EAST OF HUDSON
WATERSHED CORPORATION

Solicitation 2017-05

REQUEST FOR PROPOSALS

for

Professional Engineering Services

Stormwater Retrofit Projects
Kent-MB-601
Pat-EB-602

EOHWC Solicitation Issue Date: March 17, 2017

Site Visit Date: March 30, 2017

Questions Due Date: April 3, 2017

Proposal Due Date: April 7, 2017

1. OVERVIEW

1.1 General Information

The East of Hudson Watershed Corporation (EOHWC) is seeking Proposals to provide civil engineering services to the EOHWC for the design, permitting, and construction phase services (CPS) of stormwater retrofit projects (SRPs) during its Year 6 through 10 funding cycle. The successful Proposer will demonstrate the required expertise and experience to fulfill all requirements of this Solicitation and any Addenda or modifications to this Solicitation.

This Solicitation includes several attachments and refers to the EOHWC Stormwater Retrofit Project Design Manual (SRPDM). The SRPDM is available on the EOHWC web site (www.eohwc.org). All of the information in this Solicitation and attachments, Addenda, and SRPDM shall be considered the Work. The Proposer shall consider the information in the attachments and the SRPDM when preparing their proposal.

1.2 Definitions

Engineer: the engineering firm awarded a Contract from their proposal for the services described in this Solicitation.

Host Municipality: the municipality in which the SRP is located.

Proposer: the engineering firm preparing and submitting a proposal for the services described in this Solicitation.

Site: the physical location at which the stormwater retrofit will be constructed.

Solicitation: This document, including all of the items listed in the appendices, forms and exhibits, and any subsequent Addenda or clarifications issued by EOHWC.

Stormwater Retrofit Project or SRP: a stormwater management practice described in the stormwater retrofit plan prepared by either EOHWC, the Dutchess County MS4 Coordinating Committee, Putnam County MS4 Coordinating Committee, or Westchester County Croton-Kensico Watershed Intermunicipal Coalition, including modifications/revisions by EOHWC, and approved by the NYSDEC.

Work: All of the information in this Solicitation and attachments, Addenda, and SRPDM.

1.3 EOHWC Contact:

Kevin Fitzpatrick, P.E.
East of Hudson Watershed Corporation
EOHWC

Route 164
Patterson, NY 12563
Kevin@EOHWC.org, (845) 319-6349

[Fax and email are provided for inquiries only; the response to this Solicitation may not be submitted via email]

2. SCOPE OF SERVICES

2.1. Year 6 through 10 Projects. EOHWC has caused to be prepared a preliminary report identifying SRP's that may be undertaken by EOHWC during the Years 6 through 10 funding period. A copy of such report may be found on the EOHWC website at www.eohwc.org. The Proposer must be a professional engineer or firm licensed to perform engineering services in the State of New York. EOHWC anticipates identifying one or more engineering firms capable of providing the requested services for one or more of such Year 6 through 10 SRP's and providing the best value to the EOHWC as determined by EOHWC in its discretion.

In this solicitation round EOHWC anticipates awarding one engineering services contract for the projects identified as set forth at **Appendix I.** Additional solicitation rounds may be undertaken at any time in EOHWC's discretion.

2.2. SRP Design Requirements. SRP engineering services will be consistent with the requirements of the EOHWC Stormwater Retrofit Project Design Manual (SRPDM). SRP design will be expected to take into account the requirements of the Policy for the EOHWC's Operation and Maintenance of Stormwater Retrofit Practices and the EOHWC's SRP Operations and Maintenance Manual (OMM) available on the EOHWC's website, in order to assist the EOHWC in achieving a cost effective balance of installation and maintenance costs.

2.3. Terms and Conditions of Contract. The EOHWC expects to enter into a contract with the selected Proposer(s) in substantially the form attached hereto at **Appendix II**. Submission of a proposal constitutes an acknowledgement that the proposer has thoroughly examined and become familiar with the work required under this Solicitation, that it is capable of performing quality work to achieve the objectives of the EOHWC, and that it will accept those terms and conditions unless exceptions are specified in the proposer's submission as set forth in this section. Any objection to the terms and conditions must be expressly identified in a separate section of the respondent's proposal identified as "objections to terms and conditions" and with reference to the specific provisions objected to. EOHWC reserves the right to reject any objections as nonresponsive.

2.4. SRP's. The Scope of Services and schedules for specific SRP's shall be authorized on a task order basis that identifies the specific project and schedule for which Work is authorized to commence. All submittals and design milestones are required to meet the structure set forth in the SRPDM.

2.5. Contract Term. It is the intent to award one or more Contract(s) for a one-year period with the option for up to two one-year renewal(s), subject to EOHWC's right of early termination as provided in the Contract. Any decision to renew the Contract(s) will be at the sole discretion of EOHWC.

3. PROPOSAL SUBMITTAL

3.1. Sealed Proposals. Sealed proposals will be received at the EOHWC main office at either of the following

Postal Delivery:
EOHWC
2 Route 164
Patterson, NY 12563

Parcel Delivery Service:
EOHWC
2 Route 164
Patterson, NY 12563

Proposals must be received by 12:00 PM on the Proposal Due Date specified on the cover page of this Solicitation. The Proposer shall be responsible for actual delivery of the proposal to the required location before the deadline. Any proposal received after the deadline by any delivery method will not be accepted by EOHWC. All electronically transmitted Proposals will be disqualified by EOHWC. A Proposal may be withdrawn by the Proposer prior to the specified submittal time. No Proposal may be withdrawn by any party after the specified submittal time.

Each proposal shall include five (5) hard copies and one (1) CD containing the required forms and/or certifications provided with this Solicitation and Addenda, and shall be completed by the Proposer. The Proposer shall submit the required number of copies in one or more sealed opaque envelope(s). The outermost envelope shall include: Solicitation Number, "PROPOSAL ENCLOSED", the name and address of the Proposer; in a location and of sufficient size to be easily identified by any person receiving the envelope. The Proposal shall be written in a legible font style and size (e.g. arial 12 point, Times New Roman 12 point, etc.)

Proposers are required to provide all of the information requested in this Solicitation, along with any additional information or alternates requested by EOHWC. It is the Proposer's responsibility to provide all requested information and to describe clearly the benefits of their service in meeting the needs of the EOHWC established in this Solicitation. The EOHWC will not be responsible for any omissions on the part of the Proposer, and is not required to notify the

Proposer of omitted information, nor required to accept omitted information after the specified submittal time. Proposers are cautioned to read the Solicitation carefully and follow the response format, as any deviation from the format and requirements listed may be cause for rejection. No proposal will be accepted which contains any changes, additions, omissions or erasures.

Proposals must be signed in ink by the Proposer. Proposals which are incomplete, conditioned or obscure, or which contain additions not called for (e.g. erasures, alterations, ambiguities or irregularities of any kind) may be rejected as incomplete.

3.2. Site Visits. Informational site visits, if available, will be conducted on the date or dates set forth on the cover page of this Solicitation. Site access to all projects may not be available at the time of this Solicitation.

3.3. Interpretation, Clarifications, and Addenda

Questions regarding this Solicitation must be in writing and must be received by the contact person identified above at the address set forth above no later than 4:00 p.m. on the Questions Due Date specified on the cover page of this Solicitation. No oral modification will be binding.

Any and all such interpretations and any supplemental instructions will be in the form of a written Addendum to the Solicitation. If an Addendum is issued, it will be sent by e-mail to Proposers who have received this Solicitation. Any Addenda so issued shall become part of this Solicitation.

Failure of any Proposer to receive any such addendum or interpretation shall not relieve such Proposer from any obligation under his Proposal submitted.

4. PROPOSAL CONTENTS

4.1. Required Information. The Proposal shall include the following:

a. Cover Letter:

    1 Name, Address, and Telephone number of the licensed Professional Engineer to be assigned as project manager for the project or projects (include local office address if different)
    2 Acknowledgement of receipt of any Addenda
    3 Printed name and signature by an Officer authorized to bind the Proposer

b. Statement of Qualifications and Experience. Include the background, qualifications, credentials and experience of the Project Manager and other key project staff proposed to be assigned that would support its ability to do the proposed work in a professional and timely manner.

c. Design Approach. The proposal shall describe how the Proposer will provide the SRP design for the designated SRP or SRP's based on the criteria described in the EOWHC Stormwater Retrofit Project Design Manual, most recent edition.
d. Statement of References (3 references). Describe recent projects similar to the type of work requested. Include a detailed list of three projects with similar characteristics. For the projects listed, provide the name, title, and telephone number of the client official responsible for the project.
e. Financial Proposal.
    1 A lump sum fee for each project for which the Proposer wishes to be considered (FORM A). The fee shall be inclusive of direct and indirect fees and/or costs and taxes. The fee shall not include any excise or sales taxes from which the municipalities are exempt. Any contingencies/uncertainties shall be clearly identified.
    2 Detailed hourly fee schedule showing the rates for each of the professional or clerical staff proposed to be used. The rate shall be the fully-loaded rate, inclusive of all overhead and profit markup.
    3 Identify Project manager, key staff and any proposed Subcontractors.
f. Conflicts of Interest statement (FORM C): The Proposal shall include a statement describing any potential conflicts of interest the Proposer may have due to work being done for outside parties. Also the Proposal shall describe any business or family associations with any of the Board of Directors of the EOHWC, or of any persons employed by the EOHWC or any municipalities who are members of EOHWC. Refer to the EOHWC's Code of Ethics posted on its website, www.eohwc.org.
g. Statement of Non-Collusion (FORM C)
h. Statement of Insurance (FORM D).
i. Certification that VENDEX has been completed
j. Any other information that the Proposer may wish to provide to demonstrate that they can complete the work described in this Proposal.

4.2. Joint Proposals. Where two or more Engineers desire to submit a single proposal in response to this Solicitation, they should do so on a prime-sub Consultant basis rather than as a joint venture.

4.3. Exceptions and Deviations. Any exceptions to the requirements in this Solicitation, including the insurance requirements and the contract terms and conditions, must be included as a separate element of the proposal under the heading "Exceptions and Deviations." EOHWC retains the right, in its sole discretion, to reject these requests for exception.

4.4. VENDEX

a. The Proposal shall include certification and documentation that the Proposer and all subcontractors retained or to be retained by it have completed the applicable New York City Vendor Information Exchange System ("VENDEX") questionnaire, submitted the completed

questionnaire to New York City as required therein, and otherwise complied with all VENDEX requirements.

b. If the Proposer's complete VENDEX submission is more than 2½ years old, the Proposer shall submit documentation that it has completed new forms and returned them directly to New York City at the address provided therein. If there have been no changes in information requiring an update of the forms, the Proposer shall provide proof it has executed a Certification of No Change and submitted it to New York City. If there have been changes in information requiring an update of the forms, the Proposer shall submit proof that it has submitted full questionnaires using new forms to New York City.

4.5. Duration of Proposal. The Proposal shall remain effective for at least ninety (90) days from the submittal date defined in the Advertisement or Addenda.

4.6. Statement of Insurance. Attach evidence of general liability, automobile liability, worker's compensation, and professional liability insurance as set forth at **APPENDIX II**. By signing and submitting a proposal, the Respondent certifies that if awarded the contract, it will have the applicable coverage described at **APPENDIX II** in effect at the time of award and execution, and will maintain this coverage during the entire term of the contract.

4.7. Required Forms. All responses shall include the attached Forms, along with all supporting items. All blank spaces in the Forms must be filled in. Any items which are not applicable should be marked N/A (not applicable).

5. PROCEDURE FOR SELECTION

5.1. Basis of Award. EOHWC anticipates making the award to the proposer or proposers whose proposal represents the best value taking into account all facts and circumstances.

5.2. Review Procedure. A review committee consisting of the EOHWC Technical Committee and the Director of Engineering will review and evaluate proposals taking into account the following factors:

a. Professional qualifications and specific experience and competence in area needed: 30%
b. Capacity to accomplish the work in the required time, past performance on contracts with EOHWC and other agencies, familiarity with location and local regulations regarding project(s), and history of change orders required in construction: 30%
c. Bid price: 40%.

In reviewing the foregoing factors, EOHWC may further consider such information as it may deem material to the foregoing including: Financial and organizational capacity; legal authority to do business in the State of New York and the Counties of Dutchess, Putnam and

Westchester; business integrity of the owners/officers/principals/members and contract managers, including compliance with New York City VENDEX procedures; past performance of the bidder on prior government contracts; sufficiency of proposer's personnel to meet the requirements deliverables of the specifications; ability to meet insurance requirements noted in the specifications; and record of compliance with NYS Labor Law requirements.

EOHWC's review committee may select one or more respondents for interviews based on the review of the responses, and will recommend one or more firms to the Executive Committee.

The Executive Committee will make the final selection and authorization of contract terms in its discretion based on its determination as to the best interests of EOHWC taking into account all facts and circumstances it deems material. Notwithstanding any other provisions of this Solicitation, EOHWC reserves the right to award a contract to the Proposer(s) that best meet the requirements of the Solicitation, and not necessarily to the lowest cost proposal.

5.3. Notice of Award and Contract. The EOHWC will select a firm by means of a Notice of Award issued pursuant to a resolution adopted by the Executive Committee. Neither the selection of a firm nor the issuance of a Notice of Award shall constitute a binding commitment on behalf of the EOHWC to enter into a services contract with the firm, as any binding arrangement must be set forth in definitive agreement signed by both parties and shall be subject to all requisite approvals.

6. EOHWC's RESERVATION OF RIGHTS

6.1. Reserved Rights. The EOHWC in its sole discretion specifically reserves to itself the following rights:

a. Amend, withdraw or cancel this Solicitation, in whole or in part, at any time;
b. Award a contract to a Proposer, in whole or in part;
c. Disqualify any Proposer whose conduct and/or proposal fails to conform to the requirements of this solicitation;
d. Seek clarifications and revisions of Proposals;
e. Use proposal information obtained through site visits, management interviews and the EOHWC's investigation of a Proposer's qualifications, experience, ability or financial standing, and any material or information submitted by the Proposer in response to the EOHWC's request for clarifying information in the course of evaluation and/or selection under this solicitation;
f. Waive any informality or defect;
k. Negotiate with a Proposer, within the scope of the Solicitation in the best interests of the EOHWC;
m. Utilize any and all ideas submitted in the Proposals received.

6.2. No Liability for Errors

While the EOHWC has used considerable efforts to ensure an accurate representation of information in this Solicitation, EOHWC makes no representation as to the information provided. All Proposers are urged to conduct their own investigations into the material facts and the EOHWC shall not be held liable or accountable for any error, omission, or inconsistency in any part of this Solicitation. Proposer is solely responsible to establish, verify, and ensure that any and all information is correct, complete and necessary to provide a complete and informed proposal.

6.3. No EOHWC Obligation for Proposal Costs

Costs associated with the preparation of a proposal, including but not limited to any transportation costs to any subsequent interviews shall be the sole responsibility of the Proposer, with the express understanding that there will be no claim whatsoever for reimbursement from the EOHWC

6.4. Public Announcements. News releases or other public announcements relating to this Solicitation shall not be made by any party without the prior written approval of the EOHWC.

6.5. Freedom of Information Law. All proposals submitted to the EOHWC in response to this Solicitation may be disclosed in accordance with the standards specified in the Freedom of Information Law, Article 6 of the Public Officers Law of the State of New York ("FOIL"). A firm submitting a proposal may provide in writing, at the time of its submission, a detailed description of the specific information contained in its submission which it has determined is a trade secret and which, if disclosed, would cause substantial injury to such firm's competitive position, including completion of **FORM E.** This characterization shall not be determinative, but will be considered by the EOHWC when evaluating the applicability of any exemptions in response to a FOIL request. However, EOHWC assumes no responsibility for any disclosure or use of information submitted.

ATTACHMENTS TO THIS SOLICITATION:

APPENDIX I: Initial Evaluations for SRP's in this Solicitation Round

APPENDIX II: Form of Agreement for Professional Services (Engineering Services), including Insurance Requirements

APPENDIX III: Proposal Forms.

The following forms must be completed and returned with the proposal:

FORM "A" Lump Sum Fee Proposal

FORM "B" Conflict of Interest Affidavit

FORM "C" Statement of Non-Collusion

FORM "D" Statement of Insurance

FORM "E" Confidentiality Notice (FOIL)

EAST OF HUDSON
WATERSHED CORPORATION

2 Route 164
Patterson, NY 12563
Tel: 845-319-6349
Fax: 845-319-6391

APPENDIX I

Initial Evaluations for SRPs

EAST OF HUDSON
WATERSHED CORPORATION

2 Route 164
Patterson, NY 12563
Tel: 845-319-6349
Fax: 845-319-6391

INITIAL EVALUATION SUMMARY INFORMATION

Project ID: Kent-MB-601

Location: Montrose Dr, Town of Kent

Land Ownership: Public

Requested services: The proposed stormwater retrofit project includes the design and construction administration services for the installation of a multiple pond system on public property. Engineer is expected to confirm all information provided within the Initial Evaluation. Survey information will be provided by EOHWC.

