



The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at wvOASIS.gov. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at WVPurchasing.gov with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.

Header 1

List View

General Information | Contact | Default Values | Discount | Document Information | Clarification Request

Procurement Folder: 886901

Procurement Type: Central Purchase Order

Vendor ID: 000000232671

Legal Name: TETRA TECH INC

Alias/DBA:

Total Bid: \$0.00

Response Date: 08/12/2021

Response Time: 9:59

Responded By User ID: aileen.molloy

First Name: Aileen

Last Name: Molloy

Email: aileen.molloy@tetratech.

Phone: (703) 385-2037

SO Doc Code: CEOI

SO Dept: 0313

SO Doc ID: DEP2200000001

Published Date: 8/9/21

Close Date: 8/12/21

Close Time: 13:30

Status: Closed

Solicitation Description: EOI Green Infrastructure

Total of Header Attachments: 1

Total of All Attachments: 1

| Line | Comm Ln Desc | Qty | Unit Issue | Unit Price | Ln Total Or Contract Amount |
|------|-----------------------------------|-----|------------|------------|-----------------------------|
| 1 | Professional engineering services | | | | |

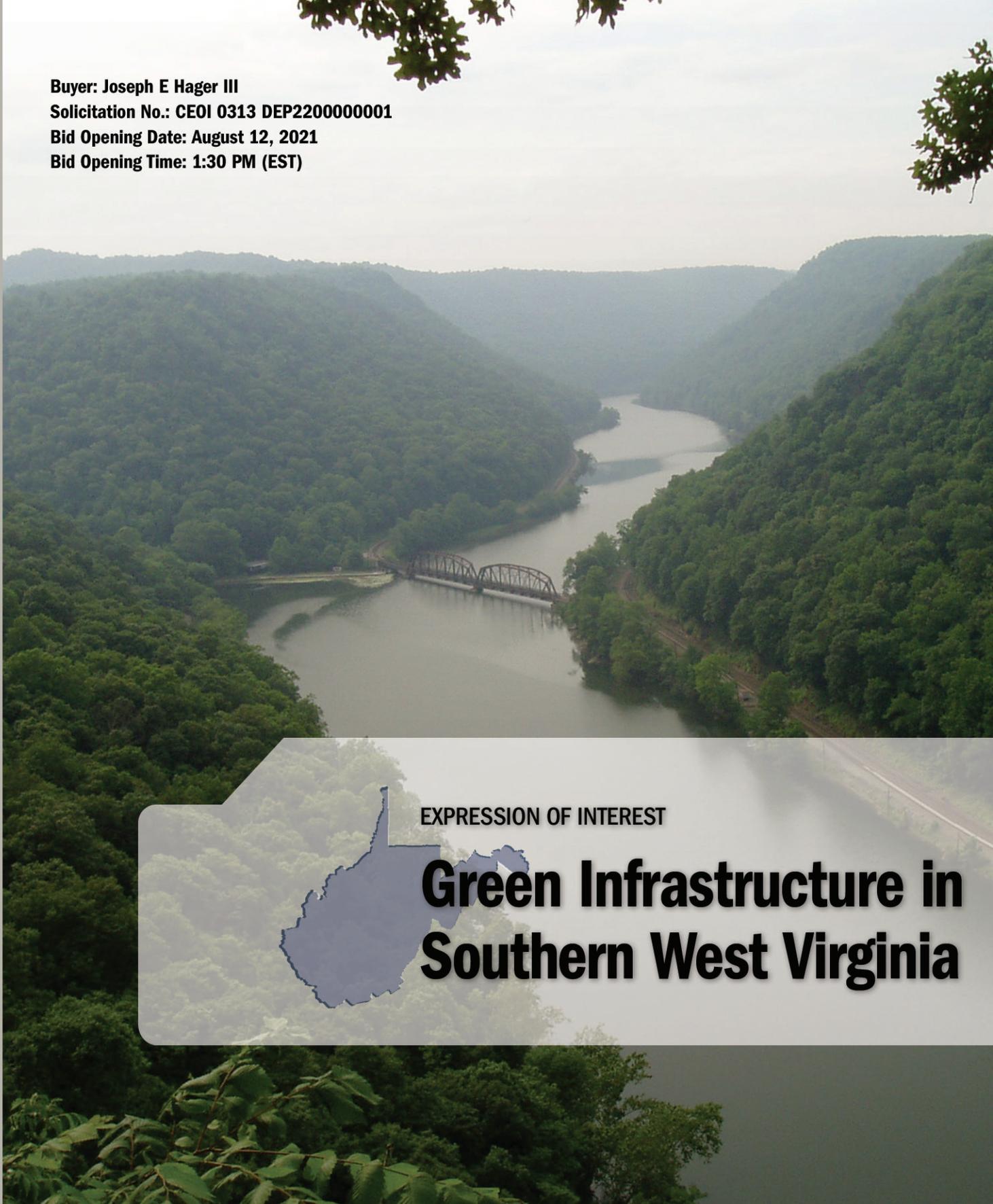
| Comm Code | Manufacturer | Specification | Model # |
|-----------|--------------|---------------|---------|
| 81100000 | | | |

Commodity Line Comments: In accordance with W.VA Code 5G-1-3, best value solution will be selected. No price or fee information is permitted in the response.

Extended Description:

Professional engineering services

Buyer: Joseph E Hager III
Solicitation No.: CE01 0313 DEP2200000001
Bid Opening Date: August 12, 2021
Bid Opening Time: 1:30 PM (EST)



EXPRESSION OF INTEREST



Green Infrastructure in Southern West Virginia



SUBMITTED TO:
Department of Administration
Purchasing Division
2019 Washington Street East
Charleston, WV 25305-0130

SUBMITTED BY:
Tetra Tech, Inc.
10306 Eaton Place
Suite 340
Fairfax, VA 22030



Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

State of West Virginia
 Centralized Expression of Interest
 Architect/Engr

| | | | |
|--|----------------------------|-------------------------|--|
| Proc Folder: 886901 | | | Reason for Modification: Addendum #1 issued to publish agency responses to all vendor quesitons. |
| Doc Description: EOI Green Infrastructure | | | |
| Proc Type: Central Purchase Order | | | |
| Date Issued | Solicitation Closes | Solicitation No | Version |
| 2021-08-09 | 2021-08-12 13:30 | CEOI 0313 DEP2200000001 | 2 |

BID RECEIVING LOCATION

BID CLERK
 DEPARTMENT OF ADMINISTRATION
 PURCHASING DIVISION
 2019 WASHINGTON ST E
 CHARLESTON WV 25305
 US

VENDOR

Vendor Customer Code: 000000232671
Vendor Name : Tetra Tech, Inc.
Address :
Street : 10306 Eaton Place, Suite 340
City : Fairfax
State : Virginia **Country :** USA **Zip :** 22030
Principal Contact : Jon Ludwig
Vendor Contact Phone: 703-385-1973 **Extension:**

FOR INFORMATION CONTACT THE BUYER

Joseph E Hager III
 (304) 558-2306
 joseph.e.hageriii@wv.gov

Vendor
 Signature X

FEIN# 954148514

DATE August 10, 2021

All offers subject to all terms and conditions contained in this solicitation

ADDITIONAL INFORMATION

The Acquisitions and Contract Administration Section of the Purchasing Division ("Purchasing Division") is soliciting Expression(s) of Interest ("EOI" or "Bids") for the West Virginia Department of Environmental Protection ("WVDEP"), from qualified firms to provide architectural/engineering services ("Vendors") as defined herein.

The mission or purpose of the project for which bids are being solicited is to provide Green Infrastructure (GI) education, workshops, and conceptual plans for one small community in the Lower New River Watershed in southern West Virginia.

| INVOICE TO | SHIP TO |
|---|--|
| ENVIRONMENTAL PROTECTION DIV OF WASTE AND WATER MGT 601 57TH ST SE CHARLESTON WV 25304 US | ENVIRONMENTAL PROTECTION DIVISION OF WATER AND WASTE MGT 601 57TH ST SE CHARLESTON WV 25304 US |

| Line | Comm Ln Desc | Qty | Unit Issue |
|------|-----------------------------------|-----|------------|
| 1 | Professional engineering services | | |

| Comm Code | Manufacturer | Specification | Model # |
|-----------|--------------|---------------|---------|
| 81100000 | | | |

Extended Description:
Professional engineering services

SCHEDULE OF EVENTS

| <u>Line</u> | <u>Event</u> | <u>Event Date</u> |
|-------------|--------------|-------------------|
|-------------|--------------|-------------------|

| | Document Phase | Document Description | Page |
|--------------|----------------|--------------------------|------|
| DEP220000001 | Final | EOI Green Infrastructure | 3 |

ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.: DEP2200000001

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6 |
| <input type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7 |
| <input type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8 |
| <input type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9 |
| <input type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Tetra Tech, Inc.

