with receiving those data.

*Awardee* will not conduct work on any of the tasks until written approval is received from the NYS DEC. If *Awardee* anticipates a delay in submission of deliverables or delay in meeting milestone, *Awardee* will contact the NYS DEC immediately and at least two days prior to the planned delivery date or milestone.