Project ID: Pat-EB-602

Location: Dayton Rd, Town of Patterson NY

Land Ownership: Public

Requested services: The proposed stormwater retrofit project includes the design and construction administration services for the stabilization of a highly eroded channel on municipal property. Engineer is expected to confirm all information provided within the Initial Evaluation. In addition to stabilization of the channels in question, the engineer will be required to quantify the amount of water quality volume which can be captured with the use of check dams, in order to provide additional phosphorus reduction credit. Survey information will be provided by EOHWC.

EAST OF HUDSON
WATERSHED
CORPORATION

Initial Engineering Evaluation

Kent-MB-601

Prepared by

The East of Hudson Watershed Corporation

Date: March 17, 2017

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NWI Wetland Map
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Kent-MB-601 Phosphorus Loading Calculations

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1.0 INTRODUCTION

The East of Hudson Watershed Corporation (EOHWC) was created to oversee the design and installation of Stormwater Retrofit Projects (SRP's) within the New York City Department of Environmental Protection (NYCDEP) drinking water reservoir system located east of the Hudson River. The major focus of these projects is the reduction of phosphorus (P) from stormwater runoff prior to entering the reservoir system and is monitored and approved by the New York State Department of Environmental Conservation (NYSDEC). The basis of design for the SRP program is the NYSDEC Stormwater Management Design Manual (SMDM), 2015. Both Water Quality Volume (WQv) calculation and stormwater management practice (SMP) selection follow all SMDM, 2015 regulations and requirements.

The engineering initial evaluation process begins with an estimation of the phosphorus concentration or "loading" within the stormwater runoff from a given drainage area. Once a phosphorus load (P-load) has been determined, an appropriate SMP is selected to remove as much of the P-load as the site constraints will allow.

1.1 Project Objectives

The Montrose Drive contributing drainage area (DA-1) contains a number of stormwater runoff catch basins and piping that collects and routes stormwater runoff to the northwest corner of the drainage area. This project proposes to provide the contributing drainage area with a series of ponds that will treat the water quality volume (WQv).

The project designated as Kent-MB-601 will use one (1) of the NYDEC approved SMPs. This project proposes to design and install a multiple pond system. The main objective of this type of project is to collect and treat previously untreated stormwater runoff prior to discharge off site.

2.0 EXISTING CONDITIONS

The Engineering analysis of these projects began with a site investigation to verify site characteristics and to verify engineering parameters and assumptions that will be used to determine the Engineering Basis of Design.

2.1 Project Location

The Montrose Drive area is located within the Town of Kent, NY. The proposed multiple pond system will be located in the northwestern area of the project contributing drainage area. Figure 2.1 below shows the location of Montrose Drive area.

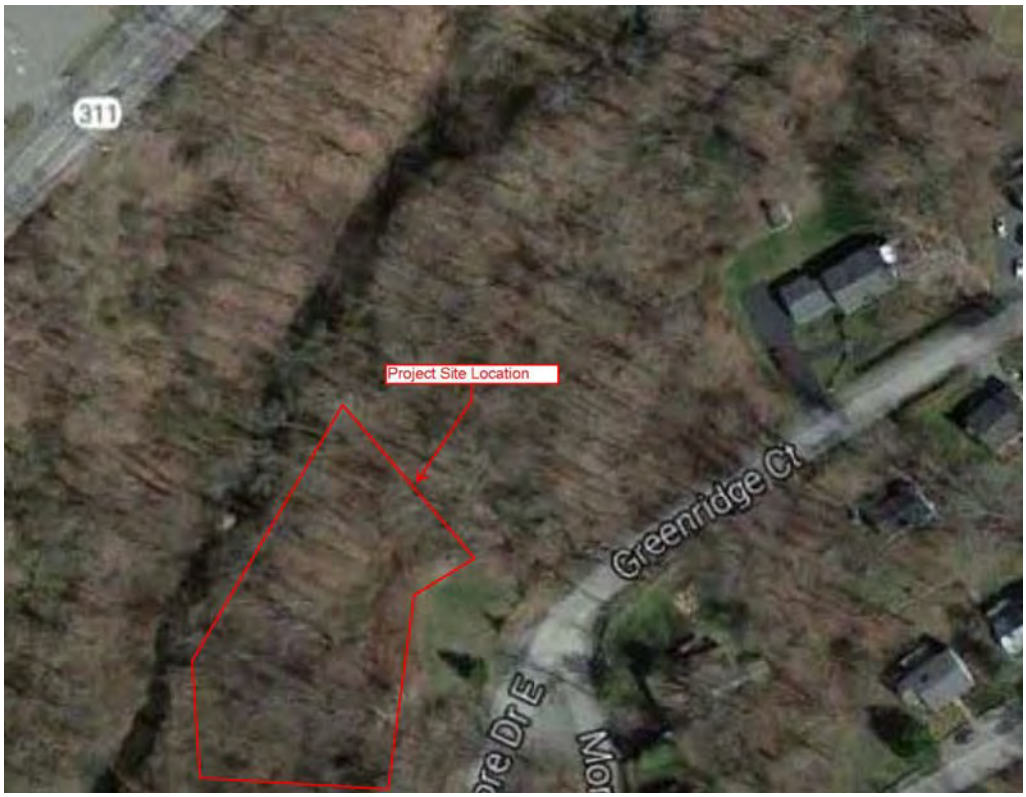

Figure 2.1 Montrose Drive area Location Map

2.2 Current Land Use

The Montrose Drive area is owned by the Town of Kent and is currently unused. The figures listed below verify the locations of any existing wetland areas managed by the NYSDEC and the USACOE, and those areas designated as flood plains by the Federal Emergency Management Agency (FEMA). The maps are shown in Appendix A and include the following:

- FIRM Mapping
- NYSDEC ERM Wetland Mapping
- National Wetland Inventory (NWI) Wetland Mapping

The FIRM map verifies that the project location is outside of the 100 and 500 year flood plan (FIRM Mapping). The ERM and NWI maps show that the project location is outside the influence of any NYSDEC and USACOE designated wetland areas.

2.3 USGS Soil Classification

The Hydrologic Soil Group index is based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils

are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

When a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter describes the drained areas and the second refers to the undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes. Figure 2.2 below shows the soil types in the project area.

Figure 2.2 USGS Soil Types

The percent of soils within the project area and their respective HSG values are shown in Appendix A. The site is a mix of B, C and D soil groups with approximately 30% of the soils within the C classification and approximately 70% a combination B/D HSG.

2.4 Site Topology

The topology of the pond location starts at an elevation of approximately 630 ft at the northwest corner of the Montrose Drive area. The site itself slopes down gradient to the

northeast to an elevation of approximately 620 feet near the stream that flows into Lake Carmel. The contributing drainage area for this site is approximately 61 acres and has an elevation range from approximately 890 feet at the high point to 620 feet at the proposed pond location.

2.5 Stormwater Flow Path

The stormwater runoff flow paths for the site currently run southeast to northwest within the residential neighborhood for one contributing drainage areas (DA-1). A figure showing this drainage sub-basin is included in Appendix B.

2.6 Nearest Receiving Waterbody

The nearest receiving water body is the NYSDEC designated Lake Carmel. This wetland area is located outside the project area as shown on the NYSDEC ERM map that is included in Appendix A.

3.0 ENGINEERING BASIS OF DESIGN

The Montrose Drive drainage area is approximately 61 acres in size and is located in Town of Kent, New York. An initial project site visit to the Montrose Drive area was performed. During this initial site investigation, the stormwater runoff collection system was reviewed. Stormwater runoff for the contributing drainage area flows to a natural channel adjacent the northern boundary that flows west into Lake Carmel.

3.1 Stormwater Management Practice Selection

The Montrose Drive area in the Town of Kent is a residential area with the site impervious area of approximately 25%. Any SRP selected for this project must have a minimal impact on the community including residential schedules and public traffic during normal business hours.

Only a limited number of SMP's can be considered for this SRP. This high traffic area precludes the use of particle separators as well as any underground storage or infiltration systems within the neighborhood. Additionally, the high groundwater table eliminates infiltration practices near the stream adjacent to Lake Carmel. Any wetland or bioretention practices are expensive due to plantings and would ultimately be overtaken be invasive species that are present within Lake Carmel.

A multiple pond treatment system provides the greatest P-Removal and is acceptable within the site design parameters.

3.2 Design Considerations

Phosphorus removal requires the treatment of the WQv generated from the contributing drainage area (DA). The phosphorus load (P-Load) for this project was calculated using the simple method (SM). It was initially estimated that 80% of the WQv will be treated due to the size of the treatment area prior to outfall into Lake Carmel.

3.3 Stormwater Management Practice (SMP)

Site survey of the project area was performed to verify existing catch basin locations and conveyance pipe size and length. Figure 3.1 below shows the locations of the multiple pond treatment system.

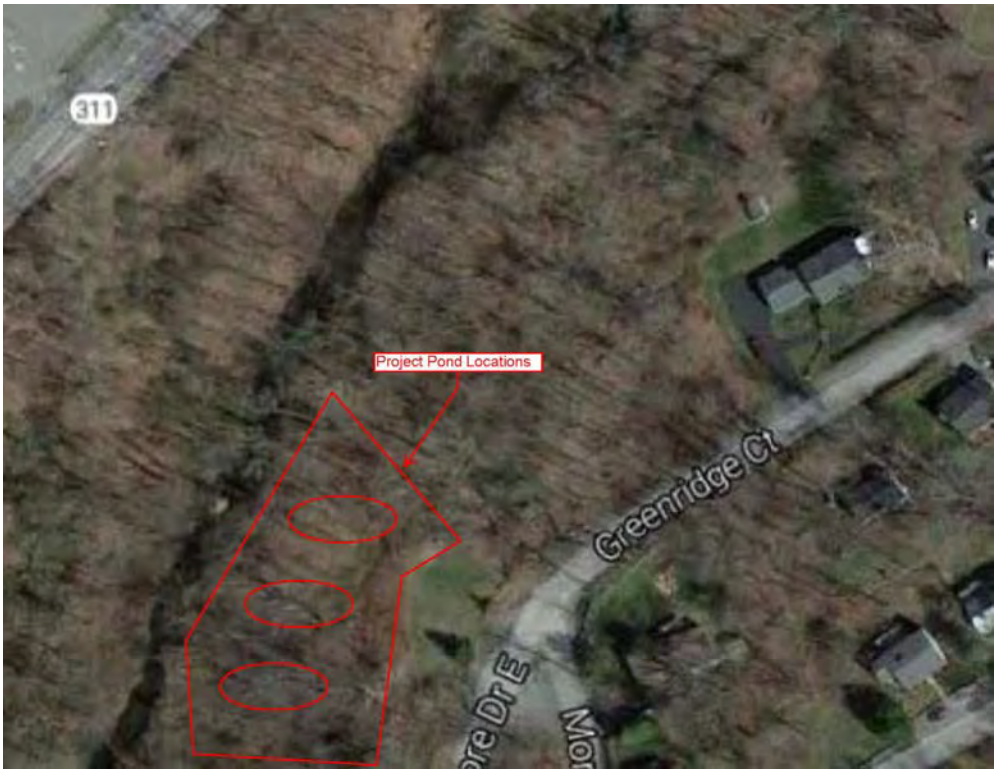

Figure 3.1 Kent-MB-601 Multiple Pond Location Map

3.4 Design Analysis

The total drainage area for project Kent-MB-601 is approximately 61.0 acres and is defined as one (1) sub-basin contributing drainage area (DA-1).

A Figure showing the drainage area is included in Appendix B. Table 3.1 below shows the design parameters for the project.

Table 3.1 Kent-MB-601 Site Analysis

Drainage Area ID	Contributing Drainage Area (ac)	Impervious Area (ac)
DA-1	61.2	18.5

The contributing drainage area (DA-1) flows to one outfall location and subsequently into previously identified proposed multiple ponds.

3.5 Phosphorus Loading Calculation

As noted above, the contributing drainage area was used to determine the runoff information for the WQv events for the proposed SRP. As part of this design, the simple method was used to calculate the WQv and the P-Loading Rate for the site. The WQv was determined to be approximately 86,000 ft^3, with a P-load of 25.63 Kg/yr. It is further estimated that only eighty percent (80%) of this P-load will be treated due to the limited area for the pond locations. This calculation is approximately 20.5 Kg/yr of overall reduction. This SM worksheet is shown in Appendix B.

4.0 ANTICIPATED REGUALTORY APPROVAL AND PERMITS

A regulatory review was conducted for this project location. It was determined that a wetland permit from Town of Kent will not be required for this project. A NYSDEC general permit for construction activity SPDES GP-0-15-002 will be required for this project.

Appendix A

FIRM Map

NYSDEC ERM Wetland Map

NWI Wetland Map

Soil Characterization and Delineation

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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

MAP SCALE 1" = 500'

250 0 500 1000

FEET

METER

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

3 — 3 — Limited detail cross section line

23 — 23 — Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

76°N — 1000-meter Universal Transverse Mercator grid values, zone 18N

600000 FT — 5000-foot grid ticks: New York State Plane coordinate system, East zone (FIPSZONE 3101), Transverse Mercator projection

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 — River Mile

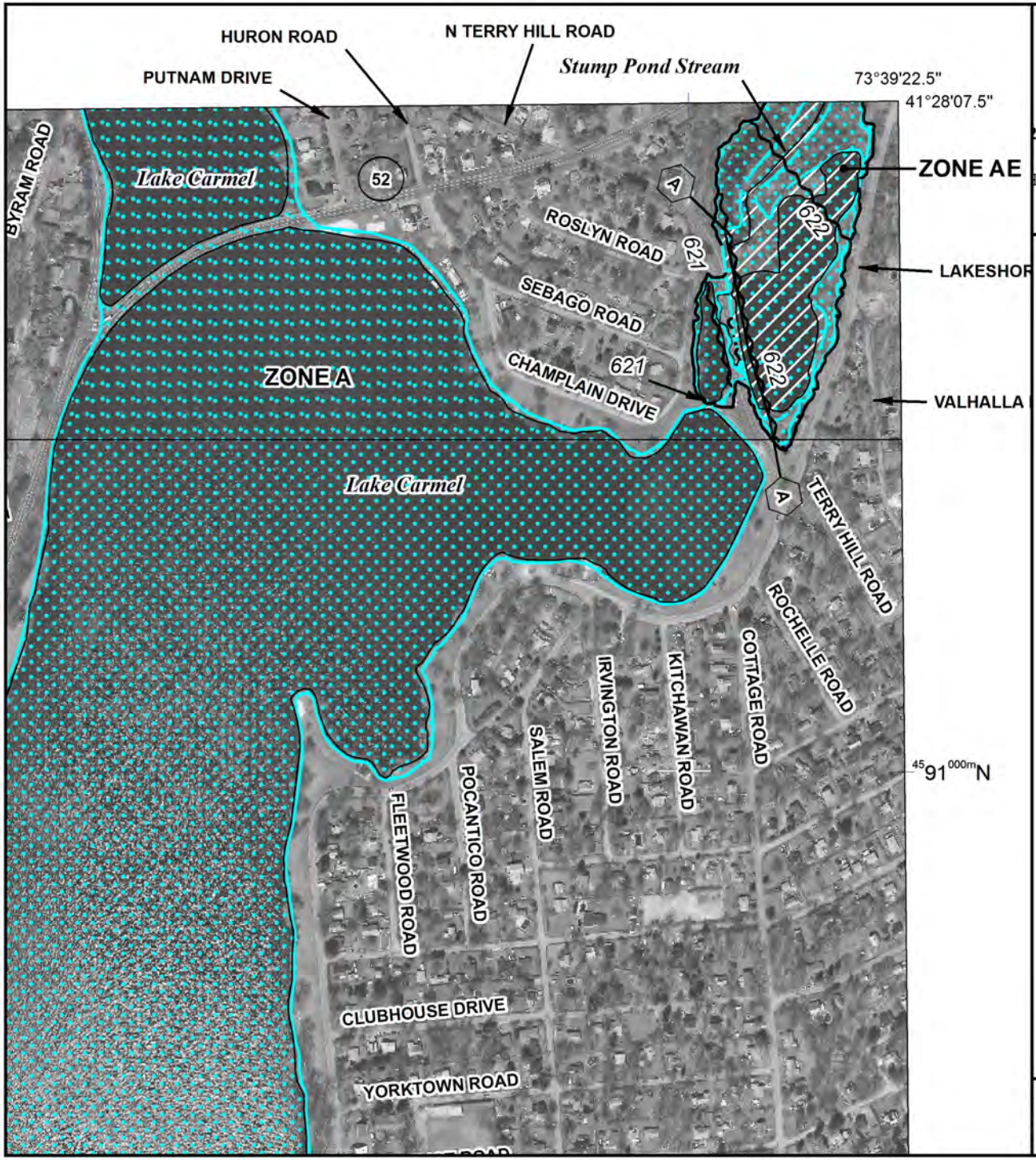
MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 28, 2007

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



MAP SCALE 1" = 500'

250 0 500 1000

FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0133E

FIRM

FLOOD INSURANCE RATE MAP

PUTNAM COUNTY, NEW YORK
(ALL JURISDICTIONS)