Company



Authorized Signature

August 10, 2021

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

Revised 6/8/2012

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.



(Name, Title)

Jon C. Ludwig, Director

(Printed Name and Title)

10306 Eaton Place, Suite 320, Fairfax, VA 22030

(Address)

Phone: 703-385-1973 Fax: 703-385-6007

(Phone Number) / (Fax Number)

jon.ludwig@tetrattech.com

(email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that: I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law.

Tetra Tech, Inc.

(Company)



Director

(Authorized Signature) (Representative Name, Title)

Jon C. Ludwig, Director

(Printed Name and Title of Authorized Representative)

August 10, 2021

(Date)

Phone: 703-385-1973 Fax: 703-385-6007

(Phone Number) (Fax Number)

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: TETRA TECH, INC.

Authorized Signature: [Signature] Date: July 30, 2021

State of Virginia

County of London, to-wit:

Taken, subscribed, and sworn to before me this 30 day of July, 2021

My Commission expires 3/31, 2022

AFFIX SEAL HERE

NOTARY PUBLIC [Signature]



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
GREEN INFRASTRUCTURE VENDOR QUALIFICATION QUESTIONNAIRE **Attachment A**

| | | |
|---|--|-------------------|
| PROJECT NAME Green Infrastructure (GI) Project for the Lower New River Watershed | DATE (DAY, MONTH, YEAR) August 12, 2021 | FEIN 954148514 |
|---|--|-------------------|

| | | |
|----------------------------------|--|----------------------------|
| 1. FIRM NAME Tetra Tech, Inc. | 2. HOME OFFICE BUSINESS ADDRESS 10306 Eaton Place, Suite 340 Fairfax, VA 22030 | 3. FORMER FIRM NAME N/A |
|----------------------------------|--|----------------------------|

| | | |
|--|-------------------------------|--|
| 4. HOME OFFICE TELEPHONE 703-385-6000 | 5. ESTABLISHED (YEAR) 1966 | 6. TYPE OWNERSHIP Individual <u>Corporation</u> Partnership Joint-Venture |
|--|-------------------------------|--|

6. PRIMARY GI OFFICE: ADDRESS/ TELEPHONE/ PERSON IN CHARGE/ NO. OF GI PERSONNEL IN OFFICE

10306 Eaton Place, Suite 340 / 703-385-6000 / Jon Ludwig, Program Manager / 5 GI personnel in office
Fairfax, VA 22030

| | |
|--|---|
| 7. NAMES OF PRINCIPAL OFFICERS OR MEMBERS OF FIRM Andrew Parker, Vice President | 8a. NAME, TITLE, & TELEPHONE NUMBER - OTHER PRINCIPALS Jon Ludwig, Program Manager, 703-385-1973 |
|--|---|

9. PERSONNEL BY DISCIPLINE

| | | |
|---|--|--|
| <u>2</u> CONTRACT ADMINISTRATOR(S) <u>2</u> PROGRAM MANAGER(S) <u>8</u> PROJECT MANAGER(S) <u>1</u> QA/QC MANAGER(S) <u>3</u> PROFESSIONAL ENGINEER(S) <u>3</u> MODELER(S) | <u>3</u> WATERSHED ANALYST(S) <u>2</u> SOILS SPECIALIST(S) <u>3</u> TECHNICAL EXPERT(S) <u>3</u> TECHNICAL WRITER(S) <u>2</u> OUTREACH SPECIALIST(S) | — OTHER (LIST BELOW) <u>4</u> <u>Administrative</u> <u>3</u> <u>Environmental Scientist</u> <u>6</u> <u>Other Engineers</u> |
|---|--|--|

45 TOTAL PERSONNEL

Note: If needed, Tetra Tech has over 70 additional highly qualified staff to support this project.

10. DO YOU NEED ADDITIONAL EMPLOYEES TO FULFILL THE REQUIREMENTS OF THIS CONTRACT? YES NO

11. OUTSIDE KEY CONSULTANTS/SUB-CONSULTANTS ANTICIPATED TO BE USED. Attach "TMDL Vendor Qualification Questionnaire".

| | | |
|--|---|--|
| NAME AND ADDRESS: NOT APPLICABLE | SPECIALTY: NOT APPLICABLE | WORKED WITH BEFORE <input type="checkbox"/> Yes NOT APPLICABLE <input checked="" type="checkbox"/> No |
| NAME AND ADDRESS: | SPECIALTY: | WORKED WITH BEFORE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| NAME AND ADDRESS: | SPECIALTY: | WORKED WITH BEFORE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| NAME AND ADDRESS: | SPECIALTY: | WORKED WITH BEFORE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| NAME AND ADDRESS: | SPECIALTY: | WORKED WITH BEFORE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| NAME AND ADDRESS: | SPECIALTY: | WORKED WITH BEFORE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| NAME AND ADDRESS: | SPECIALTY: | WORKED WITH BEFORE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| NAME AND ADDRESS: | SPECIALTY: | WORKED WITH BEFORE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| NAME AND ADDRESS: | SPECIALTY: | WORKED WITH BEFORE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |

12. A. Is your firm experienced in organizing and facilitating green infrastructure workshops and GI assessment site visits for local governments and/or other stakeholders?

YES

12.A.1 Provide Names and Number of Workshops/site visits.

Tetra Tech has been organizing and facilitating green infrastructure workshops and conducting green infrastructure site visits since at least 2012. Since that time, Tetra Tech has completed at least 27 workshops and GI assessment site visits, primarily across the northeast and Mid-Atlantic region. The table below shows projects that included GI workshops and site visits conducted by Tetra Tech.

| Project | Client | Number |
|---|--|--------|
| West Virginia Green Infrastructure Planning and Implementation | US EPA/WVDEP | 2 |
| Resilient by Design (Huntington, WV and Seaford, DE) | US EPA Region 3 | 2 |
| Green Infrastructure Community Partners Program Technical Assistance | US EPA Office of Wastewater Management | 9 |
| Green and Complete Streets Building Blocks Technical Assistance Program | US EPA Office of Sustainable Communities | 11 |
| Central Lake Erie Collaborative, OH | West Creek Conservancy | 1 |
| Garner Creek Retrofit BMP Design | Gwinnett County, GA | 1 |
| Vulcan Avenue GI Drainage Improvements | City of Encinitas, CA | 1 |
| Alamo, Salvation, and 68th Street Basins Green Street Retrofit | City of San Diego | 1 |

12.A.2 Provide an example GI workshop/site visit

A key example of our experience with GI workshop planning and facilitation and site visits is our ongoing support for GI in the Chesapeake Bay portion of West Virginia through an EPA Contract and in support of West Virginia DEP. Tetra Tech has supported GI workshops and site visits in Romney and Martinsburg, WV. In both cases, Tetra Tech ensured that invited stakeholders included local administration officials including the Mayor, Vice mayor, Department of Public Works, Department of Planning, local residents and other interested parties. At each workshop, Tetra Tech provided an educational overview of green infrastructure, so attendees could understand the benefits and functions of GI and the various types of GI. These workshops were also used as planning sessions to involve the stakeholders in the identification of stormwater management problem areas and to elicit preferred GI solutions from each group. In addition to conducting a collaborative site visit with each stakeholder group to see problem areas and talk about solutions, Tetra Tech conducted separate, more data-intensive engineering focused site visits to collect the necessary data to inform the concept designs. Following the stakeholder site visits, Tetra Tech conducted tabletop planning exercises to allow the workshop attendees to suggest GI that they would like to see at select areas. Tetra Tech recognizes that stakeholder involvement is a key component to project buy-in.

12.A.3 Provide a detailed description of the methodology to be used to implement a GI workshop and site visit as per EOJ.

A detailed description of the methodology to implement a GI workshop and site visit is presented in Sections 2.1 through 2.4 of the proposal that accompanies this questionnaire.