PANEL 133 OF 256

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

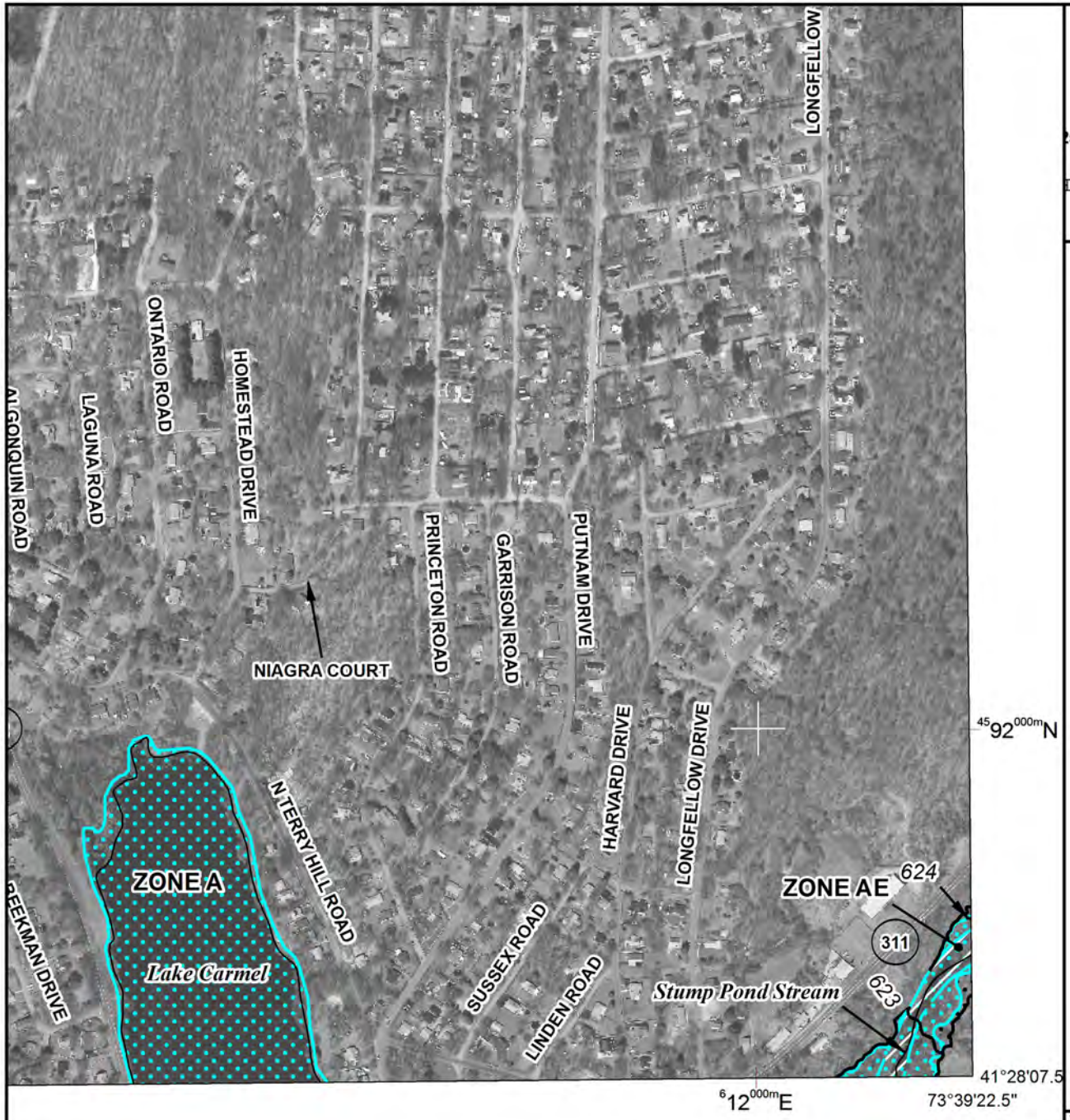
COMMUNITY	NUMBER	PANEL	SUFFIX
CARMEL, TOWN OF	360669	0133	E
KENT, TOWN OF	360671	0133	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36079C0133E

EFFECTIVE DATE
MARCH 4, 2013

Federal Emergency Management Agency



MAP SCALE 1" = 500'

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FEET

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NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0131E

FIRM

FLOOD INSURANCE RATE MAP

PUTNAM COUNTY, NEW YORK
(ALL JURISDICTIONS)

PANEL 131 OF 256

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KENT, TOWN OF	360671	0131	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
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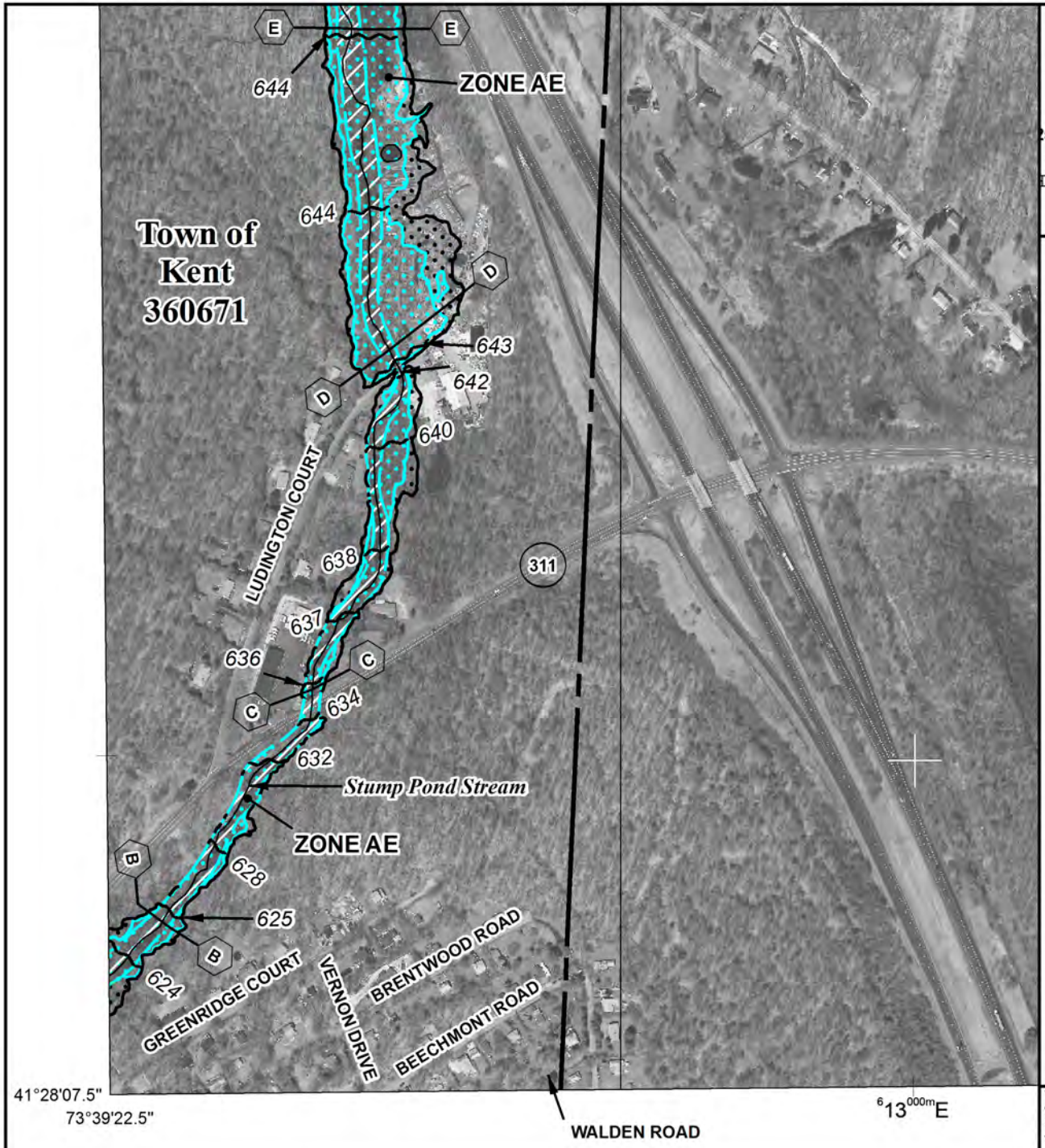
EFFECTIVE DATE
MARCH 4, 2013

Federal Emergency Management Agency



MAP SCALE 1" = 500'

250 0 500 1000

FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0132E

FIRM

FLOOD INSURANCE RATE MAP

PUTNAM COUNTY,
NEW YORK
(ALL JURISDICTIONS)

PANEL 132 OF 256

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KENT, TOWN OF	360671	0132	E
PATTERSON, TOWN OF	361023	0132	E

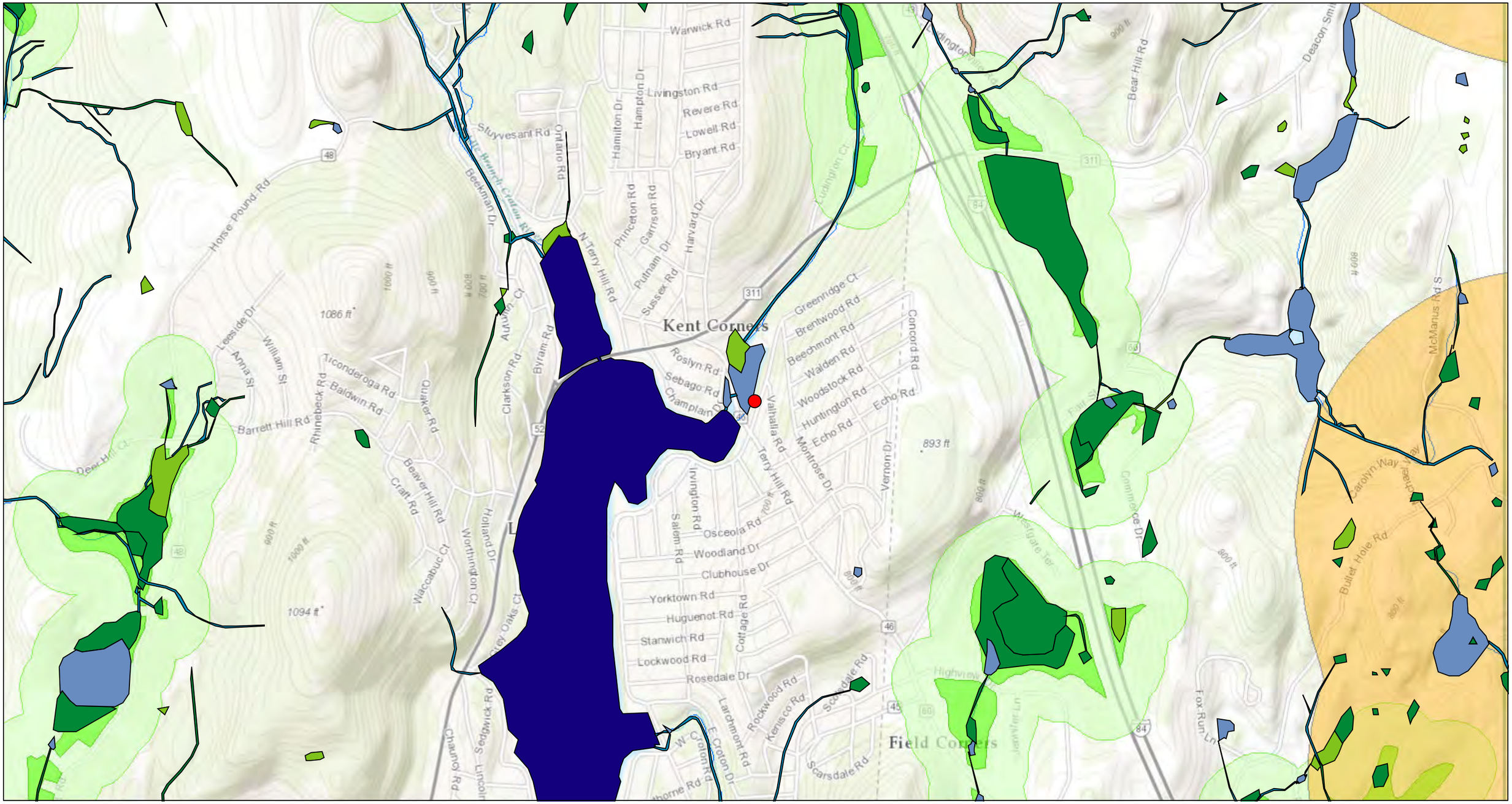
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36079C0132E

EFFECTIVE DATE
MARCH 4, 2013

Federal Emergency Management Agency

Kent MB 601 ERM



December 16, 2016

1:18,056

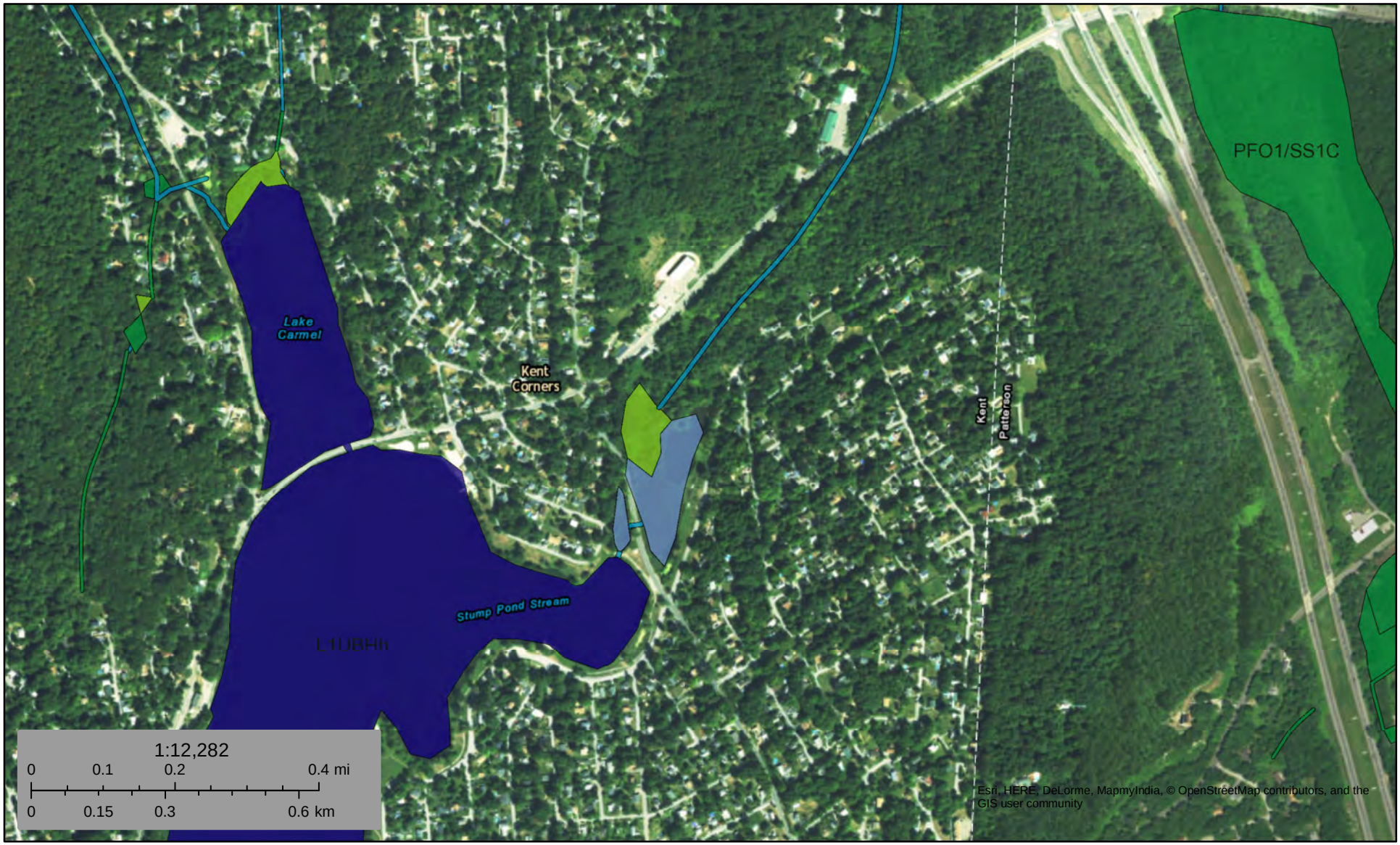
0 0.225 0.45 0.9 mi

0 0.35 0.7 1.4 km

U.S. Fish and Wildlife Service

National Wetlands Inventory

Kent-MB-601



December 16, 2016

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

Hydrologic Soil Group—Putnam County, New York
(Kent-MB-601)

Map Scale: 1:593 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Putnam County, New York
Survey Area Data: Version 13, Sep 24, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Putnam County, New York (NY079)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RdB	Ridgebury loam, 3 to 8 percent slopes	B/D	1.1	100.0%
Totals for Area of Interest			**1.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix B