12. B. Is your firm experienced in development of low cost, low maintenance green infrastructure concept plans?

YES

12.B.1 Provide Names and Number of Plans

The next phase following workshops and site visits in the process of developing GI is the development of GI concept plans. Tetra Tech has extensive experience developing these plans which offer the community a chance to visualize the proposed project before full design and provides engineers a preliminary opportunity to assess the feasibility of potential project sites. The table below shows projects where Tetra Tech has completed low cost, low maintenance GI concept plans.

| Project | Client | Number |
|--|--|--------|
| West Virginia Green Infrastructure Planning and Implementation (Romney and Martinsburg) | US EPA/WVDEP | 2 |
| Resilient by Design (Huntington, WV and Seaford, DE) | US EPA Region 3 | 2 |
| Concept Designs (Congressional Cemetery, Hebrew Cemetery, Mt. Olivet Cemetery (2), Knollwood Military Retirement Community) | District Stormwater | 5 |
| Pine Hills, WV GI | Beckley Sanitary Board | 1 |
| Campus GI Design, NJ | Stevens Institute of Technology | 2 |
| Lynnhaven Park, Indian River Road, Lake Joyce | City of Virginia Beach | 3 |
| Green Infrastructure Community Partners Program Technical Assistance | US EPA Office of Wastewater Management | 14 |
| Central Lake Erie Collaborative, OH | West Creek Conservancy | 1 |
| Ronald Reagan Park Regenerative Stormwater Conveyance and Bioretention; F. Wayne Hill Water Resource Center Nutrient Recovery Area Smart Stormwater Design | Gwinnett County, GA | 2 |
| Vulcan Avenue GI Drainage Improvements | City of Encinitas, CA | 1 |
| Design of GI Practices for the San Fernando Green Streets | TreePeople | 1 |

12.B.2 Provide an example GI concept plans

Tetra Tech developed concept plans for multiple sites in Romney and Martinsburg, WV through our ongoing support for GI in the Chesapeake Bay portion of West Virginia through an EPA Contract and in support of West Virginia DEP. In both municipalities, Tetra Tech used data collected during the site visits and workshops to design preliminary engineering concepts for GI. In Romney, Tetra Tech proposed bioretention and tree planting opportunities at an elementary school and along the roadway by the senior center to better manage large areas of impervious surface impacting a nearby stream. In Martinsburg, Tetra Tech developed a green streets concept plan for 4 blocks of predominantly residential streets to help address localized flooding concerns. The concept plan included permeable pavement, bioretention, swales and tree planting. Because of the extent of the GI, Tetra Tech used our in-house landscape architect to develop full-color renderings of the concept designs to help City of Martinsburg officials better understand what each concept would look like at completion and to gain buy-in from local decision-makers. Further information on this project is provided in Section 1.4 of the proposal that accompanies this questionnaire.

12.B.3 Provide a detailed description of the methodology to be used to develop this GI concept plan as per EOI.

A detailed description of the methodology to develop GI concept plans is provided in Section 2.5 of the proposal that accompanies this questionnaire.

12. C. Is your firm experienced in development of green infrastructure project designs, construction documents, cost estimates, permitting, and development of GI BMP maintenance plans?

YES

12.C.1 Provide Names and Number of Project designs, construction docs, maintenance plans

Tetra Tech has been developing green infrastructure project designs, construction documents, cost estimates, permitting and maintenance plans for more than a decade. The table below shows recent projects where Tetra Tech has completed these activities.

| Project | Client | Number |
|---|----------------------------------|--------|
| City of Martinsburg Green Streets Design | US EPA/WWDEP/City of Martinsburg | 1 |
| Pine Hills, WV GI | Beckley Sanitary Board | 1 |
| GI Designs (Mt. Olivet Cemetery (3), Knollwood Military Retirement Community) | District Stormwater | 4 |
| Campus GI Design, NJ | Stevens Institute of Technology | 1 |
| Lynnhaven Park | City of Virginia Beach | 1 |
| Garner Creek Retrofit BMP Design; Ronald Reagan Park Regenerative Stormwater Conveyance and Bioretention Design; F. Wayne Hill Water Resource Center Nutrient Recovery Area Smart Stormwater Design | Gwinnett County | 3 |
| Vulcan Avenue GI Drainage Improvements | City of Encinitas, CA | 1 |
| Alamo, Salvation, and 68th Street Basins Green Street Retrofit | City of San Diego | 1 |
| Design of GI Practices for the San Fernando Green Streets | TreePeople | 1 |

12.C.2 Provide an example GI project design, cost estimate and maintenance plan

Tetra Tech has completed project designs, construction documents, cost estimates, permitting and maintenance plans for 3 projects for District Stormwater, LLC in Washington, DC, and is currently working on project designs for a fourth GI project. Each project included site visits and concept designs that informed the final designs, which included bioretention areas and tree plantings. After completing 30%, 60% and 90% designs with maintenance and an engineer's cost estimate, Tetra Tech submitted the plans for permitting and received permits with only minimal changes to the design plans. During construction, Tetra Tech supported the contractor with construction documents and requests for information. All three projects were completed, and Tetra Tech submitted the as-built design plans to the appropriate regulatory agency (District Department of Energy and Environment).

12.C.3 Provide a detailed description of the methodology to be used to develop GI project design, construction estimates, cost estimates, permitting and BMP maintenance plan as per EOI.

A detailed description of the methodology to develop GI project designs, construction documents, cost estimates, permitting, and maintenance plans is provided in Section 2.7 of the proposal that accompanies this questionnaire.

ATTACH ADDITIONAL PAGES AS NECESSARY

12. D. Is your firm experienced in development of green infrastructure projects noted in 12B and 12C in karst?

YES

12.D.1 Provide Names and Number of Projects

Karst areas require special consideration when designing GI projects because of the higher likelihood of a groundwater connection near the surface. In these cases, it is recommended to use liners in GI practices to prevent infiltration below the practices and minimize any increased discharge to the subsurface, which could cause or exacerbate sink holes. Tetra Tech has designed GI in karst regions in the past. The City of Martinsburg Green Streets design is the most recent relevant project.

12.D.2 Provide an example GI project designed in karst.

Tetra Tech developed GI design plans in Martinsburg, WV through our ongoing support for GI in the Chesapeake Bay portion of West Virginia through an EPA Contract and in support of West Virginia DEP. Martinsburg is in a karst region of the state. To ensure that our designs accounted for any karst features, a geotechnical survey using electrical resistivity was obtained for the project area to help detect voids and other characteristics of sinkhole-prone areas. In areas with wet soils and medium to high plasticity clay, impermeable liners were installed in the green infrastructure practices to avoid infiltration. Underdrains were installed in all BMPs.

12.D.3 Provide a detailed description of the methodology to be used to design a GI project in karst.

A detailed description of the methodology to design in karst areas is provided in Section 2.5 of the proposal that accompanies this questionnaire.

ATTACH ADDITIONAL PAGES AS NECESSARY

12. E. Is your firm experienced in identifying and applying for funding for green infrastructure implementation projects?

YES

12.D.1 Provide Names and Number of Projects

| Client | Grant | Number of Projects (Grant applications) |
|---|---|---|
| US EPA/WVDEP/Romney, WV | EPA Green Streets, Green Jobs, Green Towns (G3) grant | 1 |
| District Stormwater | DC SRC Aggregator Startup Grants | 1 |
| University of Maryland Extension/Howard County Watershed Stewards Academy | EPA G3 Grant (Green Streets, Green Jobs, Green Towns) | 1 |
| Prince George's County | Chesapeake Bay Trust – Watershed Assistance Grant Program | 1 |

12.D.2 Provide an example funding source and application package for a GI project.

Following the development of the concept designs and final report for green infrastructure in Romney, WV, the City was interested in applying for an EPA G3 grant to fund full design of the project. The City was leading the application process but required technical assistance from Tetra Tech to respond to several of the application's technical questions, including the project description, cost-efficiency strategies, and developing a scope of work with tasks and estimated hours and costs, including costs for additional required investigation including geotechnical and survey crews. Tetra Tech wrote substantial portions of the grant application narrative to support the City's application.

In another example, Tetra Tech provides GI consulting services to District Stormwater, LLC, an entity owned by The Nature Conservancy. In order to fund some of our initial green infrastructure work with them and minimize their initial costs, Tetra Tech applied for a Stormwater Retention Credit (SRC) Aggregator Startup Grant. Tetra Tech was successful in receiving a grant for \$75,000 to support District Stormwater by conducting GI feasibility assessments, site visits and concept designs. The application (details found here: [SRC Aggregator Startup Grants | ddoe \(dc.gov\)](#)) required Tetra Tech to provide a narrative description of the project, a task list, an itemized budget, letters of support from project partners, and a project schedule. Grant deliverables included site visit reports and concept design plans and a final report summarizing the project accomplishments and any lessons learned.

12.D.3 Provide a detailed description of the methodology to be used to identify and apply for GI funding as per EOI.

A detailed description of the methodology to identify and apply for funding for GI is provided in Section 2.6 of the proposal that accompanies this questionnaire.

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR GI DEVELOPMENT PROJECTS** (Insert additional copies as necessary)

| NAME & TITLE (Last, First, Middle Int.) | YEARS OF EXPERIENCE | |
|---|-----------------------|------------------------|
| | In field of expertise | In GI-related projects |
| Ludwig, Jon, C. | 21 | 5 |

Brief Explanation of Responsibilities
 Mr. Ludwig will support Ms. Molloy in assigning staff, monitoring work assignment progress and providing general oversight and guidance. Mr. Ludwig, working from our Fairfax, VA office, will coordinate closely with Ms. Molloy and WVDEP Project Managers to ensure that project tasks are meeting all technical and schedule objectives.

EDUCATION (Degree, Year, Specialization)
 M.S., 1997, Environmental Pollution Control
 B.S., 1995, Environmental Science

| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS | REGISTRATION (Type, Year, State) |
|--|----------------------------------|
| American Water Resource Association. Water Environment Federation. | None |

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR GI DEVELOPMENT PROJECTS**

| NAME & TITLE (Last, First, Middle Int.) | YEARS OF EXPERIENCE | |
|---|-----------------------|------------------------|
| | In field of expertise | In GI related projects |
| Molloy, Aileen, M. | 18 | 4 |

Brief Explanation of Responsibilities
 Ms. Molloy will serve as the day-to-day point of contact to WVDEP. She will staff projects and maintain communication among all parties. She will also lead the organizational aspects of GI workshops. Ms. Molloy will continue to provide leadership and technical expertise as she has for the last 3 years on the support for West Virginia Green Infrastructure Planning and Implementation in the Chesapeake Bay region of the state.

EDUCATION (Degree, Year, Specialization)
 M.E.M, 2005, Ecosystem Science and Management
 B.S., 2000, Biology and Marine Science

| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS | REGISTRATION (Type, Year, State) |
|--|----------------------------------|
| None | None |

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR GI DEVELOPMENT PROJECTS** (Insert additional copies as necessary)

| NAME & TITLE (Last, First, Middle Int.) | YEARS OF EXPERIENCE | |
|---|-----------------------|------------------------|
| | In field of expertise | In GI related projects |
| Smith, Jonathan, F. | 26 | 26 |

Brief Explanation of Responsibilities
 Mr. Smith will serve as the lead design engineer and workshop facilitator. He will provide technical oversight to the design engineers and landscape architect. He will provide design QA/QC as well. As the workshop facilitator, he will be responsible for developing GI content and leading participants through discussions of priority stormwater issues, problem areas and solutions.

EDUCATION (Degree, Year, Specialization)
 B.S., 1995, Biological & Agricultural Engineering

| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS | REGISTRATION (Type, Year, State) |
|--|--|
| American Public Works Association, NC Chapter. | Professional Engineer, 2008, Virginia [REDACTED] Professional Engineer, 2021, Maryland [REDACTED] Professional Engineer, 2000, North Carolina [REDACTED] Professional Engineer, 2021, Georgia [REDACTED] Professional Engineer, 2021, District of Columbia, provisional [REDACTED] Certified Professional in Storm Water Quality, 2010, North Carolina [REDACTED] |

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR GI DEVELOPMENTS PROJECTS**

| NAME & TITLE (Last, First, Middle Int.) | YEARS OF EXPERIENCE | |
|---|-----------------------|------------------------|
| | In field of expertise | In GI related projects |
| Tucker, Bobby | 14 | 14 |

Brief Explanation of Responsibilities
 Mr. Tucker will provide site visit evaluations and concept design support. He has previously participated in the design of the green streets project in Martinsburg, WV.

EDUCATION (Degree, Year, Specialization)
 M.S., 2007, Biological & Agricultural Engineering
 B.S., 2004, Environmental Engineering

| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS | REGISTRATION (Type, Year, State) |
|--|--|
| American Ecological and Engineering Society American Society of Agricultural and Biological Engineers | Professional Engineer, 2013, North Carolina [REDACTED] Certified Professional in Low Impact Development, North Carolina |

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR GI DEVELOPMENT PROJECTS** (Insert additional copies as necessary)

| NAME & TITLE (Last, First, Middle Int.) | YEARS OF EXPERIENCE | |
|---|-----------------------|------------------------|
| | In field of expertise | In GI related projects |
| Montali, David | 39 | 4 |

Brief Explanation of Responsibilities
 Mr. Montali will serve as a programmatic expert and support WVDEP in programmatic needs and provide support at the workshops and site assessments. He has supported WVDEP programmaticly for over 35 years serving as the Team Leader of the NPDES Permitting Team, the West Virginia Pretreatment Coordinator and TMDL Program Manager. He has supported both the Romney and Martinsburg GI projects assisting with project facilitation and selection.

EDUCATION (Degree, Year, Specialization)
 B.S., 1981, Environmental Engineering

| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS | REGISTRATION (Type, Year, State) |
|--|----------------------------------|
| None | None |

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR GI DEVELOPMENTS PROJECTS**

| NAME & TITLE (Last, First, Middle Int.) | YEARS OF EXPERIENCE | |
|---|-----------------------|------------------------|
| | In field of expertise | In GI related projects |
| Cormier, Élise | 18 | 4 |

Brief Explanation of Responsibilities
 Ms. Cormier will serve at the Landscape Architect on the concept designs. She will provide renderings of the proposed designs in a visually appealing way that provides clarity and understanding to the stakeholders about the design and concept. Her perspective will ensure the concept designs provide considerations for aesthetics and native vegetation.

EDUCATION (Degree, Year, Specialization)
 M.L.A, 2006, Landscape Architecture
 M.N.R, 2006, Natural Resources
 B.A., 2000, Geology

| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS | REGISTRATION (Type, Year, State) |
|---|---|
| American Society of Landscape Architects (ASLA) | Registered Landscape Architect, Georgia [REDACTED] Registered Landscape Architect, Alabama # [REDACTED] Certified Charrette Facilitator, 2014, Oregon |

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR GI DEVELOPMENT PROJECTS** (Insert additional copies as necessary)

| NAME & TITLE (Last, First, Middle Int.) | YEARS OF EXPERIENCE | |
|---|-----------------------|------------------------|
| | In field of expertise | In GI related projects |
| Edwards, Cori | 11 | 3 |

Brief Explanation of Responsibilities
 Cori will provide GIS expertise for developing visually appealing site maps, and delineating GI drainage areas. She will also provide grant funding application support.

EDUCATION (Degree, Year, Specialization)
 M.GIS, 2018, Geographic Information Systems
 B.A., 2006, Geography/Cartography & GIS

| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS | REGISTRATION (Type, Year, State) |
|---|----------------------------------|
| West Virginia Association of Geospatial Professionals | None |
| American Water Resources Association | |

15. CURRENT PROJECTS/ACTIVITIES IN WHICH YOUR FIRM IS PRESENTLY INVOLVED

| PROJECT NAME, TYPE AND LOCATION | NAME AND ADDRESS OF OWNER | NATURE OF YOUR FIRM'S RESPONSIBILITY | ESTIMATED PROJECT COST | PERCENT COMPLETE |
|--|--|--|------------------------|------------------|
| <p>West Virginia Green Infrastructure Planning and Implementation, GI workshops and concept design plans, Romney, WV, Martinsburg, WV, and other locations TBD.</p> | <p>Megan Thyng US EPA Chesapeake Bay Program 1750 Forest Drive Suite 130 Annapolis, Md. 21401 Thyng.meghan@epa.gov</p> <p>Teresa Koon WVDEP Division of Water and Waste Management Watershed Improvement Branch 601 57th Street, SE Charleston, WV 25304 304-414-3828 Teresa.M.Koon@wv.gov</p> | <p>Plan and conduct GI workshops, site assessments, concept designs and full design</p> | <p>\$200,000</p> | <p>50%</p> |
| <p>City of Martinsburg Green Streets Design, full engineering plans, load reductions, costs, stormwater volume reduction modeling, Martinsburg, WV</p> | <p>Jared Tomlin City of Martinsburg 800 Boston Street Martinsburg, WV 25401 304-263-7187 jtomlin@cityofmartinsburg.org</p> | <p>Green infrastructure design, stormwater volume reduction modeling and cost estimation</p> | <p>\$78,000</p> | <p>90%</p> |
| <p>Mt Olivet Phase III Green Infrastructure Design, Voluntary Stormwater Retention Credits, design, permitting and construction engineering support, Washington, DC</p> | <p>Aileen Craig District Stormwater 425 Barlow Place, Suite 100 Bethesda, MD 20814 585-489-7556 Aileen.craig@districtstormwater.com</p> | <p>Green infrastructure design, permitting, and construction support</p> | <p>\$150,000</p> | <p>60%</p> |
| <p>Green Infrastructure Assessments and Concept Designs in Washington, DC</p> | <p>Aileen Craig District Stormwater 425 Barlow Place, Suite 100 Bethesda, MD 20814 585-489-7556 Aileen.craig@districtstormwater.com</p> | <p>Green infrastructure site assessments and concept designs</p> | <p>\$50,000</p> | <p>5%</p> |

| | | | | |
|---|---|---|---|---|
| F Wayne Hill Smart Stormwater Design Nutrient Recovery Area BMPs in Gwinnett County. Project includes an RSC system and three bioretention basins. | Mike Kajder PE Gwinnett County Department of Water Resources 678-376-4294 Michael.Kajder@gwinnettcountry.com | Concept development, construction document preparation, permitting assistance, bid support, construction support, and operations and maintenance support. Provided a plan for monitoring and evaluating the constructed BMPs performance. | \$1,220,000 | 65% |
| City of Virginia Beach Stormwater and Environmental Management Services (includes Lynnhaven Park Stormwater Management Facility Design) City of Virginia Beach | Melanie Coffey City of Virginia Beach Public Works Stormwater Management Regulatory Division 3556 Dam Neck Rd. Virginia Beach, VA 23453 757-385-8593 mcoffey@vbgov.com | Evaluation of existing BMPs, field assessment, concept designs and final engineering designs. BMP prioritization, BMP retrofits, street sweeping and floatables reduction assessments | \$1,549,000 (Contract) (\$148,000 for Lynnhaven BMP design) | 50% (Contract) 70% (Lynnhaven BMP design) |
| TOTAL NUMBER OF PROJECTS: 6 | | | TOTAL ESTIMATED PROJECT COSTS: \$3,047,200 | |