Contributing Drainage Area Mapping

Kent-MB-601 Phosphorus Loading Calculations

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Feet

0 130 260 520 780 1,040

Coordinate System: NAD 1983 UTM Zone 18N
Central Meridian: 75°0'0"W

EAST OF HUDSON WATERSHED CORPORATION

Montrose Drive

Approximate Drainage Areas

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Kent-MB-601

Inputs

DA (acres)	61.5		Retrofit:	Multiple Pond	
Impervious (acres and %)	18.5	30.08	Removal Efficiency:	0.76	
P (in)	1.2		**P Load -->**	**74.35**	lb/yr
Total Annual Rainfall (in)	45			**33.73**	kg/yr
Pj	0.9		**P Removal -->**	**56.51**	lb/yr
				25.63	kg/yr

LEGEND

Input Cell	
Formula Cell	
Output Values	

Land Use	**% of Total Area**	**Weighted EMC**
Residential	1	
Commercial		0.41
Industrial		
Actively Grazed Pasture		
Forest		
Impervious		
Developed Open Space*		

*i.e. golf course, parks, cemeteries, single houses with large lawns

PERCENTAGE CHECK

1.0000

NOTES:

Outputs

Water Quality V	***WQv (acre-ft)***	***WQv (cu-ft)***	***Rv***
	1.973	85922	0.3207

L (lbs) = P x Pj x Rv x C x A x 0.227

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EAST OF HUDSON
WATERSHED
CORPORATION

Initial Engineering Evaluation

Pat-EB-602

Prepared by

The East of Hudson Watershed Corporation

Date: Mach 17, 2017

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1.1 Project Objectives 1
2.0 EXISTING CONDITIONS 1
2.1 Project Location 2
2.2 Current Land Use 2
2.3 USGS Soil Classification 3
2.4 Site Topology 4
2.5 Stormwater Drainage Area 4
2.6 Nearest Receiving Waterbody 4
3.0 ENGINEERING BASIS OF DESIGN 4
3.1 Preliminary Site Grading 4
3.2 Design Considerations 4
3.3 Channel Identification 5
3.4 Engineering Assumptions 5
3.5 Design Analysis 6
3.6 Erosion Control Matting and Rip Rap Sizing 6
3.7 Phosphorus Loading Calculation 7
4.0 ANTICIPATED REGUALTORY APPROVAL AND PERMITS 7

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Figure 2.2 USGS Soil Types 3
Figure 3.1 PAT-EB-602 Channel Location Map 5

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Table 3.2 Channel Material Sizing 6
Table 3.3 Channel P-Load Calculation Summary Table 7

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APPENDICIES

Appendix A

FIRM Map
NYSDEC ERM Wetland Map
NWI Wetland Map
Soil Characterization and Delineation

Appendix B

Contributing Drainage Area Mapping
HydroCAD 10.0 Modeling Results
V-Max SC250 Turf Reinforcement Matting Specifications
BEHI Estimated Soil Erosion Depth
PAT-EB-602 Phosphorus Loading Calculations

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1.0 INTRODUCTION

The East of Hudson Watershed Corporation (EOHWC) was created to oversee the design and installation of Stormwater Retrofit Projects (SRP's) within the New York City Department of Environmental Protection (NYCDEP) drinking water reservoir system located east of the Hudson River. The major focus of these projects is the reduction of phosphorus (P) from stormwater runoff prior to entering the reservoir system and is monitored and approved by the New York State Department of Environmental Conservation (NYSDEC).

The basis of design for the SRP program is the NYSDEC Stormwater Management Design Manual (SMDM), 2015. Both Water Quality Volume (WQv) calculation and stormwater management practice (SMP) selection follow all SMDM, 2015 regulations and requirements.

The engineering design process begins with an estimation of the phosphorus concentration or "loading" within the stormwater runoff from a given drainage area. Once a phosphorus load (P-load) has been determined, an appropriate SMP is selected to remove as much of the P-load as the site constraints will allow.

1.1 Project Objectives

Dayton Road and adjacent properties in Patterson, New York contain an incised channel that has been severely eroded. This project proposes to stabilize the channel banks and prevent further degradation and soil transport. The project designated as PAT-EB-602 will employ one (1) SMP. This is channel stabilization. The main objective of this type of project is to stop the transport of loose soils from severely eroded intermittent stream channels and, if possible, pretreat the runoff from a portion of the drainage area that contributes to the site.

2.0 EXISTING CONDITIONS

The Engineering analysis of these projects began with a site investigation to verify site characteristics and to verify engineering parameters and assumptions that will be used to determine the Engineering Basis of Design. The channel was severely eroded including undercutting of the root systems of many of the trees along it banks. A number of trees have fallen into the channel and there are large areas of exposed soils with clear evidence of transport of sediments through the channel. These observations are indicative of a large volumetric flow of runoff from the contributing drainage area.

2.1 Project Location

Dayton Road is located within the Town of Patterson, NY. The project channel intersects with Dayton Road. The channel is located south of Dayton Road and flows southeast to northwest. Figure 2.1 below shows the location of project proposed as PAT-EB-602.

Figure 2.1 PAT-EB-602 Location Map

2.2 Current Land Use

The location of the channel (CS-1) is in an area between two parcels that is owned by the Town of Patterson. The channel is in a wooded area within a residential community. The figures listed below verify the locations of any existing wetland areas managed by the NYSDEC and the USACOE, and those areas designated as flood plains by the Federal Emergency Management Agency (FEMA). The maps are shown in Appendix A and include the following:

- FIRM Mapping
- NYSDEC ERM Wetland Mapping
- National Wetland Inventory (NWI) Wetland Mapping

The FIRM map verifies that the project location is outside of the 100 and 500 year flood plan (FIRM Mapping). The ERM and NWI maps show that the project location is outside the influence of any NYSDEC and USACOE designated wetland areas.

2.3 USGS Soil Classification

The Hydrologic Soil Group index is based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

When a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter describes the drained areas and the second refers to the undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes. Figure 2.2 below shows the soil types in the project area.

Figure 2.2 USGS Soil Types

The percent of soils within the project area and their respective HSG values are shown in Appendix A. The site is predominantly group B and C with approximately 100% of the soils within these classifications.

2.4 Site Topology

The topology of the project site starts at an elevation of approximately 830 feet and flows east to west to the channel inlet at an elevation of approximately 545 feet at an approximate slope of 14% slope for approximately 2000 linear feet. The channel inlet elevation of 545 feet then slopes at approximately 8% for 250 linear feet to an elevation of 525 feet at the outfall.

2.5 Stormwater Drainage Area

The stormwater runoff flow paths for the site currently run east to west within one (1) contributing drainage areas (DA-1). A figure showing this drainage basin is included in Appendix B. The basin was modeled in HydroCAD 10.0 for this project to estimate volumetric flow and velocities from the WQv, 10 year and 25 year storm events.

2.6 Nearest Receiving Waterbody

The nearest receiving water body is Putnam Lake The project area is not located near any wetland areas as shown on the NYSDEC ERM map that is included in Appendix A.

3.0 ENGINEERING BASIS OF DESIGN

The Dayton Road drainage area is approximately 14 acres in size and is located almost entirely within New Fairfield, Connecticut. An initial project review included a site visit to the Dayton Road. During this initial site investigation, a large incised channel was observed. The repair and stabilization of this large, severely eroded channel has been identified for completion within the SRP program.

3.1 Preliminary Site Grading

The preliminary site grading only affects the incised channel with respect to the overall stability of the channel. The channel slopes will be mitigated as necessary to prevent further soil erosion.

3.2 Design Considerations

Numerous design considerations were examined as part of this projects SMP selection. The site constraints noted below eliminate the use of many SMP's. Infiltration practices, stormwater ponds, engineered wetlands and bioretention areas are not applicable for consideration due to the following site constraints:

1) Number of trees required to be cleared in and around channel area.

2) Possible rocky subsurface.
3) Site Slope of 8%.

3.3 Channel Identification

Site survey of the project area was performed to precisely locate the project channel and the site existing conditions (tree location, etc). Figure 3.1 below shows the location of the channel.

Figure 3.1 PAT-EB-602 Channel Location Map

3.4 Engineering Assumptions

For this design process, a number of variable site parameters were observed in the field and then estimates were developed using sound engineering judgement. The site root depth ranges from 1.5'-2, the site root density is approximately 30%, the average channel side slope is approximately 1:1 and the percent of the channel surface area that is protected is approximately 30%. These assumptions and the results generated using HydroCAD 10.0 were uses to calculate the P-load for the channels.

3.5 Design Analysis

The total contributing drainage area for project PAT-EB-602 is approximately 14.0 acres and is defined as one (1) contributing drainage areas. As previously noted, this area where used to determine the runoff information for the WQv and 25 year storm events for the proposed SRP.

A figure showing the drainage area is included in Appendix B. Table 3.1 below shows the design parameters for the project.

Table 3.1 PAT-EB-602 Calculation Parameters

Drainage Area ID	Contributing Drainage Area (ac)	Impervious Area (ac)
DA-1	14.0	3.0

3.6 Erosion Control Matting and Rip Rap Sizing

The calculation parameters in Table 3.1 above were used to develop the Hydraulic / Hydrologic models for their respective drainage areas. HydroCAD 10.0 was used for this modeling effort and provided the velocity calculations required to estimate the annual depth of soil erosion as well as estimating the runoff velocities for larger storm events. Although the NYSDEC requires that the 25 year storm event be used to assess the channel stabilization matting strength and the size of the streambed stone.

Table 3.2 Channel Material Sizing

Channel ID	WQv Storm Velocity (ft/s)	25 yr Storm Velocity (ft/s)	Rip Rap Sizing (in D_{50})	E&S Permanent Matting
CS-1	5.61	11.64	16	V-Max SC250

The matting selected for this project is the V-Max SC250 Turf Reinforcement Matting, with specification documentation shown in Appendix B. The streambed stone sizing is based on the NYS Erosion & Sediment Control Manual, 2005 (*Standard Specifications for Structural Streambank Protection Table 5B.3, Page 5B.38*). This table was used to approximate the D_{50} as angular rock riprap, shown above in Table 3.2 using interpolated velocities for the six channels.

3.7 Phosphorus Loading Calculation

The depth of erosion estimation uses a Bank Erosion Hazzard Index (BEHI) and associated stream data previously approved by the NYSDEC for use with this application. The HydroCAD models, the BEHI index approximations and the P-loading calculations are all shown in Appendix B. The phosphorus reduction for this project from channel stabilization is estimated at 15.6 Kg/yr and is shown below in Table 3.3.

It is important to note that some P reduction may occur within the stabilized channel through the use of check dams. Sixty percent (60%) reduction of the calculated SM P-load can be achieved if the volume of runoff detained within the check dam pools is equal to the WQv. Table 3.3 below also shows the potential value of P-reduction an additional 3.5 Kg/yr with a total p-reduction of 19.1 Kg/yr if the entire WQv can be treated. This P-reduction value will be reduced by the percent of the WQv detained in the various check dams in the channel.

Table 3.3 Channel P-Load Calculation Summary Table

SMP ID	Simple Method P-Reduction DA-1	CS-1	Total P-Reduction
P-Reduction (Kg/yr)	3.5	15.6	19.1

4.0 ANTICIPATED REGUALTORY APPROVAL AND PERMITS

A regulatory review was conducted for this project location. It was determined that a wetland permit from Town of Patterson will not be required for this project. A NYSDEC general permit for construction activity SPDES GP-0-15-002 will be required for this project.

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Appendix A

FIRM Map

NYSDEC ERM Wetland Map

NWI Wetland Map

Soil Characterization and Delineation

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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM AREAS

MAP SCALE 1" = 500'

250 0 500 1000

FEET

METER

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

3 — 3 — Limited detail cross section line

23 — 23 — Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

24 76 000m N — 1000-meter Universal Transverse Mercator grid values, zone 18N

600000 FT — 5000-foot grid ticks: New York State Plane coordinate system, East zone (FIPSZONE 3101), Transverse Mercator projection

DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

● M1.5 — River Mile

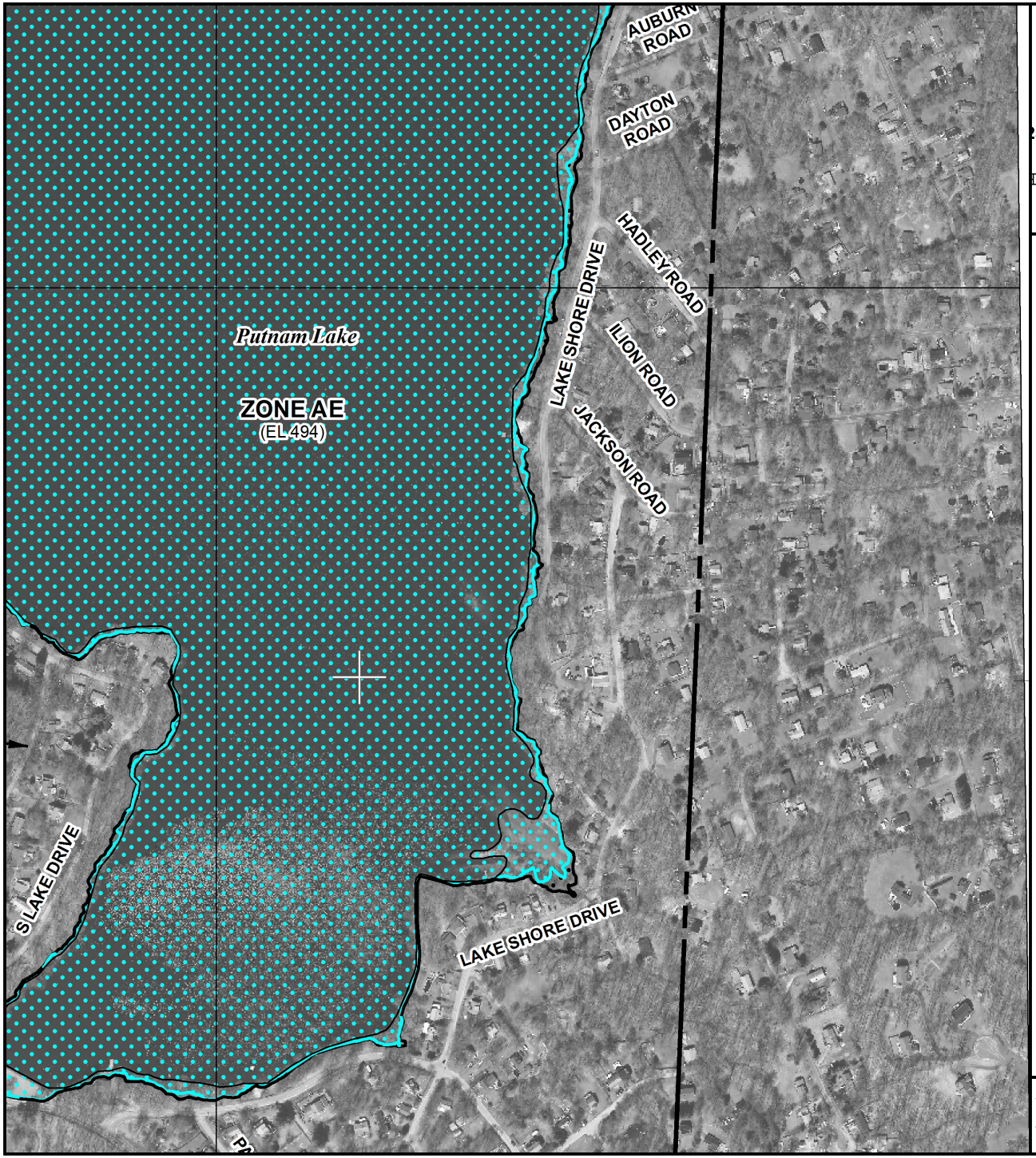
MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 28, 2007

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



MAP SCALE 1" = 500'

250 0 500 1000

FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0158E

FIRM

FLOOD INSURANCE RATE MAP

PUTNAM COUNTY, NEW YORK
(ALL JURISDICTIONS)

PANEL 158 OF 256

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PATTERSON, TOWN OF	361023	0158	E
SOUTHEAST, TOWN OF	361041	0158	E