17. COMPLETED WORK WITHIN LAST 5 YEARS IN WHICH YOUR FIRM WAS THE DESIGNATED FIRM OF RECORD

| PROJECT NAME, TYPE AND LOCATION | NAME AND ADDRESS OF OWNER | ESTIMATED PROJECT COST | YEAR | EPA APPROVED? |
|---|---|---|------|---------------|
| Resilient By Design , GI Workshops and Concept Designs, Huntington, WV and Seaford, DE | Ken Hendrickson Green Infrastructure Lead US EPA Region 3 (215) 814-2753 hendrickson.kenneth@epa.gov | \$72,500 (Huntington, WV) \$50,600 (Seaford, DE) | 2019 | Yes |
| Green Infrastructure Community Partners Program Technical Assistance , GI Workshops and Concept Designs (Nation-wide) | Chris Kloss US EPA Office of Wastewater Management (202) 564-1438 kloss.christopher@epa.gov | \$2,600,000 | 2017 | Yes |
| Green and Complete Streets Building Blocks Technical Assistance Program , GI strategic and programmatic assistance (Nation-wide) | Charles (Chip) Gurkin US EPA Office of Sustainable Communities (202) 564-2778 gurkin.charles@epa.gov | \$192,000 | 2020 | Yes |
| Mt. Olivet Phase II, Green Infrastructure , Voluntary Stormwater Retention Credits, BMP design, permitting and construction engineering support, Washington, DC | Aileen Craig District Stormwater 425 Barlow Place, Suite 100 Bethesda, MD 20814 585-489-7556 Aileen.craig@districtstormwater.com | \$121,000 | 2019 | N/A |
| Knollwood Military Retirement Community, Green Infrastructure , Voluntary Stormwater Retention Credits, BMP design, permitting and construction engineering support Washington, DC | Aileen Craig District Stormwater 425 Barlow Place, Suite 100 Bethesda, MD 20814 585-489-7556 Aileen.craig@districtstormwater.com | \$139,600 | 2021 | N/A |
| Vulcan Avenue Drainage Improvements , Green street bioretention and permeable pavement design, Encinitas, CA | City of Encinitas, Public Works Department 505 S. Vulcan Avenue Encinitas, CA 92024 | \$ 351,125 (Design Cost) | 2020 | N/A |
| Alamo, Salvation, and 68th Street Basins Green Street Retrofit , Green Street (suspended pavement) design, San Diego, CA | City of San Diego Public Works - Department, Engineering & Capital Projects, Right of Way Design Division, Drainage Section 525 B Street, Suite 750, MS 908A San Diego, CA 92101-4502 | \$328,445 (Design Cost) \$33,475 (Construction Management) | 2021 | N/A |

| | | | | |
|---|--|--------------------------------------|-------------|------------|
| <p>Ronald Reagan Bioretention and Regenerative Stormwater Conveyance System, concept designs and full design, Gwinnett County, GA</p> | <p>Gwinnett County Department of Water Resources Rachel Jones, PE, CFM Watershed Improvement Program Manager 678-376-6764; Rachel.Jones@gwinnettcounty.com</p> | <p>\$246,000 (Design Cost)</p> | <p>2021</p> | <p>N/A</p> |
| <p>Garner Creek Watershed Improvement Project design of bioretention cells, engineered wetlands, and stream restoration, Gwinnett County, GA</p> | <p>Gwinnett County Department of Water Resources Rachel Jones, PE, CFM Watershed Improvement Program Manager 678-376-6764; Rachel.Jones@gwinnettcounty.com</p> | <p>\$242,000 (Design Cost)</p> | <p>2021</p> | <p>N/A</p> |
| <p>Green Street Design, 30 percent design of a Green Street (bioretention and permeable pavement) City of San Fernando, CA</p> | <p>TreePeople 12601 Mulholland Drive, Beverly Hills, CA 90210</p> | <p>\$79,985.00 (30% design cost)</p> | <p>2018</p> | <p>N/A</p> |
| <p>Stevens Institute of Technology Stormwater Projects, Stevens Institute of Technology, City of Hoboken, NJ</p> | <p>Lisa DeMarco Senior Project Manager Division of Facilities & Campus Operations (201) 216-3554 ldemarcl@stevens.edu</p> | <p>\$67,037</p> | <p>2018</p> | <p>N/A</p> |
| | | | | |

18. COMPLETED WORK WITHIN LAST 5 YEARS ON WHICH YOUR FIRM HAS BEEN A SUB-CONSULTANT TO OTHER FIRMS (INDICATE PHASE OF WORK FOR WHICH YOUR FIRM WAS RESPONSIBLE)

| PROJECT NAME, TYPE AND LOCATION | NAME AND ADDRESS OF PRIMARY FIRM | ESTIMATED PROJECT COST OF YOUR FIRM'S PORTION | YEAR | EPA APPROVED? | CLIENT NAME AND ADDRESS |
|--|--|--|------|---------------|---|
| Mt. Olivet Phase I, Green Infrastructure, Voluntary Stormwater Retention Credits, Washington, DC | EQR, Inc. 1 Churchview Road Millersville, Md 21108 | \$134,700 (Tetra Tech was responsible for full design, permitting, and construction engineering support) | 2017 | N/A | Aileen Craig District Stormwater 425 Barlow Place, Suite 100 Bethesda, MD 20814 585-489-7556 Aileen.craig@districtstormwater.com |
| | | | | | |
| | | | | | |

19. Use this space to provide any additional information or description of resources supporting your firm's qualifications to perform work for the WVDEP's TMDL Program.

See attached accompanying proposal for additional information and qualifications.

20. The foregoing is a statement of facts.

Signature:  Title: Director

Date: August 11, 2021

Printed Name: Jon Ludwig

Expression of Interest to Provide Architectural/Engineering Services for Green Infrastructure in Southern West Virginia

CEOI 0313 DEP2200000001

SUBMITTED TO

Department of Administration

Purchasing Division

2019 Washington Street East

Charleston, WV 25305-0130

SUBMITTED BY

Tetra Tech, Inc.

10306 Eaton Place, Suite 340

Fairfax, VA 22030



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APPENDICES

Appendix A: RESUMES

1.0 QUALIFICATIONS, EXPERIENCE AND PAST PERFORMANCE

As requested in the Expression of Interest (EOI), this section discusses Tetra Tech's history and experience, company resources to support the project, staff qualifications and experience, management capabilities and approach, client references, and past experience completing similar projects.

Tetra Tech, Inc.

Founded in 1966, Tetra Tech, Inc. is a leading provider of specialized environmental management consulting and technical services. We develop innovative, successful, and cost-effective solutions to complex environmental problems for public and private clients. Tetra Tech's success is a result of several factors, starting with technical skills in a wide range of discipline and including a commitment to open, honest communication about project performance with clients, which fosters partnerships that enable us to meet fast-track schedules and stay within budget. Tetra Tech's vision for growth and diversification to meet client's needs has been another key to our success. As environmental policies and regulations have changed the ways our clients do business, Tetra Tech has national experts who are knowledgeable in those areas and has put their skills to work. The result is that today, as a publicly owned company, we have 450 offices with over 21,000 employees worldwide. More important than our size, however, is that Tetra Tech is rated consistently by the industry as one of the most financially stable, top-quality environmental engineering firms. This year marked the ***eighteenth*** consecutive year in which Tetra Tech was ranked 1st in the top U.S. water firms by *Engineering News-Record*. Tetra Tech was also ranked #1 in Environmental Science, Water Treatment/Desalination, Hydro Plants and Wind Power, and #2 in Environmental Engineering/Design. In addition, Engineering News-Record ranked Tetra Tech #4 in their list of the Top 200 Environmental Firms and Top 500 Design Firms.