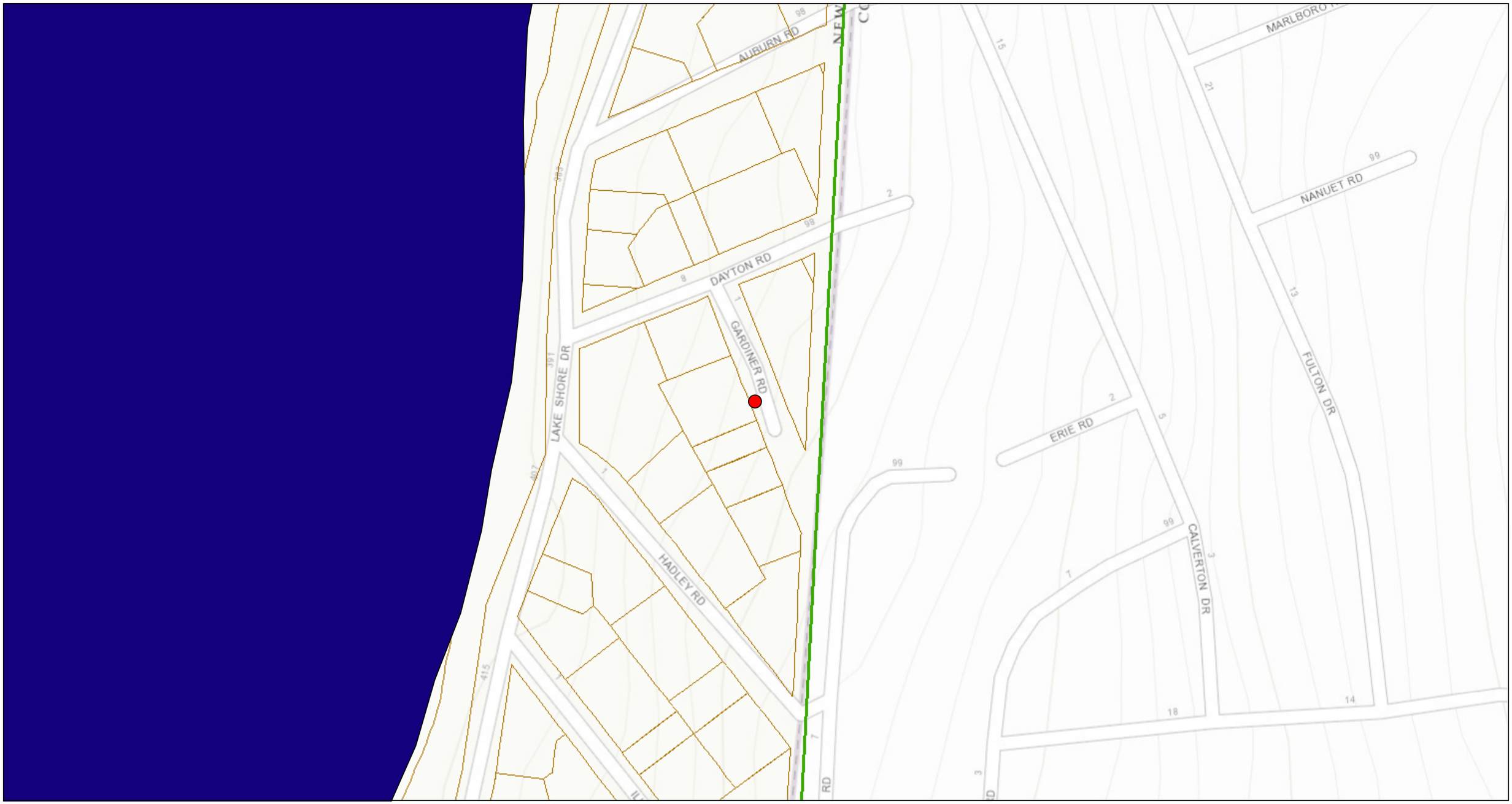
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36079C0158E

EFFECTIVE DATE
MARCH 4, 2013

Federal Emergency Management Agency

Pat-EB-602 ERM



December 16, 2016

1:2,257

0 0.0275 0.055 0.11 mi

0 0.0425 0.085 0.17 km

NYS Department of Environmental Conservation
Not a legal document

U.S. Fish and Wildlife Service

National Wetlands Inventory

Pat-EB-602

December 16, 2016

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

Hydrologic Soil Group—Putnam County, New York
(Kent-MB-601)

Map Scale: 1:593 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Putnam County, New York
Survey Area Data: Version 13, Sep 24, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Putnam County, New York (NY079)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RdB	Ridgebury loam, 3 to 8 percent slopes	B/D	1.1	100.0%
Totals for Area of Interest			**1.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix B

Contributing Drainage Area Mapping

HydroCAD 10.0 Modeling Results

V-Max SC250 Turf Reinforcement Matting Specifications

BEHI Estimated Soil Erosion Depth

Pat-EB-602 Channel Phosphorus Loading Calculations

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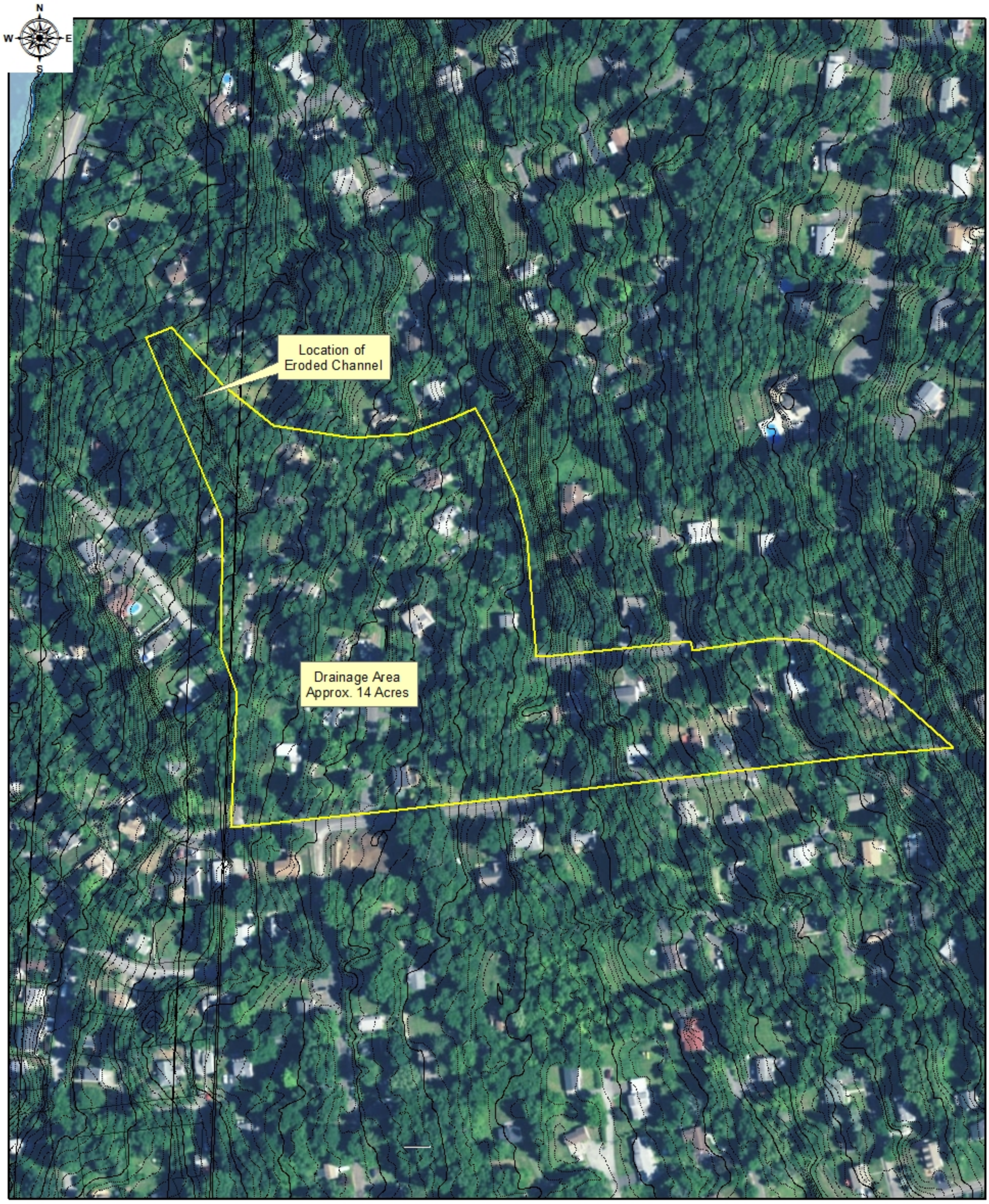

Feet

0 80 160 320 480 640

Coordinate System: NAD 1983 UTM Zone 18N
Central Meridian: 75°0'0"W

EAST OF HUDSON WATERSHED CORPORATION
Dayton Road
Approximate Drainage Area

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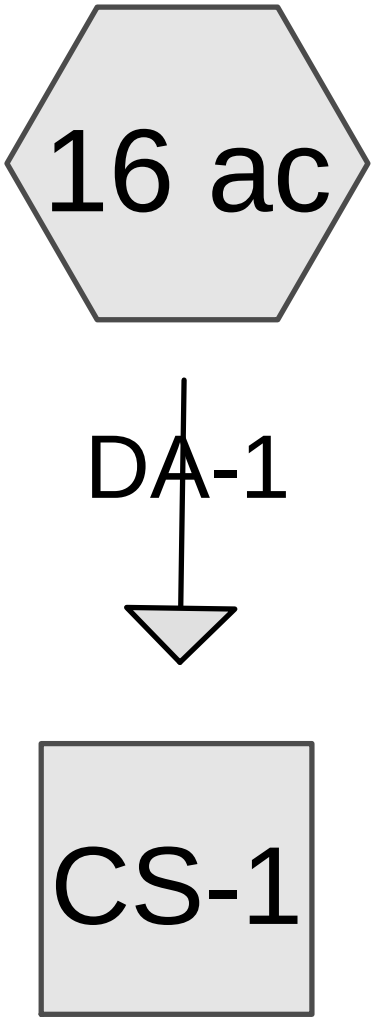


(new Reach)

Subcat Reach Pond Link

Routing Diagram for Pat-EB-602
Prepared by HP, Printed 3/16/2017

Summary for Subcatchment 16 ac: DA-1

Runoff = 45.14 cfs @ 12.19 hrs, Volume= 4.190 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.25"

Area (ac)	CN	Description
3.000	98	Paved parking, HSG C
11.000	81	1/3 acre lots, 30% imp, HSG C
14.000	85	Weighted Average
7.700		55.00% Pervious Area
6.300		45.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
3.7	350	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	450	Total			

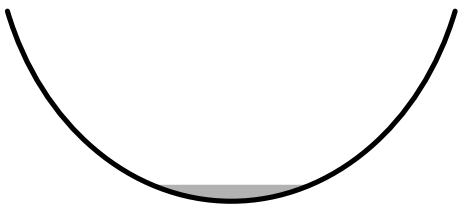
Summary for Reach CS-1: (new Reach)

Inflow Area = 14.000 ac, 45.00% Impervious, Inflow Depth > 3.59" for 10 year event
Inflow = 45.14 cfs @ 12.19 hrs, Volume= 4.190 af
Outflow = 44.74 cfs @ 12.21 hrs, Volume= 4.188 af, Atten= 1%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.74 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 4.03 fps, Avg. Travel Time= 1.4 min

Peak Storage= 1,472 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.86'
Bank-Full Depth= 10.00' Flow Area= 166.7 sf, Capacity= 7,740.39 cfs

25.00' x 10.00' deep Parabolic Channel, n= 0.025 Earth, clean & winding
Length= 350.0' Slope= 0.0714 '/'
Inlet Invert= 80.00', Outlet Invert= 55.00'



Summary for Subcatchment 16 ac: DA-1

Runoff = 59.28 cfs @ 12.19 hrs, Volume= 5.560 af, Depth> 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.50"

Area (ac)	CN	Description
3.000	98	Paved parking, HSG C
11.000	81	1/3 acre lots, 30% imp, HSG C
14.000	85	Weighted Average
7.700		55.00% Pervious Area
6.300		45.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
3.7	350	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	450	Total			

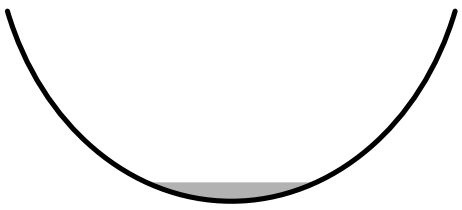
Summary for Reach CS-1: (new Reach)

Inflow Area = 14.000 ac, 45.00% Impervious, Inflow Depth > 4.77" for 25 year event
Inflow = 59.28 cfs @ 12.19 hrs, Volume= 5.560 af
Outflow = 58.80 cfs @ 12.21 hrs, Volume= 5.558 af, Atten= 1%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.64 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 4.28 fps, Avg. Travel Time= 1.4 min

Peak Storage= 1,783 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 10.00' Flow Area= 166.7 sf, Capacity= 7,740.39 cfs

25.00' x 10.00' deep Parabolic Channel, n= 0.025 Earth, clean & winding
Length= 350.0' Slope= 0.0714 '/'
Inlet Invert= 80.00', Outlet Invert= 55.00'



Summary for Subcatchment 16 ac: DA-1

Runoff = 5.31 cfs @ 12.21 hrs, Volume= 0.525 af, Depth> 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.50"

Area (ac)	CN	Description
3.000	98	Paved parking, HSG C
11.000	81	1/3 acre lots, 30% imp, HSG C
14.000	85	Weighted Average
7.700		55.00% Pervious Area
6.300		45.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.1500	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
3.7	350	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.0	450	Total			

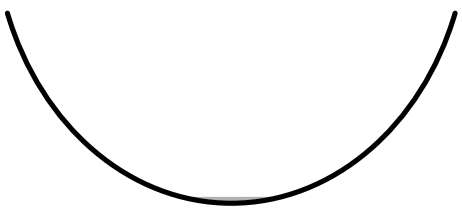
Summary for Reach CS-1: (new Reach)

Inflow Area = 14.000 ac, 45.00% Impervious, Inflow Depth > 0.45" for WQv event
Inflow = 5.31 cfs @ 12.21 hrs, Volume= 0.525 af
Outflow = 5.20 cfs @ 12.25 hrs, Volume= 0.525 af, Atten= 2%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.61 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.84 fps, Avg. Travel Time= 2.1 min

Peak Storage= 330 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 10.00' Flow Area= 166.7 sf, Capacity= 7,740.39 cfs

25.00' x 10.00' deep Parabolic Channel, n= 0.025 Earth, clean & winding
Length= 350.0' Slope= 0.0714 '/'
Inlet Invert= 80.00', Outlet Invert= 55.00'



ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet – VMax® SC250® Turf Reinforcement Mat

DESCRIPTION

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 70% straw and 30% coconut fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, an ultra heavy UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 inch (1.27 x 1.27 cm) openings, and covered by an heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81cm) centers with UV stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats.

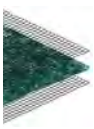
The SC250 shall meet Type 5A, 5B, and 5C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18

Material Content		
Matrix	70% Straw Fiber	0.35 lb/sq yd (0.19 kg/sm)
	30% Coconut Fiber	0.15 lbs/sq yd (0.08 kg/sm)
Netting	Top and Bottom, UV-Stabilized Polypropylene	5 lb/1000 sq ft (2.44 kg/100 sm)
	Middle, Corrugated UV-Stabilized Polypropylene	24 lb/1000 sf (11.7 kg/100 sm)
Thread	Polypropylene, UV Stable	

Standard Roll Sizes		
Width	6.5 ft (2.0 m)	8 ft (2.44m)
Length	55.5 ft (16.9 m)	90 ft (27.4 m)
Weight ± 10%	34 lbs (15.42 kg)	70 lbs (31.8 kg)
Area	40 sq yd (33.4 sm)	80 sq. yd. (66.8 sm)

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.62 in. (15.75 mm)
Resiliency	ASTM 6524	95.2%
Density	ASTM D792	0.891 g/cm^3
Mass/Unit Area	ASTM 6566	16.13 oz/sy (548 g/sm)
UV Stability	ASTM D4355/ 1000 HR	100%
Porosity	ECTC Guidelines	99%
Stiffness	ASTM D1388	222.65 oz-in.
Light Penetration	ASTM D6567	4.1%
Tensile Strength – MD	ASTM D6818	709 lbs/ft (10.51 kN/m)
Elongation – MD	ASTM D6818	23.9%
Tensile Strength – TD	ASTM D6818	712 lbs/ft (10.56 kN/m)
Elongation – TD	ASTM D6818	36.9%
Biomass Improvement	ASTM D7322	441%

Design Permissible Shear Stress		
	Short Duration	**Long Duration**
Phase 1: Unvegetated	3.0 psf (144 Pa)	2.5 psf (120 Pa)
Phase 2: Partially Veg.	8.0 psf (383 Pa)	8.0 psf (383 Pa)
Phase 3: Fully Veg.	10.0 psf (480 Pa)	8.0 psf (383 Pa)
Unvegetated Velocity	9.5 fps (2.9 m/s)	
Vegetated Velocity	15 fps (4.6 m/s)	