Tetra Tech was originally founded to provide engineering services related to waterways, harbors, and coastal areas. Our reputation as a national leader in the water resources arena was forged through our early coast water quality efforts and was solidified in the early 1980s when we established the forerunner of the Water Division and were awarded the first in a series of national watershed assessment and management contracts with the US EPA Office of Water. For more than 20 years the Water Division has supported US EPA's watershed and water quality programs, through multiple contract re-competes. In addition to our national role in developing watershed and water quality management tools and practices, the Water Division has been asked by other federal agencies (e.g. U.S. Army Corps of Engineers [USACE]), more than 40 states, and numerous local and municipal agencies to provide technical assistance in designing and implementing watershed and water quality related programs and plans for their waters. In response to these requests, the Water Division has grown and located offices across the United States, all reporting to central management in the Water Division's east coast headquarters in Fairfax, VA. Our success demonstrates our ability to adapt to our clients' needs. For example, the Water Division opened our Charleston, WV office in July 2002 to provide local support to WVDEP in the development of TMDLs. Since then, Tetra Tech management and technical staff have contributed to more than \$9.5 million worth of work directly for WVDEP.

Our Fairfax, VA office will be the primary office for this project and will be supported by more than 70 staff members in our Charleston, WV and Research Triangle Park, NC offices. Resources and equipment available to support this project are described in the following Section (**Error! Reference source not found.**).

1.1 STAFF QUALIFICATIONS AND EXPERIENCE

Tetra Tech will administer the proposed contract from the Fairfax, VA office of the Water Division. Figure 1 shows the proposed project management organization and Tetra Tech project team. It features a core management team of dedicated senior managers who have clearly defined management roles to ensure timely, high-quality, cost-effective performance under the contract. In addition, it shows the staffing plan of key staff, who will guide support staff in the completion of each aspect of green infrastructure (GI) workshop planning and design.

Our Project Manager, Aileen Molloy, is located in the Fairfax, VA office, along with other management staff (Program Manager). Other key staff are located in the Charleston, WV and Research Triangle Park, NC offices. For more than 21 years, staff from the Fairfax and Charleston offices have worked with WVDEP on stormwater management, watershed planning, and Total Maximum Daily Load (TMDL) development and have provided GI support for the last three years. In addition to the key staff in our more local offices, we can draw on our extensive GI engineering expertise, experience and resources from our other offices throughout the country (Cleveland, OH; Atlanta, GA; and San Diego, CA) to support GI design, construction cost estimating, and stormwater modeling to ensure a seamless and cost-efficient project.

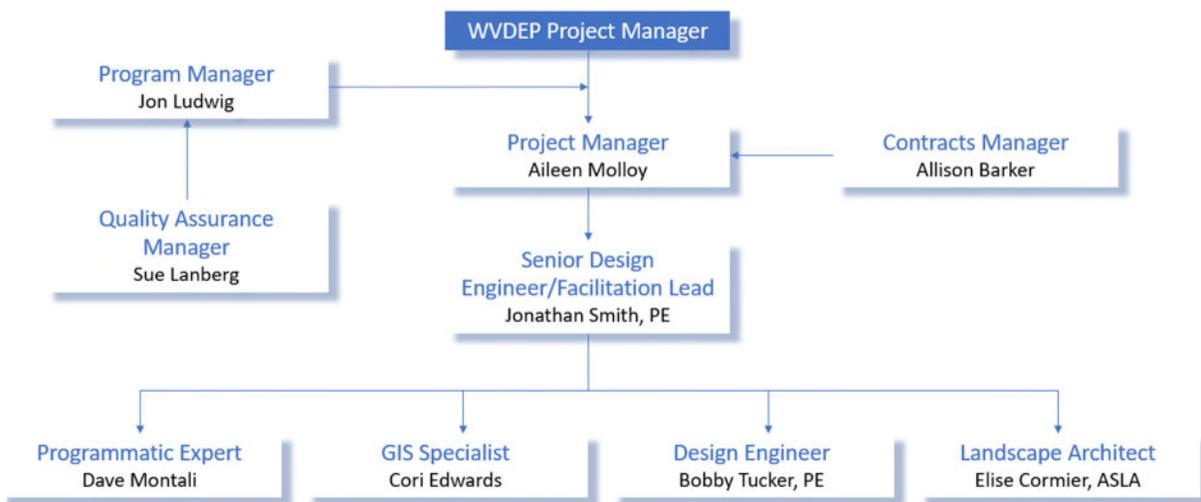


Figure 1. Organization of the Proposed Tetra Tech Team.

Core Management Team

Brief descriptions of the roles and qualifications of each member of the Core Management Team follow.

Jon Ludwig, Program Manager

Mr. Ludwig has worked with WVDEP since joining Tetra Tech over 21 years ago. Originally, he served as project manager for multiple EPA Region 3 task orders to develop TMDLs throughout West Virginia to meet aggressive consent decree timelines. Over the next decade, Mr. Ludwig successfully managed five large WVDEP TMDL contracts that contained very aggressive project schedules that progressed simultaneously, leading to timely, high-quality, and cost-effective performance. His leadership and energy have produced highly technical and innovative solutions that have helped WVDEP's TMDL Program become a national leader in TMDL development. Mr. Ludwig also serves as the program manager for a GI design contract with District Stormwater. For the last five years he has been leading GI concept plans and full design for projects in the District of Columbia. Mr. Ludwig will provide leadership and technical guidance to ensure WVDEP's GI program is able to expand to provide high-quality technical assistance in the southern part of West Virginia.

Aileen Molloy, Project Manager

Ms. Molloy will serve as the WVDEP point of contact and will work closely with WVDEP to achieve desirable GI projects with strong community buy-in in Southern West Virginia. As a project manager, Ms. Molloy has extensive experience in supplying clients with project deliverables and supervising technical staff. She will be responsible for staff planning, reporting progress, invoicing, and quality assurance/quality control. Ms. Molloy currently manages a task order supporting similar GI workshops and concept designs in the Chesapeake Bay region of West Virginia, as such, she has worked closely with WVDEP watershed improvement staff over the last three years. She managed support for the Romney, WV and Martinsburg, WV projects and will manage future work with small municipalities selected to participate in the program under this task. She also manages the District Stormwater GI planning and design contract in the District of Columbia, which supports the installation of voluntary GI practices throughout the District.

Allison Barker, Contracts Manager

Ms. Barker will be responsible for financial reports, contract administration, and cost control. She has served as the Contract Administrator for the previous and current WVDEP contracts (Purchase Order No. DEP12147, DEP13860, DEP14798, DEP15231, DEP15530, DEP15990, DEP16379, DEP16550, and DEP1600000072, DEP1700000011, DEP1800000018, DEP1900000013, DEP2000000018, and DEP2200000001) and has done so since the beginning of Tetra Tech's support for WVDEP. Ms. Barker is the Contracts Group Manager and a senior contract administrator in Tetra Tech's Fairfax office. She has been extensively involved in negotiating and managing all levels and types of federal and private sector contracts and subcontracts.

Jonathan Smith, PE, Senior Design Engineer and Green Infrastructure Workshop Facilitation Lead

Mr. Smith serves as the senior design engineer and lead for stakeholder workshops and our overall Technical Lead. He has 20 years of experience in water resources engineering, specializing in stormwater management. Mr. Smith is a professional engineer licensed in West Virginia, as well as a Certified Professional in Stormwater Quality, a Certified Professional in Erosion and Sedimentation Control, and a LEED-Accredited Professional.

He is an expert in stormwater management with the ability to plan, manage, and implement stormwater-related projects for municipal and private clients. He has completed design and construction oversight for more than 20 types of stormwater BMPs, including stormwater wetlands, bioretention areas, green roofs, pervious pavement practices, innovative wet ponds, level spreaders, media filters, and a number of water quality retrofits of existing BMPs. He recently completed the design of a 4-block green streets GI project in Martinsburg, WV as part of support for WVDEP's GI assistance in the Chesapeake Bay watershed.

Sue Lanberg, Quality Assurance Officer

Ms. Lanberg is an environmental scientist with 20 years of experience at Tetra Tech and more than 25 years total experience in the environmental field. As the Environmental/Science Quality Assurance (QA) Officer for Tetra Tech's Water Division (WTR), she oversees compliance with Tetra Tech's QA/quality control (QC) requirements for science-based projects for regional offices in Tetra Tech's WTR Division. The support she provides for Tetra Tech's WTR QA Program includes preparing quality management plans (QMPs), quality assurance project plans (QAPPs), standard operating procedures (SOPs), and other quality-related documents; conducting laboratory, field, and system audits; and reviewing environmental data.

Other Key Staff

Table 1-1 summarizes the qualifications of the key technical staff identified for supporting this project. This table includes all the required fields identified in the EOI (i.e., titles, education, and work experience). Relevant experience with the key skills and qualifications (e.g., ability to organize and facilitate a workshop, knowledge of green infrastructure, estimating stormwater volume) is identified for each of the selected staff. Focused resumes for the proposed technical staff are provided in Appendix A of the proposal.