	TEMPORARY			PERMANENT			
	BIONET			ERONET	VMAX		
							
	S150BN	**SC150BN**	**C125BN**	**P300**	**SC250**	**C350**	**P550**
Longevity	12 mo.	18 mo.	24 mo.	Permanent	Permanent	Permanent	Permanent
Applications	Moderate Flow Channels 3:1-2:1 Slopes	Medium Flow Channels 2:1-1:1 Slopes	High-Flow Channels 1:1 and Greater Slopes	High-Flow Channels 1:1 Slopes	High-Flow Channels 1:1 and Greater Slopes	High-Flow Channels 1:1 and Greater Slopes	Extreme High-Flow Channels 1:1 and Greater Slopes
Design Permissible Shear Stress lbs/ft² (Pa)	Unvegetated 1.85 (88)	Unvegetated 2.10 (100)	Unvegetated 2.35 (112)	Unvegetated 3.0 (144) Vegetated 8.0 (383)	Unvegetated 3.0 (144) Vegetated 10.0 (480)	Unvegetated 3.2 (153) Vegetated 12.0 (576)	Unvegetated 4.0 (191) Vegetated 14.0 (672)
Design Permissible Velocity ft/s (m/s)	Unvegetated 6.00 (1.83)	Unvegetated 8.00 (2.44)	Unvegetated 10.00 (3.05)	Unvegetated 9.00 (2.7) Vegetated 16.0 (4.9)	Unvegetated 9.5 (2.9) Vegetated 15.0 (4.6)	Unvegetated 10.5 (3.2) Vegetated 20.0 (6.0)	Unvegetated 12.5 (3.8) Vegetated 25.0 (7.6)
Top Net	Leno woven. 100% biodegradable jute fiber 9.30 lbs/1000 ft² (4.53 kg/100 m²) approx wt	Leno woven. 100% biodegradable jute fiber 9.30 lbs/1000 ft² (4.53 kg/100 m²) approx wt	Leno woven. 100% biodegradable jute fiber 9.30 lbs/1000 ft² (4.53 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 5.0 lbs/1000 ft² (2.44 kg/100 m²) approx wt	Heavyweight polypropylene 5.0 lbs/1000 ft² (2.44 kg/100 m²) approx wt	Extra heavyweight polypropylene 8.0 lbs/1000 ft² (3.91 kg/100 m²) approx wt	Ultra heavyweight polypropylene 24.0 lbs/1000 ft² (11.7 kg/100 m²) approx wt
Center Net	N/A	N/A	N/A	N/A	Ultra heavyweight polypropylene – corrugated 24.0 lbs/1000 ft² (11.7 kg/100 m²)	Ultra heavyweight polypropylene – corrugated 24.0 lbs/1000 ft² (11.7 kg/100 m²)	Ultra heavyweight polypropylene – corrugated 24.0 lbs/1000 ft² (11.7 kg/100 m²)
Fiber Matrix	Straw fiber 0.50 lbs/yd² (0.27 kg/m²)	Straw/coconut matrix 70% Straw 0.35 lbs/yd² (0.19 kg/m²) 30% Coconut 0.15 lbs/yd² (0.08 kg/m²)	Coconut fiber 0.50 lbs/yd² (0.27 kg/m²)	UV-stabilized polypropylene fiber 0.70 lbs/yd² (0.38 kg/m²)	Straw/coconut matrix 70% Straw 0.35 lbs/yd² (0.19 kg/m²) 30% Coconut 0.15 lbs/yd² (0.08 kg/m²)	Coconut fiber 0.50 lbs/yd² (0.27 kg/m²)	UV-stabilized polypropylene fiber 0.50 lbs/yd² (0.27 kg/m²)
Bottom Net	Woven. 100% biodegradable jute fiber 7.70 lbs/1000 ft² (3.76 kg/100 m²) approx wt	Woven. 100% biodegradable jute fiber 7.70 lbs/1000 ft² (3.76 kg/100 m²) approx wt	Woven. 100% biodegradable jute fiber 7.70 lbs/1000 ft² (3.76 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 3.0 lbs/1000 ft² (1.47 kg/100 m²) approx wt	Heavyweight UV-stabilized polypropylene 5.0 lbs/1000 ft² (2.44 kg/100 m²) approx wt	Extra heavyweight polypropylene 8.0 lbs/1000 ft² (3.91 kg/100 m²) approx wt	Ultra heavyweight polypropylene 24.0 lbs/1000 ft² (11.7 kg/100 m²) approx wt
Thread	Biodegradable	Biodegradable	Biodegradable	UV-stabilized polypropylene	UV-stabilized polypropylene	UV-stabilized polypropylene fiber	UV-stabilized polypropylene

CS-1

Total BEHI= 21.3

Estimated Soil Depth= 0.1 "

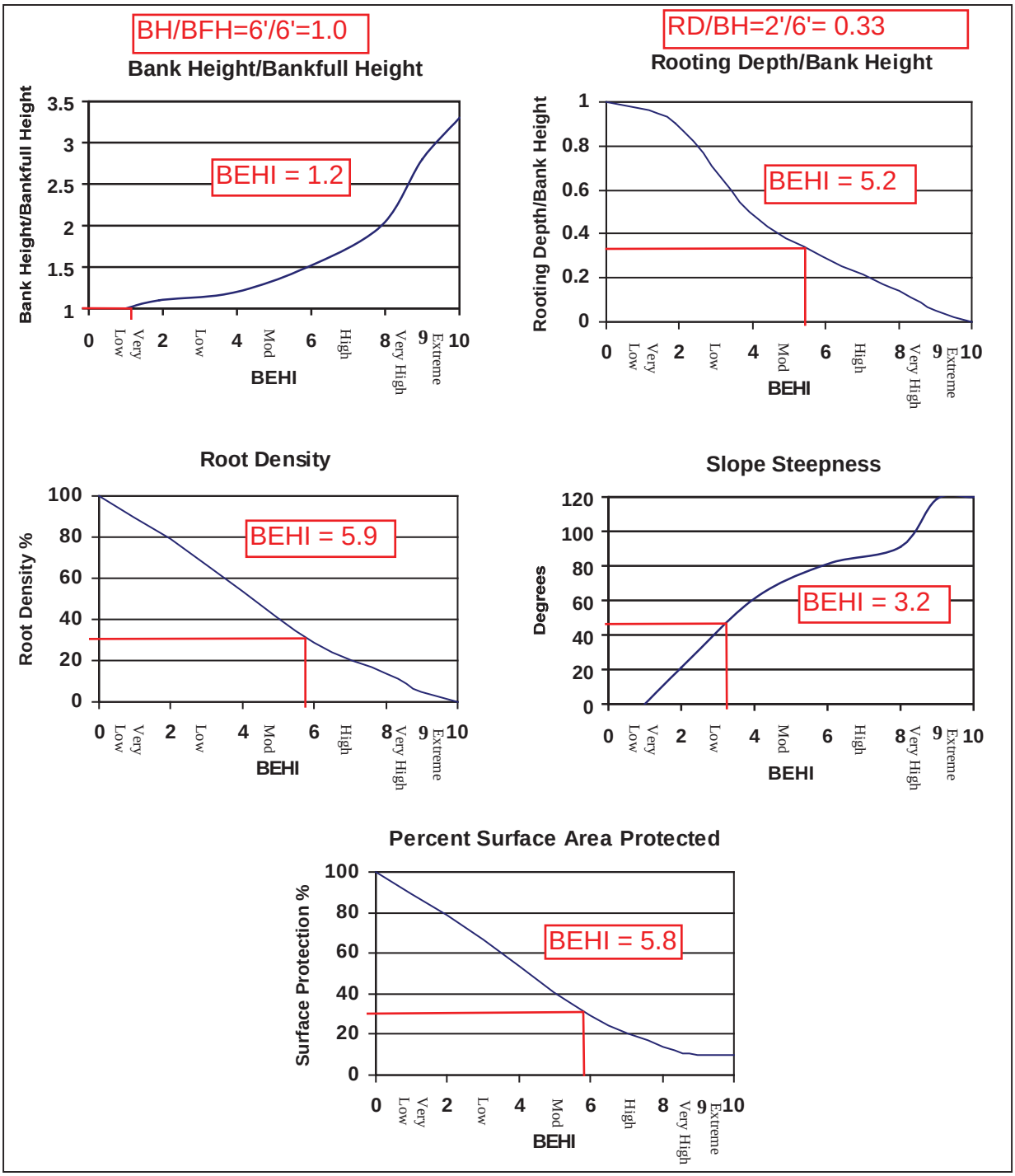


Figure 1. Example of streambank erodibility variables in relation to the Bank Erosion Hazard Index (BEHI)

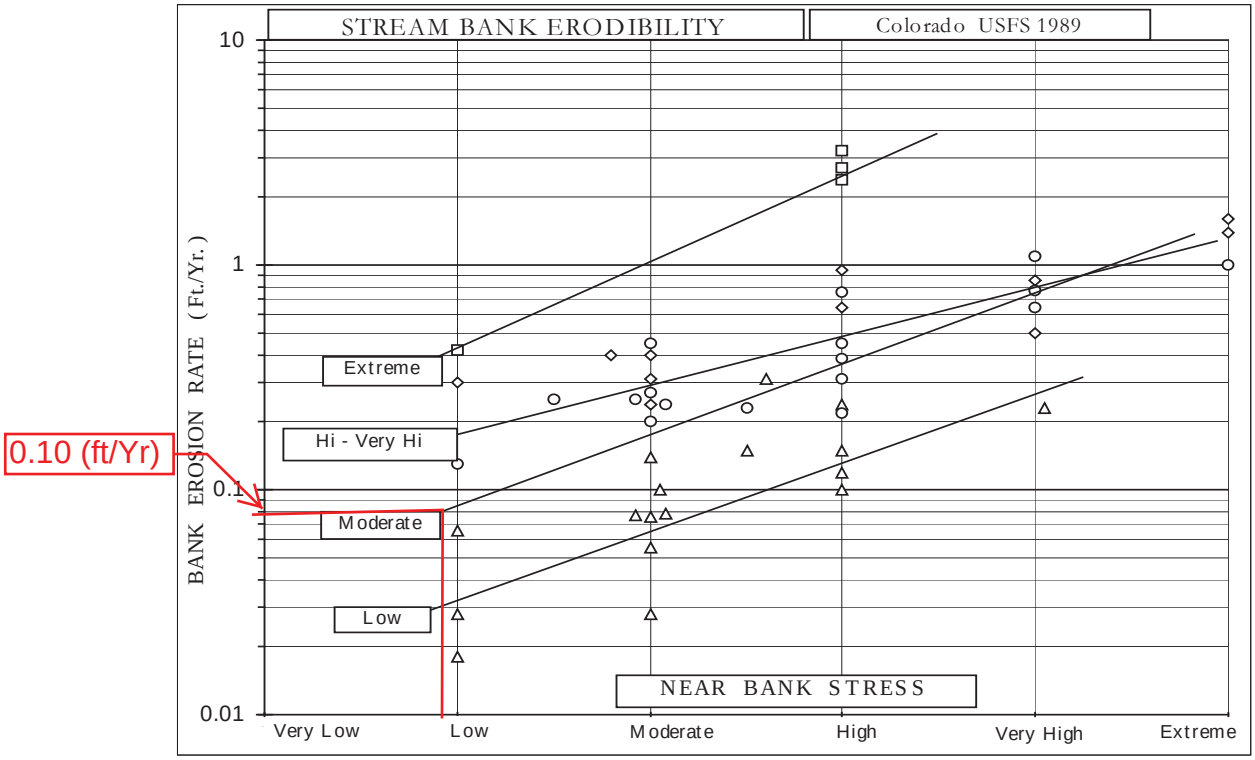
Table 1. Streambank characteristics used to develop Bank erosion Hazard Index (BEHI)

Adjective Hazard or risk rating categories		Bank Height/ Bankfull Ht	Root Depth/ Bank Height	Root Density %	Bank Angle (Degrees)	Surface Protection%	Totals
VERY LOW	Value	1.0-1.1	1.0-0.9	100-80	0-20	100-80	
	Index	1.0-1.9	1.0-1.9	1.0-1.9	1.0-1.9	1.0-1.9	5-9.5
LOW	Value	1.11-1.19	0.89-0.5	79-55	21-60	79-55	
	Index	2.0-3.9	2.0-3.9	2.0-3.9	2.0-3.9	2.0-3.9	10-19.5
MODERATE	Value	1.2-1.5	0.49-0.3	54-30	61-80	54-30	
	Index	4.0-5.9	4.0-5.9	4.0-5.9	4.0-5.9	4.0-5.9	20-29.5
HIGH	Value	1.6-2.0	0.29-0.15	29-15	81-90	29-15	
	Index	6.0-7.9	6.0-7.9	6.0-7.9	6.0-7.9	6.0-7.9	30-39.5
VERY HIGH	Value	2.1-2.8	0.14-0.05	14-5.0	91-119	14-10	
	Index	8.0-9.0	8.0-9.0	8.0-9.0	8.0-9.0	8.0-9.0	40-45
EXTREME	Value	>2.8	<0.05	<5	>119	<10	
	Index	10	10	10	10	10	46-50

For adjustments in points for specific nature of bank materials and stratification, the following is used:
Bank Materials: Bedrock (very low), Boulders (low), cobble (subtract 10 points unless gravel/sand>50%, then no adjustment), gravel (add 5-10 points depending on % sand), sand (add 10 points), silt/clay (no adjustment).
Stratification: Add 5-10 points depending on the number and position of layers.

Table 2. Velocity gradient and near-bank stress indices

Bank Erosion Risk Rating	**Velocity gradient**	**Near-bank stress/shear stress**
Very low	Less than 0.5	Less than 0.8
Low	0.5 -1.0	0.8 -1.05
Moderate	1.1 -1.6	1.06 -1.14
High	1.61 - 2.0	1.15 - 1.19
Very High	2.1 -2.4	1.20 -1.60
Extreme	Greater than 2.4	Greater than 1.60


STREAM BANK ERODIBILITY
Colorado USFS 1989
BANK EROSION RATE (Ft./Yr.)
10
1
0.1
0.01
Extreme
Hi - Very Hi
Moderate
Low
0.10 (ft/Yr)
NEAR BANK STRESS
Very Low
Low
Moderate
High
Very High
Extreme

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Pat-EB-602

Inputs

DA (acres)	14		Retrofit:	Retrofit Type	
Impervious (acres and %)	3	21.43	Removal Efficiency:	P Reduction (%)	
P (in)	1.2		**P Load -->**	**12.82**	lb/yr
				5.81	kg/yr
Total Annual Rainfall (in)	45		**P Removal -->**	**#VALUE!**	lb/yr
Pj	0.9			**#VALUE!**	kg/yr

LEGEND

Input Cell	
Formula Cell	
Output Values	

Land Use	**% of Total Area**	**Weighted EMC**
Residential	1	
Commercial		0.41
Industrial		
Actively Grazed Pasture		
Forest		
Impervious		
Developed Open Space*		

PERCENTAGE CHECK: 1.00

*i.e. golf course, parks, cemeteries, single houses with large lawns

NOTES:

Outputs

Water Quality V	***WQv (acre-ft)***	***WQv (cu-ft)***	***Rv***
	0.340	14810	0.2429

L (lbs) = P x Pj x Rv x C x A x 0.227

Alternative Channel Stabilization Phosporus Loading Calculaton Method (P Load)

Legend

Input Cell
Output Values

Parabolic Channel Wetted Perimiter (P) : $P = T + [(8/3) \times (y^2/T)]$

where:

- y = Channel Depth - y (ft)
- T = Channel Top Width -T (ft)
- P = Wetted Perimeter Calculation-P (ft)

Soil Erosion Volume: V= P x L x D

where:

- L = Channel Length-L (ft)
- D = Soil Erosion Depth-D (ft)
- V = Soil Erosion Volume-V (ft^3)

P Load : P-Load = V x BD* x P-test

where:

- BD* = Bulk density (typ. 95 lbs/CF)
- P_{test} = Phosphorus level in soil (typ. 300 mg/kg)

P Load =	15.63	Kg/yr

34.38

Input Values

Channel ID	A
Channel Depth - y (ft)	8.0
Channel Top Width -T (ft)	25.0
Wetted Perimeter Calculation-P (ft)	31.81
Channel Length-L (ft)	380
Soil Erosion Depth-D (ft)	0.1
Soil Erosion Volume-V (ft^3)	1,208.8
Weight* (lbs)	114,832.7
Weight (Kg)	52,088.1
P Load (mg/Yr)	15,626,427.8
P Load (Kg/Yr)	15.63

EAST OF HUDSON
WATERSHED CORPORATION

2 Route 164
Patterson, NY 12563
Tel: 845-319-6349
Fax: 845-319-6391

APPENDIX II

Professional Service Agreement

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AGREEMENT FOR PROFESSIONAL SERVICES
(Engineering Services)
Contract No._____

THIS AGREEMENT FOR PROFESSIONAL SERVICES ("Agreement"), is made as of the ___ day of _____, 2017 by and between the **East of Hudson Watershed Corporation**, a not-for-profit local development corporation with its offices at 2 Route 164, Patterson, New York (the "EOHWC"), and _____, a _____organized under the laws of the State of _____ , with its offices at the address specified on the execution page of this Agreement (hereinafter referred to as the "Engineer");

WITNESSETH:

WHEREAS, pursuant to a request for proposals dated _____, 201__ (the "RFP") and as authorized by the Executive Committee of the Board of Directors (the "Executive Committee") on _____, 201__, the EOHWC has determined to enter into this Agreement providing for services of the Engineer for the purposes set forth herein;

NOW THEREFORE, in consideration of the mutual agreements herein contained and other good and valuable consideration, receipt of which is hereby acknowledged, the parties hereto agree as follows:

Section 1. SCOPE OF SERVICES.

a. The Engineer shall render the professional services ("Services") described in the RFP and at **Exhibit B** (hereinafter referred to collectively as the "Scope of Services").

b. During the term of this Agreement, the Engineer shall perform such additional services as Engineer as may be requested in writing by the EOHWC, at the hourly rates and actual expenses specified in **Exhibit A** (such additional Services being referred to herein as "Additional Services"). Prior to undertaking any such Additional Services the Engineer shall propose a budget and schedule for in a written change order to be approved by the Executive Committee prior to commencing work. No work shall be considered Additional Services unless specifically agreed to in a written change order signed by the Engineer and approved by the Executive Committee.