Table 1-1. Summary of Experience and Skills of Proposed Technical Staff.

| Staff | Proposed Role | Highest Degree | Total Years of Experience | Organizing and Facilitating Workshops | Working with Stakeholders | GI Planning and Design | Site Assessments | Estimating Stormwater Volume/Understanding Flood Hazards and CSO Abatement | Calculating Pollutant Load Reductions | Estimating Construction Costs | Developing User-Friendly Concept Plans | Identifying and applying for funding for GI | Experience in developing GI in karst regions | Full GI Project Designs, Construction Documents, Cost Estimates, Permitting and Maintenance Plans |
|--------------------|---|----------------|---------------------------|---------------------------------------|---------------------------|------------------------|------------------|--|---------------------------------------|-------------------------------|--|---|--|---|
| Jon Ludwig | Program Manager | MS | 21 | • | • | • | • | | | | • | | | • |
| Aileen Molloy | Project Manager | MEM | 18 | • | • | • | • | | • | | • | • | • | • |
| Jonathan Smith, PE | Senior Design Engineer / Workshop Facilitator | BS | 26 | • | • | • | • | • | • | • | • | • | • | • |
| Bobby Tucker, PE | Design Engineer | MS | 14 | | | • | • | • | • | • | • | | • | • |
| Dave Montali | Programmatic Expert | BS | 39 | • | • | • | | | | | • | | | |
| Elise Cormier, RLA | Landscape Architect | MLA | 15 | • | • | • | | | | | • | | • | • |
| Cori Edwards | GIS Specialist | MGIS | 11 | • | • | | • | | | | • | | | |

1.2 PROJECT MANAGEMENT

Tetra Tech has a long history of successfully meeting aggressive project schedule while staying within project budgets.

This success is due to the exceptional performance of key technical staff and strong leadership provided by our core management team. Tetra Tech has been providing timely, high-quality and cost-effective performance for both WVDEP's TMDL program and the Watershed Improvement Branch on various projects throughout the last 20 years. We will leverage the stability and continuity of our management team to maintain this successful management structure. Our Program Manager, Jon Ludwig, will continue to provide corporate visibility and national leadership in water resources. Technical oversight will be provided by Senior Engineer, Jonathan Smith, PE. Aileen Molloy will serve as the Project Manager, as she has for the ongoing support Tetra Tech is providing for GI projects in the Chesapeake Bay watershed portion of West Virginia. She will draw upon the guidance and knowledge of the management team and WVDEP's Project Manager to solve technical issues, encourage strong participation from local stakeholders, and ensure quality concept designs that meet the needs of the local community.

1.2.1 Unique Capabilities offered by the Tetra Tech Team

Tetra Tech would like to highlight our unique capabilities we offer WVDEP in meeting the goals of the WVDEP's Division of Water and Waste Management to broaden community understanding of the environmental benefits and co-benefits of green infrastructure, increase community decision-making for green infrastructure, prioritize areas for implementation and prepare concept designs.

Tetra Tech has been supporting WVDEP with the planning and execution of GI stakeholder workshops in the Chesapeake Bay watershed since 2018, and out of this same support, Tetra Tech has had the opportunity to develop concept designs for Romney and Martinsburg, WV. Tetra Tech's approach to working with small communities on GI starts with a listening first approach. Stakeholders are the focus of the workshops; we strive to provide educational information on GI that can be understood by non-technical participants and allow and encourage stakeholder participation in identifying their own community's stormwater issues, strengths and weaknesses. Tetra Tech plans to bring this same approach to the Lower New River watershed and its communities.

In addition, Tetra Tech brings long-term experience and a successful history of working with WVDEP and managing contracts of similar size and scope, with a skilled and experienced management and contracts team that can efficiently meet WVDEP's requirements.

1.2.2 Project Management Plan for Quality and Cost Control

Tetra Tech's proposed project organization and management approach to support WVDEP in the service areas presented in the EOI are based on the development of clearly defined staff roles to ensure timely, high-quality, and cost-effective performance under the contract. The roles of the key personnel presented in Section 1.1 of this proposal include the Program Manager, Project Manager, QA Manager, Technical Lead, and individual leads for technical areas. This Core Management Team will maintain overall responsibility for the day-to-day

activities of our technical staff, whose skills and availability greatly exceed that necessary to support WVDEP. The relevant experience and skills of each of the key personnel are outlined in Section 1.1 and resumes for all staff are included in Appendix A. This section outlines our approach to project organization and management, including:

- Cost Control
- Quality Control
- Schedule Control
- Project Tracking
- Use of Subcontractors

1.2.2.1 Cost Control

Financial control will be ensured by means of Tetra Tech’s formalized and computerized management information system, which provides the Tetra Tech Program Manager and Project Manager, with up-to date (weekly) fiscal information for the project. A principal advantage of this system is that it enables managers to obtain financial data quickly and in sufficient detail for proper decision making. The system is designed to provide both the client and Tetra Tech management with full visibility on the current status and progress of each work item. It identifies potential problem areas before they can jeopardize the success of the project by causing work delays or cost overruns. Weekly charges to each task are provided to the Tetra Tech Program Manager and Project Manager. These weekly (Tetra Tech internal) reports include the names and number of hours of staff charging to the contract, computer usage, subcontractors’ charges, and purchase commitments.

1.2.2.2 Quality Control

Strict adherence to Tetra Tech’s Quality Management Plan (QMP) guarantees a high quality of technical performance. Quality control is achieved by Tetra Tech in four ways: careful definition of work assignments to ensure that the project team understands WVDEP’s needs, careful selection of staff, monitoring of technical progress and budgetary performance on a continual basis, and review of analyses and reports as necessary in response to critique and comment from the WVDEP Project Manager or other designated person. Team meetings and internal peer review are used to exert quality control based on the professional standards of team members.

1.2.2.3 Schedule Control

Time and schedule control can be a problem as a result of changing priorities that might result from a lack of information or new information. Additionally, when working with small communities, Tetra Tech has found that GI projects are just one of many competing priorities and topics that local leaders need to attend to. With regard to scheduling changes related to obtaining local information and data, input and buy-in, Tetra Tech has experience “meeting the community where they are” to keep the project moving. We provide flexibility in meeting times and try to offer substantial guidance and insight to the local community to make decision-making an easy and understandable process. We are also well-versed to narrowing down decisions to critical points, to minimize the burden on local officials and prevent decision paralysis. For GI workshops in

particular, we also strive to address as many issues, topics and decisions while attending the workshop, so that any questions and concerns can be answered face-to-face, to prevent delays from confusion and uncertainty.

Conflicts between workload requests by different programs might also cause some difficulty in scheduling. In the past, these problems have been worked out by contract officers and Tetra Tech by coordinating planning activities. By remaining flexible and maintaining frequent communication with client management and technical staff, we have been able to accommodate changes, substitutions, and reasonable new requests. Tetra Tech has identified staff with availability that exceeds that expected under this contract, ensuring that we can accommodate potential workload surges or new priority efforts. Adherence to the planning process results in a more uniform level of effort and allows better performance.

Scheduling of work is important to all projects. Project schedules are developed by the Tetra Tech Project Manager and Technical Lead to define the pathways necessary to meet each project's key milestones and deliverables. These schedules include charts to identify project milestones and delivery dates. This information is shared with the members of the project team to make them aware of when their input is needed by other members of the team. The Tetra Tech Project Manager holds regular conference calls and requires, at a minimum, monthly reports from the Technical Lead. Regular reporting identifying existing and potential problems and allows for early initiation of corrective actions.

1.2.2.4 Project Tracking

Tetra Tech has set up a contract management system that performs the necessary financial and performance tracking and develops progress reports. This contract management system is used for all Tetra Tech contracts of similar size, type, and scope. The system is equally suited to both small and large task order contracts of all types. Tetra Tech has adapted its tracking and reporting systems to meet the needs of the previous WVDEP contracts, and intends to maintain, and where appropriate adapt, its tracking and reporting systems to meet the needs of this WVDEP Contract.

Tetra Tech will conform to the EOI reporting requirements through the efforts of dedicated contract management support staff in Fairfax whose job descriptions include fulfilling the tracking and reporting requirements of the contract. These personnel are a contract specialist, Allison Barker, who will report to the Program Manager, Jon Ludwig, and Project Manager, Aileen Molloy on all matters regarding contract administration. The job performance ratings of the contract specialists are tied directly to Tetra Tech's contract management performance under the contract. The dedicated contract management staff will conduct the following activities to ensure strict conformance with the West Virginia contract requirements:

- Operate and maintain a computerized (Microsoft® Excel-based) internal tracking system. This system is linked to Tetra Tech's corporate contract accounting system (CODA) to allow weekly inputs of direct labor, other direct costs (ODCs), and subcontractor charges, as well as all indirect costs. Reports generated from the inputs are distributed to the Project Manager and Program Manager on Wednesday following the Sunday close of week. This allows each Project Manager to know, on a real-time basis, how much each staff member is working on each project and track progress toward meeting project milestones.