Section 2. **ENGINEER QUALIFICATIONS; REPRESENTATIONS; NO CONFLICTS**.

a. The Engineer represents and covenants that (i) it is an engineering firm meeting the qualifications set forth in the RFP; (ii) it is experienced in performing work of the types contemplated by the Scope of Services; (iii) at all times during the term of this Agreement the persons assigned to perform Services have and will have the experience, knowledge, and licenses necessary to perform the Services described herein; (iv) the Engineer is fully qualified to perform the Scope of Services, with capability to perform the Scope of Services and timely deliver a work product as required by this Agreement, (v) the Engineer will procure and maintain all licenses and permits necessary to perform the work described in this Agreement, and (vi) the Engineer will comply with the provisions of the Labor Law and all State laws and Federal and local statutes, ordinances and regulations that are applicable to the performance of this Agreement.

b. Unless otherwise authorized in writing in advance by the EOHWC, the persons primarily responsible for performing work under this Agreement, including any subcontractors, shall be as set forth at **Exhibit A**. Any subcontractors shall be bound by the provisions of this Agreement and shall be subject to prior review and approval by the EOHWC as provided in Section 15 hereof**.**

c. The Engineer represents and warrants that (i) the Engineer has all requisite power and authority to execute, deliver and perform this Agreement; (ii) this Agreement has been duly authorized by all necessary action on the part of the Engineer and has been duly executed and delivered by the Engineer and, assuming due execution and delivery by the EOHWC, constitutes a legal, valid, binding and enforceable obligation of the Engineer; and (iii) the execution and delivery of this Agreement, and compliance with the provisions hereof, do not and will not conflict with or constitute a violation of or default under the organization documents, or any statute, indenture, mortgage, deed of trust or other agreement or instrument to which the Engineer is bound, or to the knowledge of the Engineer, any order, rule or regulation of any court or governmental agency or body having jurisdiction over the Engineer or any of its activities or properties.

d. The Engineer represents and warrants that it has not entered into any agreement for services with any other party with respect to any activities within or relating to the Scope of Services under this Agreement, other than such subcontracts as are specifically set forth at **Exhibit A**. The Engineer shall accept no other compensation, directly or indirectly, from any party, other than the EOHWC, for any services connected with the work described in the Scope of Services. The Engineer represents that it has read the Code of Ethics of EOHWC and will comply with its provisions.

e. The Engineer represents and warrants that it has not employed or retained any company or person, other than a bona fide employee working for the Engineer, to solicit or secure this Agreement, and that it has not paid or agreed to pay any company or person, other than a bona fide employee, any fee, commission, percentage, brokerage fee, gift or any other consideration, contingent on or resulting from the award or making of this Agreement. The Engineer further represents and warrants that neither it nor any of its directors, officers, members, partners, associates or employees, has any interest, nor shall they acquire any interest, directly or indirectly, which would or may conflict in any manner or degree with the performance or rendering of the services. In the event of breach of this provision the EOHWC shall have the option to annul this Agreement without liability or deduct from the Agreement consideration, or otherwise recover, the full amount of any such fee, commission, percentage, brokerage fee, gift or other consideration. Such remedies shall be in addition to and not in limitation of any other remedies available at law or in equity.

Section 3. **TERM AND COMPLETION SCHEDULE**. The Scope of Services shall commence upon the delivery by the EOHWC to Engineer of a notice to commence work under this Agreement (the "Commencement Date") and shall be completed within the term set forth at **Exhibit C** except as extended by the EOHWC in writing. Any extension granted shall be for work and payment purposes only and shall not result in any additional fees or expenses other than those agreed to herein. The Engineer acknowledges the importance to EOHWC that the work be completed in accordance with the project schedule and agrees to put forth every reasonable effort in performing the Scope of Services with due diligence in a manner consistent with that schedule.

Section 4. **REPORTS; RIGHT TO INSPECT**. The Engineer shall report to the EOHWC as specified at **Exhibit A** and **Exhibit B**. The EOHWC staff and its duly authorized representatives shall have the right at all times to inspect and receive copies of the work of the Engineer without additional charge. At the request of EOHWC, plans, reports and other documentation shall be submitted in electronic format on a disc.

Section 5. **DELIVERABLES**. The EOHWC staff will provide deliverables, if any, as specified in **Exhibit A**. In the event that such deliverables are not provided by the date set forth at **Exhibit B**, the Engineer may request an extension on the term of this Agreement.

Section 7. **FEES AND EXPENSES**.

a. As compensation for the Services performed pursuant to this Agreement, including all expenses, the EOHWC shall pay the Engineer its fees and expenses as set forth at **Exhibit A**, not to exceed the maximum amount set forth at **Exhibit A** ("Fees and Expenses").

b. The expenses provided for herein shall be limited to the expenses actually and reasonably incurred in connection with the performance of the Scope of Services, of the types listed at **Exhibit A.** Unless otherwise approved in advance by the EOHWC, the EOHWC shall not pay for the following: (1) secretarial or word processing time (normal, temporary or overtime); (2) taxis or private cars, (3) meal charges, except for actual and reasonable expenses which are required for business purposes, such as expenses incurred while hosting working group meetings; or (4) time spent in preparing bills.

Any reimbursement for travel, meals and lodging shall be made at the actual cost paid, but such reimbursement shall not exceed the prevailing maximum rates established by the New York State Comptroller or, if less, the rates generally established by the EOHWC's policy for its own officials and staff. Any out-of-state travel must be approved in advance by the EOHWC. Disbursements and expenses shall be itemized by category. Unless otherwise agreed, expenses shall be billed at the same time as the services to which they relate.

All invoices shall include details showing name or class of worker, dates, task and work completed. Upon request, the Engineer shall provide the EOHWC with detailed documentation substantiating all reimbursable expenses and disbursements. This documentation shall be maintained by the Engineer(s) for a period of six years after the completion of the matter. During that period, the EOHWC shall have the right to audit the Engineer's charges.

Section 8. ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST. If requested by EOHWC in accordance with **Exhibit A** and **Exhibit B**, the Engineer shall prepare an engineer's opinion of probable construction cost (the "EOPCC") for various project requirements. In requesting an EOPCC, EOHWC understands that the Engineer has no control over the actual cost or availability of labor, equipment or materials, or over market conditions or a contractor's method of pricing, and that the EOPCC is made based on the engineer's professional judgment, experience and knowledge of the work to be constructed.

Section 9. **PAYMENT**.

a. Work within the Scope of Services shall be billed within thirty (30) days of services performed in accordance with the fees and expenses attached hereto at **Exhibit A** unless

otherwise agreed in writing by the EOHWC. Upon request, the Engineer shall provide statements with respect to accrued fees and disbursements for any matters subject to a periodic retainer or cap.

b. For any Additional Services agreed by the EOHWC and the Engineer to be outside the Scope of Services, the EOHWC shall pay for services rendered in accordance with the schedule of hourly rates attached hereto at **Exhibit A**. Prior to undertaking any such Additional Services, the Engineer shall inform the EOHWC that such Services will be billed as Additional Services, shall provide an estimate of the total fees and expenses to be charged for such additional Services, and shall obtain the EOHWC's written authorization of a change order prior to commencing such work. For such other services, the Engineer shall submit invoices not more often than once a month.

c. All statements shall provide (a) the name and position of each individual whose time is billed; (b) the billing rate for each individual; (c) the number of hours expended on behalf of the EOHWC on any day that the individual performed services for the EOHWC; (d) a brief description of the task(s) performed each day for which time is billed; and (e) the total number of hours billed for services rendered to the EOHWC by each individual during the billing period. Copies of detailed documentation substantiating all reimbursable expenses over $25 shall be provided to the EOHWC. Reimbursable expenses shall be itemized by category. Unless otherwise agreed, any authorized expenses shall be billed at the same time as the services to which they relate. Invoices shall be submitted to the EOHWC at the address set forth above, to the attention of the Controller. The Engineer shall maintain separate billing records with respect to each matter undertaken by the Engineer. At the EOHWC's request, the Engineer shall submit invoices on forms provided by the EOHWC.

d. A five percent retainage will be withheld by EOHWC from each invoice paid. The retainage will be released to the Engineer upon final acceptance of the work by EOHWC with payment of the final invoice. The acceptance by the Engineer of final payment under this Agreement shall operate as and be a release to the EOHWC from all claims and liability to the Engineer, its representatives and assigns for any and all things done, furnished for or relating to the services rendered by the Engineer under or in connection with this Agreement or for any part thereof.

Section 10. OWNERSHIP OF DOCUMENTS. All documents, reports, opinions, plans, source code, system documentation, and other materials prepared for or relating to the Services provided hereunder shall be at all times the sole and exclusive property of the EOHWC, and shall be treated as confidential by the Engineer except as expressly authorized by the EOHWC. All work product created in connection with this Agreement, including working papers, data, maps, drafts, and other information in whatever form shall at all times be and remain the property of the EOHWC.

Section 11. **INDEPENDENT STATUS; TAXES**.

a. The Engineer and its employees, agents, contractors, subcontractors and/or engineers, are independent contractors and not employees of the EOHWC. In accordance with their status as independent contractors, the Engineer covenants and agrees that neither the Engineer nor its employees or agents will hold themselves out as, nor claim to be, officers or employees of the EOHWC.

b. Nothing in this agreement shall impose any liability or duty on the EOHWC for the acts, omissions, liabilities or obligations of the Engineer, or any person, firm, company, agency, association, expert, engineer, independent contractor, specialist, trainee, employee, servant, or agent of the Engineer for the payment of taxes of any nature including but not limited to sales tax, unemployment insurance, worker's compensation, disability benefits and social security, or, except as specifically stated in this Agreement, to any person, firm or corporation.

c. To determine whether the Engineer must receive a form 1099 at year end and as a condition precedent to any payment by EOHWC hereunder, the Engineer shall submit to EOHWC a Form W-9 with the Engineer's correct taxpayer identification number.

Section 12. **INSURANCE**.

a. The Engineer shall at all times maintain in force during the term of this Agreement, and shall provide evidence satisfactory to EOHWC, of the policies of insurance set forth in **Exhibit D**.

b. Any policy required to be maintained under this section shall be from a company rated at least A/X by Best's Rating Service and properly licensed in the State of New York, and shall provide that the policy shall not be canceled, materially changed, or not renewed without thirty (30) days' prior notice thereof to the EOHWC.

c. Prior to the effective date of this Agreement, and as a condition precedent to this Agreement, the Engineer shall furnish the EOHWC with certificates of insurance listing the EOHWC as a certificate holder and, except for worker's compensation, additional insured, and upon demand, shall provide such policies to the EOHWC. At least thirty (30) days prior to expiration of any policy required by this Agreement, the Engineer shall furnish the EOHWC evidence satisfactory to the EOHWC of the continuation of such coverage in accordance with this Agreement.

d. To the extent required pursuant to an applicable Installation Agreement, the Host Municipality shall be listed as certificate holder and, on policies other than worker's compensation, additional insured. The Engineer shall further comply with the requirements of **Exhibit E** required by the Funding Agreement with New York City.

e. This contract shall be void and of no force and effect unless the Engineer shall provide and maintain coverage during the life of this contract for the benefit of such employees as are required to be covered by the provisions of the Workers' Compensation Law.

Section 13. **INDEMNIFICATION**. The Engineer shall defend and indemnify the EOHWC, the Host Municipality (to the extent required pursuant to the applicable Installation Agreement defined herein), The City of New York (to the extent required pursuant to the Funding Agreement defined herein) and their respective directors, officers, employees and agents (the "Indemnified Parties"), and save the Indemnified Parties harmless from any liability, damage, claims, demands, costs or loss arising directly and indirectly out of the Engineer's or its officers', employees', agents', contractors', subcontractors' or engineers' respective negligent acts or omissions pursuant to this Agreement, including without limitation negligent performance of Services under this Agreement, and such indemnity may not be limited by reason or enumeration of any insurance coverage required. Negligent performance of services, within the meaning of this section, shall include, in addition to negligence founded upon tort, negligence based upon Engineer's failure to meet professional standards and resulting in obvious or patent errors in the progression of its work.

Section 14. **RIGHT TO AUDIT AND RECORDS**.

a. The Engineer shall maintain accurate and complete records detailing the back-up documentation required by this Agreement, and shall maintain such documents for a period of six years from document generation and shall allow the EOHWC access thereto for inspection and photocopying at all reasonable times.

b. All receipts and disbursements are subject to audit by the EOHWC, and the Engineer agrees to cooperate with any audit of this Agreement undertaken by the EOHWC or any entity with jurisdiction to audit the EOHWC.

Section 15. SUBCONTRACTORS. The Engineer shall not employ subcontractors to perform the Scope of Services, without the express consent of the EOHWC. EOHWC reserves the right to approve all subcontractors in its discretion. The Engineer will notify the EOHWC of the name, address, scope of services, and schedule of a subcontractor it intends retaining, the portion of the work which it is to do and/or the material which it is to furnish, and any other information requested by EOHWC. EOHWC will use the requested information to verify that the subcontractor is reputable, reliable, and able to perform the work required in this Agreement. Subcontractors shall be subject to the terms and conditions of this Agreement. By use of a subcontractor, the Engineer shall not be released from any liability or obligation assigned from executing this Agreement. The Engineer shall be held wholly responsible for subcontractor's performance, and shall be responsible to remedy any deficiencies in the subcontractor's work or performance.

Section 16. **COMPLIANCE WITH LAW**. The Engineer shall comply with all Federal, State and local laws, rules and regulations applicable to performing the Services herein.

Section 17. **DEFAULTS AND REMEDIES**.

a. If either party defaults in the observance or performance of any material term of this Agreement, and such default continues for more than thirty (30) days after written notice of such default is received by the defaulting party from the non-defaulting party, such non-defaulting party may take any action available at law or in equity to enforce the terms of this Agreement, and may suspend work or terminate this Agreement upon thirty (30) days written notice to the defaulting party. If the default is not capable of being cured within thirty (30) days and the defaulting party has commenced cure within thirty (30) days and is diligently pursuing efforts to cure, such thirty (30) day period shall be extended for a reasonable period of time.

b. If either party is required to enforce the terms of this Agreement, the prevailing party will be entitled to recover its reasonable attorneys' fees and costs. No remedy herein conferred upon or reserved to the EOHWC is intended to be exclusive of any other available remedy or remedies, but each and every such remedy shall be cumulative and shall be in addition to every other remedy given under this Agreement or now or hereafter existing at law or in equity or by statute.

c. No delay or omission in exercising any remedy shall impair any such remedy or construed to be a waiver thereof. It shall not be necessary to give any notice other than as expressly required under this Agreement. In the event any provision contained in this Agreement should be breached and thereafter duly waived by the party or parties so empowered to act, such waiver shall be limited to the particular breach so waived and shall not be deemed to be a waiver of any

other breach hereunder. No waiver, amendment, release or modification of this Agreement shall be established by conduct, custom or course of dealing.

Section 18. **EARLY TERMINATION**. EOHWC shall have the right to postpone, suspend, abandon or terminate this Agreement with or without cause, and such action shall in no event be deemed a breach of contract. Upon termination by EOHWC without cause under this section, the Engineer shall be entitled to compensation for acceptable completed Services performed through the date of postponement, suspension, abandonment or termination, such Services to be verified by audit. In the event that this Agreement is terminated by the EOHWC for any reason, then within ten days after such termination, the Engineer shall make available to the EOHWC all records, documents and data pertaining to the Services rendered under this Agreement.

Section 19. STOP WORK. If construction phase services ("CPS"), including construction observation, are requested of Engineer by EOHWC, the Engineer has no authority to stop work during construction, unless otherwise authorized in writing by EOHWC, provided that the Engineer may issue a stop work order to the contractor on behalf of EOHWC if 1) the Engineer observes a condition that compromises worker safety and/or 2) the Engineer observes a condition that presents immediate risk to immediately-adjacent structures or infrastructures. If the Engineer is authorized and issues a stop work order in accordance with this Agreement, the Engineer shall immediately notify the EOHWC Director of Engineering by telephone, and the Engineer shall fully document the condition causing the stop work order to be issued and provide documentation to EOHWC within 24 hours of the stop work order and the reason therefor. Such documentation shall include, but not be limited to field notes, sketches and photographs, and shall include names of individuals involved, company names, time, and date.

Section 20. NO MECHANIC'S LIEN. The Engineer shall not permit or suffer any mechanic's lien filed by any subcontractor, employee, or material vendor of the Engineer to remain upon the premises of EOHWC or any EOHWC member municipality, provided such lien arises from the execution of work under this Agreement. Upon final payment due under this Agreement, the Engineer agrees, for himself and his subcontractors, that the Engineer will issue to EOHWC such certificate or certificates to the effect that no mechanic's lien or claims of the Engineer or its subcontractors have arisen or are outstanding with respect to this Agreement and that there is, to the best of the Engineer's knowledge, no basis for any future liens to be filed, but that if any such liens or claims are filed, the Engineer shall defend and hold EOHWC harmless against such liens.

Section 21. VENDEX.

a. The Engineer hereby certifies that it and all subcontractors retained or to be retained by it under this Agreement have completed the applicable New York City Vendor Information Exchange System ("VENDEX") questionnaire and submitted the completed questionnaire to New York City as required therein.

b. If during the term of this Agreement, the Engineer's complete VENDEX submission is more than 2½ years old, the Engineer shall complete new forms and return them directly to New York City at the address provided therein. If there have been no changes in information requiring an update of the forms, the Engineer shall execute a Certification of No Change and submit it to New York City. If there have been changes in information requiring an update of the forms, the Engineer shall submit full questionnaires using new forms to New York City.

c. The Engineer shall promptly submit to EOHWC upon request documentation of compliance with New York City's VENDEX program, including documentation of the submission of a completed VENDEX completed questionnaire within the last 2½ years, a Certification of No Change, and any updates of the VENDEX questionnaire.

Section 22. **NOTICES**. Unless otherwise specified, all notices required or permitted for herein shall be in writing and sent by certified mail, postage prepaid, or by hand, by overnight courier, or by telecopy confirmed by any of the previous methods, addressed to the parties as indicated below or to such addresses as they may designate in writing from time to time:

To the Engineer: At the address specified on the execution page of this Agreement.

To the EOHWC: At the address specified at the beginning of this Agreement,
Attention: Director of Engineering

With a copy to:

Rodenhausen Chale LLP
20 Spring Brook Park
Rhinebeck, NY 12572

Section 23. FUNDING AGREEMENT. To the extent all or a portion of this Agreement is to be funded from moneys received by EOHWC directly or indirectly pursuant to a Funding Agreement with NYC Department of Environmental Protection ("Funding Agreement"), this agreement shall be subject to the supplemental provisions set forth at **Exhibit E.**

Section 24. MISCELLANEOUS.

a. SEVERABILITY. In case any one or more of the provisions of this Agreement shall for any reason be held to be illegal or invalid, such illegality or invalidity shall not affect any other provision of this Agreement, but this Agreement shall be construed and enforced as if such illegal or invalid provision had not been contained therein.

b. AGREEMENT IS A LEGALLY BINDING CONTRACT. Each party hereto represents and warrants that this Agreement has been duly authorized and executed by it and constitutes its valid and binding agreement, and that any governmental approvals necessary for the performance of this Agreement have been obtained.

c. NON-ASSIGNMENT CLAUSE. This contract may not be assigned, and no part or portion may be subcontracted, by the Engineer nor may its right, title or interest therein be assigned, transferred, conveyed, sublet or otherwise disposed of without the previous consent, in writing, of the Municipality and any attempts to assign the contract without the Municipality's written consent are null and void.

d. NO THIRD PARTY BENEFICIARY. Nothing in this agreement shall act to confer third party beneficiary rights on any person or entity not a party to this Agreement, except as expressly provided in Section 12 as to Indemnity and 13 as to Insurance.

e. NO ARBITRATION. Disputes involving this contract, including the breach or alleged breach thereof, may not be submitted to binding arbitration (except where statutorily authorized) but must, instead, be heard in a court of competent jurisdiction of the State of New York.

f. SERVICE OF PROCESS. In addition to the methods of service allowed by the State Civil Practice Law & Rules, Engineer hereby consents to service of process upon it by

registered or certified mail, return receipt requested. Service hereunder shall be complete upon Engineer's actual receipt of process or upon the Municipality's receipt of the return thereof by the United States Postal Service as refused or undeliverable. Engineer must promptly notify the Municipality, in writing, of each and every change of address to which service of process can be made. Service by the Municipality to the last known address shall be sufficient.

g. NO RECOURSE. All covenants, stipulations, promises, agreements and obligations of the EOHWC contained in this Agreement shall be deemed to be the covenants, stipulations, promises, agreements and obligations of the EOHWC, and not of any member, director, officer, employee or agent of the EOHWC in his individual capacity, and no recourse shall be had for the payment of any claim based under this Agreement against any member, director, officer, employee or agent of the EOHWC.

h. COUNTERPARTS. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original.

i. NONDISCRIMINATION. During the term of this Agreement, the Engineer agrees as follows:

i) In accordance with Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Engineer will not discriminate against any employee or applicant for employment because of race, creed, color sex, national origin, age, disability or marital status.

ii) In accordance with Section 220-e of the Labor Law, if this is a contract for the construction , alteration or repair of any public buildings or public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this Agreement shall be performed within the State of New York, the Engineer agrees that neither it nor its subcontractors shall, by reason of race, creed, color, national origin, sex or disability: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this Agreement. The Engineer is subject to possible termination of this Agreement and forfeiture of all moneys due hereunder for a violation of this clause.

j. PUBLIC WORKS CONTRACTS. A portion of the funds for the work is or may be provided pursuant to the Funding Agreement or other public entity sources. Even if a project is located on private property, for purposes of this section such property may be treated as if it were public property.

i) If all or any portion of the Scope of Services constitutes a public work contract covered by Article 8 of the Labor Law or a building service contract covered by Article 9 thereof, neither Engineer's employees nor the employees of its subcontractors may be required or permitted to work more than the number of hours or days stated in said statutes, except as otherwise provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the New York State Labor Department. Furthermore, Engineer and its subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the New York State Labor Department in accordance with the Labor Law. Additionally, if this is a public work contract covered by Article 8 of the Labor Law, the Engineer understands and agrees that the filing of payrolls in a manner consistent with subdivision 3-a of this Section 220 of the Labor Law shall be a condition precedent to payment by the EOHWC of any sums due and owing to any person for work done upon the project.

ii) OSHA 10 HOUR CONSTRUCTION SAFETY AND HEALTH COURSE. If all or a portion of the Scope of Services constitutes a public work contract covered by Article 8 of the New York State Labor Law, it shall be required that on all public work projects of at least $250,000.00, all laborers, workers and mechanics working on the site be certified as having successfully completed A MINIMUM OF 10 HOURS OF CONSTRUCTION AND HEALTH SAFETY TRAINING, as approved by the United States Department of Labor's Occupational Safety and Health Administration (OSHA). The Engineer, subcontractor or other person doing or contracting to do the whole or part of the work contemplated by the contract, shall provide proof of certification for successfully completing the course for each employee prior to performing any work on the project.

k. NON-COLLUSIVE BIDDING REQUIREMENT. In accordance with General Municipal Law § 103-d, if this contract was awarded based upon the submission of bids or proposals, Engineer warrants, under penalty of perjury, that its bid was arrived at independently and without collusion aimed at restricting competition. Engineer further warrants that, at the time Engineer submitted its bid, an authorized and responsible person executed and delivered to the Municipality a non-collusive bidding certification on Engineer's behalf.

l. INTERNATIONAL BOYCOTT PROHIBITION. In accordance with Section 220-f of the Labor Law, if this contract exceeds $5,000, the Engineer agrees, as a material condition of this Agreement, that neither the Engineer nor any substantially owned or affiliated person, firm, partnership, or corporation has participated, is participating, or shall participate in an international boycott in violation of the Federal Export Administration Act of 1979 (50 USC App. Sections 2401 et seq.) or regulations thereunder. If such Engineer, or any of the aforesaid affiliates of Engineer, is convicted or is otherwise found to have violated said laws or regulations upon the final determination of the United States Commerce Department or any other appropriate agency of the United States subsequent to the contract's execution, such contract amendment or modification thereto shall be rendered forfeit and void. The Engineer shall so notify the EOHWC within five (5) business days of such conviction, determination or disposition of appeal.

m. NO INVESTMENT ACTIVITIES IN IRAN. A person that is identified on a list created pursuant to paragraph (b) of subdivision three of section 165-a of the State Finance Law as a person engaging in investment activities in Iran as described in such section, shall not be deemed a responsible party for purposes of any RFP. By signing this Agreement, the Engineer and each person signing on behalf of the Engineer certifies, under penalty of perjury, that to the best of its knowledge and belief such Engineer is not on the list created pursuant to paragraph (b) of subdivision 3 of section 165-a of the State Finance Law.

n. SET-OFF RIGHTS. The EOHWC shall have rights of set-off. These rights shall include, but not be limited to, the EOHWC's option to withhold for the purposes of set-off any moneys due to the Engineer under this contract up to any amounts due and owing by the Engineer to the EOHWC with regard to this Agreement, or any other contract with the Municipality, including any contract for a term commencing prior to the term of this Agreement. This also includes amounts due and owing the EOHWC for any other reason including, without limitation, monetary penalties, adjustments, fees, or claims for damages by the EOHWC and third parties in connection therewith.

o. SERVICE OF PROCESS. In addition to the methods of service allowed by the State Civil Practice Law & Rules, Engineer hereby consents to service of process upon it by registered or certified mail, return receipt requested. Service hereunder shall be complete

upon Engineer's actual receipt of process or upon the Municipality's receipt of the return thereof by the United States Postal Service as refused or undeliverable. Engineer must promptly notify the Municipality, in writing, of each and every change of address to which service of process can be made. Service by the Municipality to the last known address shall be sufficient.

p. ENTIRE AGREEMENT; GOVERNING LAW AND JURISDICTION; AMENDMENT. This Agreement contains the entire understanding between the parties with respect to the subject matter herein and supersedes any prior agreements or understandings, either oral or written. This Agreement shall be governed by, and construed in accordance with, the laws of the State of New York. The parties agree that any dispute or controversy arising out of this Agreement shall be venued in the jurisdiction of the EOHWC's headquarters. This Agreement may be amended only upon mutual written agreement signed by both parties.

[Remainder of page intentionally left blank]

IN WITNESS WHEREOF, the EOHWC has caused this Agreement to be signed by its duly authorized officer, and the Engineer has caused this Agreement to be signed by its duly authorized officer, as of the day and year first above written.

EAST OF HUDSON WATERSHED CORPORATION, as **EOHWC**

_____

By: Peter Parsons
Its: President

_____ , as **ENGINEER**

By:_____
Print Name: _____
Title:_____

ENGINEER's Address:
_____
_____
_____
Email: _____
Phone:_____

This Agreement consists of the Agreement together with the following Exhibits:

EXHIBIT A FEES AND EXPENSES
EXHIBIT B SCOPE OF SERVICES
EXHIBIT C TERM AND COMPLETION DEADLINES
EXHIBIT D INSURANCE REQUIREMENTS
EXHIBIT E SUPPLEMENTAL PROVISIONS REQUIRED BY FUNDING AGREEMENT

EXHIBIT A

FEES AND EXPENSES
PURPOSE: Engineering Services; CONTRACT NO. _____

Scope of Services

I. (See attached "Form A" as provided within the RFP response)

All such lump sum fees shall include all expenses in connection with the Services, including without limitation site transportation, analysis, results, data validation reports, expenses (telephone, meals, travel, computer time, fax costs, postage, Federal Express or other delivery service, overhead, profit, reproducing), and administrative costs.

II. **Additional Services**: All Additional Services require the advance written approval of the EOHWC Executive Committee by change order. Services performed without such authorization are at the Engineer's risk and under no circumstances shall the EOHWC be obligated for payment.

Project Manager and Key Professional Staff: EOHWC reserves the right to terminate this Agreement should certain personnel specifically named in the Engineer's proposal cease to be employed by the Engineer and assigned to the Projects, unless the EOHWC has determined in its discretion that alternate Project personnel are acceptable.
Project Manager: _____
Key Professional Staff: _____
Subcontractor(s), If Any, to Perform Services: _____.

EXHIBIT B

SCOPE OF SERVICES

The Consultant will provide the following services for the Project or Projects indicated below based on the criteria described in the EOHWC Stormwater Retrofit Project Design Manual, most recent edition:

SRP Design
SRP Construction Admininstration
Additional Services to the extent authorized as provided herein.

Project(s): _____
_____
_____

The list of Projects included within the Scope of Services may be amended from time to time by addenda approved by the Executive Committee and executed by the President or Vice President on behalf of the EOHWC and by the Consultant by their duly authorized officer.

For purposes of this Agreement the owner of a project may be a Town, Village or County ("Host Municipality"), a school district ("School District"), or a private entity ("Private Owner"), as preliminarily identified in the Year 6 through 10 Stormwater Retrofit Report. EOHWC has or expects to enter into an installation agreement and/or easement and/or access agreement providing for access to and conditions to construction of the SRP. The Scope of Services includes the preparation of exhibits to such agreements.

EXHIBIT C

TERM AND COMPLETION DEADLINES

PURPOSE: Engineering Services; CONTRACT NO. ____

Commencement Date:

Completion Date:

Completion Deadlines for Deliverables:

The Services shall be performed in two phases, of which the first phase shall be the initial project evaluation as defined in the EOHWC "Stormwater Retrofit Project Design Manual," available for review at www.EOHWC.org. The initial project evaluation shall include the estimated Phosphorus reduction from the stormwater retrofit project, the cost of the project, including both engineering and construction services, and a calculation of the cost per kilogram of Phosphorus reduction. Upon completion of the initial project evaluation, the Engineer shall provide same to EOHWC and stop work.

The Engineer is not authorized to proceed with work beyond the initial project evaluation without the express written approval of the EOHWC President or, where permitted by the EOHWC Fiscal Policy, the Director of Engineering.

Engineer shall inspect the stormwater retrofit project within one (1) year of the completion of construction to determine if EOHWC may release the contractor's maintenance bond. The term of the contract may be extended at EOHWC's option solely to permit the completion of this inspection, as part of the lump sum fee unless otherwise specifically provided specified at Exhibit A.

EXHIBIT D

INSURANCE REQUIREMENTS

Worker's Compensation Statutory per New York State law without regard to jurisdiction

Employer's Liability Statutory

Commercial General Liability CG 00 01 (ed. 10/02) or equivalent
Combined Single Limit - Bodily Injury and Property Damage
$2,000,000 per occurrence
$2,000,000 products/completed operations aggregate
$4,000,000 general aggregate
$25,000 maximum deductible

Automobile Liability: CA 00 01 (ed. 6/92) or equivalent.
Combined Single Limit - Bodily Injury and Property Damage
$500,000 each occurrence
The following coverage must be provided:
Comprehensive Form, Owned, Hired, Non-Owned

Professional Errors and Omissions policy with a U.S. domiciled company, with extended reporting period or automatic coverage of not less than two years, providing limits of not less than:
$1 Million per claim
$1 Million aggregate
Deductible or self-insured retention not to exceed $25,000 per claim.

EXHIBIT E
SUPPLEMENTAL PROVISIONS REQUIRED BY FUNDING AGREEMENT

To the extent all or a portion of this Agreement or any subcontract thereof is to be funded from moneys received by EOHWC directly or indirectly pursuant to a Funding Agreement with NYC Department of Environmental Protection, this Agreement shall be subject to the following supplemental provisions.

1. Engineer shall perform all work in accordance with the terms of the Funding Agreement;

2. Engineer shall perform all acts to be performed under this Agreement in compliance with all applicable federal, State and local laws, rules, regulations and orders, including that all projects, facilities or other measures funded with Stormwater Retrofit Funds requiring review and approval by NYCDEP under the Watershed Regulations or required to be designed, constructed or implemented in accordance with standards set forth in the Watershed Regulations, be submitted for such review and approval and be designed, constructed, and implemented in accordance with the Watershed Regulations;

3. [Intentionally Omitted]

4. Engineers shall have liability insurance in sufficient amount and scope to protect the interests of New York City and the EOHWC, as provided in Exhibit D of the Agreement and Appendix B of the Funding Agreement (attached);

5. Engineer agrees to indemnify The City of New York and assume liability for injuries as provided in Section 12.

6. Engineer shall comply with a budget, a scope of work, a progress schedule for completion of the work within specified milestones and payment schedule which is dependent upon completion of the work within the specified period of performance;

7. Engineer represents and warrants that no payment, gift or thing of monetary value was made, given or promised to a the EOHWC officer, director, or employee to obtain the Contract or any other agreement with The City of New York or the EOHWC;

8. Nothing contained in this Agreement shall impair the rights of The City of New York under the Funding Agreement or the Watershed MOA;

9. EOHWC or The City of New York shall have the right from time to time to conduct

random, unannounced inspections of the work performed under this Agreement to determine whether such work is being performed in accordance with the terms of the Agreement, except that, where work is being performed on private property, the EOHWC and The City of New York shall provide reasonable notice of such inspections or conduct them during normal business hours;

10. Nothing contained in this Agreement shall create any contractual relationship between the Engineer and The City of New York; and

11. Engineer shall not engage in any unlawful discrimination in hiring employees under this Agreement based upon race, creed, color, national origin, sex, age, disability, marital status or sexual orientation.

12. Engineers performing public work within the meaning of Section 220 of the New York State Labor Law shall pay not less than the prevailing wage to laborers, workmen and mechanics performing such public work and comply with all other applicable provisions of Section 220 of the Labor Law. Such Engineers shall maintain records evidencing their compliance with this Subsection.

[*Attach Appendix B to Funding Agreement*]

EAST OF HUDSON
WATERSHED CORPORATION

2 Route 164
Patterson, NY 12563
Tel: 845-319-6349
Fax: 845-319-6391

APPENDIX III

Proposal Forms

(not included, see future Adendum)