-
- Maintain an internal project status tracking system (Microsoft® Excel-based) that tracks, for each project, period of performance, WVDEP Project Manager, and Project Manager, applicable telephone numbers, dollar and LOE amount of original project assignment and each amendment, date received from WVDEP, work plan due date and actual date submitted to WVDEP, date of receipt of approval by WVDEP, and comment column for any unusual conditions or problems.
 - In conjunction with the Tetra Tech Program Manager and Project Manager, issue formal letters to designated Tetra Tech or subcontractor Project Managers and request a complete work plan, cost estimates, and schedule and reporting requirements.
 - Maintain a filing system for all incoming documentation (work plans, completion reports, monthly reports, technical reports) and all correspondence.
 - Prepare a detailed work plan and budget (by task) to guide the execution and assess the technical progress of each task.

Tetra Tech is flexible in reporting formats and procedures and will be happy to discuss any modifications that may be desired.

Difficulties and Resolution

We are always prepared to address administrative and technical difficulties. In our current and past contracts, we have successfully anticipated potential difficulties and prevented them during initial planning phases. The experienced Technical Lead assigned from the Project Team will address potential problems in the work plan; if problems arise once the work has begun, they will be addressed immediately. Difficulties and their resolution will be brought to the immediate attention of the Tetra Tech Program Manager and Project Manager, and WVDEP Project Manager.

Difficulties encountered and steps taken to solve them will be an important subject of the monthly progress reports to WVDEP, as well as the monthly periodic review meetings and telephone discussions with the WVDEP Project Manager. If any modification of the work schedule is required, WVDEP will be involved as soon as the need is recognized.

Frequent communication will occur among the WVDEP Project Manager and the Tetra Tech Program Manager, Project Manager, and Technical Lead. With these contacts, and by comparing progress on a project against milestones described in the work plan, the Project Manager will become aware, at an early stage, of any difficulties that might require corrective action. Corrective action could include:

- Discussions with the WVDEP Project Manager to negotiate modification in scope, schedule, or deliverables.
- Securing additional commitments of staff time to devote to the assignment.
- Retaining outside consultants to review problems in specialized technical areas.
- Restricting expenditures in any task area.
- Making adjustments in staff.

The Tetra Tech Program Manager or Project Manager may exercise the authority to replace the Technical Lead or staff member if it is in the best interest of the project. Such action will be taken only with the explicit approval of the WVDEP Project Manager. Because Tetra Tech offers in-depth experience and skills, an equally

qualified staff replacement can be found for almost any professional involved in a work assignment. Tetra Tech has gained a great deal of experience in addressing the limited number of difficulties that have arisen during past GI workshops and concept design projects. Solutions have been developed for most of the difficulties that might be expected under this contract. Specific difficulties that have needed attention and their resolution are described below.

Estimating Required Level of Effort

It is often difficult to estimate the level of effort required to complete a task because all information to be collected or reviewed is not available at the time estimates are required. Whenever possible, a preliminary review of available data and data quality will be made to provide a better estimate of required effort. In addition, Tetra Tech has kept careful records of both estimated and actual time required to complete work assignments of similar type and scope to those expected on this contract. This record allows reasonable estimates despite uncertainties.

Effective Project Management and Communication

Our experience with contracts of similar size and scope to the WVDEP EOI has convinced us that the successful development and administration of work assignments depends on effective communications and interactions among the key project positions: the WVDEP Project Manager, the Tetra Tech Program Manager, Project Manager, and the Technical Lead. Effective communications among this group can greatly facilitate and expedite the issuance of project requests, the review of work plans, and the authorization to proceed. If awarded the contract, the Tetra Tech Program Manager and Project Manager will seek a meeting with the WVDEP Project Manager to facilitate contract administration and communication protocols.

Communication with WVDEP during Projects

During the conduct of the project, the Project Manager and Senior Engineer will have day-to-day contact with designated WVDEP technical staff. This results in an efficient system, where any difficulties or problems are immediately known and reported to the Project Manager for resolution. Multiple points of communication will be provided for coordination between the Tetra Tech Team and WVDEP. The Tetra Tech Project Manager communicates directly with the WVDEP Project Manager regarding schedules, work assignments, and progress. For example, prior to initiating a scheduled activity, the Project Manager checks with the appropriate WVDEP Project Leader to ensure that there have not been any changes in circumstances or priorities and to verify any special concerns. If there are changes, a discussion is held as soon as possible to modify planned activities. All changes will be properly documented and transmitted in writing to WVDEP. The Project Manager will maintain a procedure of contacting the WVDEP Project Manager at least monthly to ensure that all concerns and problems are addressed or, ideally, are avoided through early detection. In addition, the Project Manager will be available within one hour's notice to facilitate communication on all contract issues.

Organizational Conflict of Interest Plan

Tetra Tech and each member of its staff are committed to complying fully with the requirements set forth in Subpart 9.5 of the Federal Acquisition Regulations (FAR) regarding a conflict of interest (COI) for all work Tetra Tech performs for state, federal, and other clients. This subpart defines COI as follows:

Because of activities performed or relationship established with other persons, either (1) a person is unable to render impartial assistance or advice to a client, (2) a person's objectivity in performing work for a client is or might be impeded, or (3) a person has an unfair competitive advantage.

Tetra Tech, its employees, and any subcontractors are required to fully comply with contract-specific COI requirements. The Tetra Tech Organizational Conflict of Interest Plan includes the following sections: Corporate Structure; COI Screening Process; Procedures to Avoid, Mitigate, or Neutralize Potential COI; Certifications; Responsibilities; Training; and Subcontractor COI Identification.

All Tetra Tech employees receive training on how to identify actual or potential organizational and personal COI situations, and when and how to disclose such information. In addition, each employee receives a copy of this COI plan along with orientation materials. Tetra Tech also regularly disseminates information concerning COI issues to its employees through "brown bag" seminars, interoffice conference calls, and memoranda. Tetra Tech conducts annual COI awareness training for all employees that includes review of certification language and of any changes that may have occurred in Tetra Tech's COI plan. This training is conducted as part of Tetra Tech's "Code of Business Conduct" awareness training and certification program. Certification that all employees have read and understand the contents of the current code and plan is retained by Tetra Tech.

Management of Personnel Resources

We have structured our proposed team specifically to provide the most highly qualified individuals in the nation to WVDEP. Information on how key personnel resources are organized is presented in the organization chart in Section 1.1 of this proposal. The information presented in Section 1.1 clearly demonstrates that Tetra Tech already has identified the highly qualified in-house staff and experts necessary to perform the major requirements of the technical service areas. Personnel have been selected based on their experience and familiarity with the technical or program issues to be addressed. The management and technical teams have a long history of working successfully together on both previous GI projects in West Virginia as well as around the country.

1.2.2.5 Use of Subcontractors

Tetra Tech is proud of the outstanding business relationships we have formed with companies that have a proven ability to provide timely and excellent technical support to our projects. However, because we have staff with expertise in all technical service areas, we do not anticipate the need to use subcontractor support under this contract.

Should the need arise to secure the support of other qualified subcontractors, either to provide quick response support or to provide a unique expertise, we will not hesitate to enlist their services. Successful standard procedures are in place to facilitate identification and management of the subcontractors.

1.3 RESOURCES

This section provides information on the support services and equipment capabilities for the offices proposed to support this project.

The Fairfax, VA office has contract administrators dedicated to tracking the financial status of contracts and ensuring Tetra Tech meets all contractual requirements. Activities of the contracts management staff include accessing and distributing weekly financial reports to the Tetra Tech Project Manager, issuing subcontractor agreements, tracking and administering subcontracts, and generating and submitting progress reports and invoices. We also have several administrative support staff who perform a variety of administrative duties, such as answering phones, arranging conference calls and package delivery, processing expense reports and invoices, and photocopying.

Tetra Tech has several accounts with overnight delivery services to ensure timely delivery of important products. We have accounts with Federal Express, United Parcel Service, and DHL. Tetra Tech maintains Microsoft Teams for our teleconferencing and web conferencing needs. Audio and video conferencing can be arranged on demand using Microsoft Teams meetings which can support up to 250 attendees. Additionally, Tetra Tech can provide logistical and technical support for a number of platforms including Adobe Connect, GoToWebinar, and MediaPlatform

Tetra Tech maintains state-of-the-art computing facilities, equipment, and software (**Error! Reference source not found.** and **Error! Reference source not found.**) to support our clients' needs for project management, information management, data and geospatial analysis, database management, mathematical modeling, literature searches, Internet access, file maintenance and storage, document production, and graphics generation.

Tetra Tech staff are provided individual laptops based on their needs. For basic needs, staff are provided a Dell Latitude 5510 with an Intel Core i7 processor and 16GB of memory. Staff that have advanced engineering or processing needs are provided a Dell Precision 5550 with an Intel Core i7 processor and 32GB of memory. Our offices are outfitted with color laser printers (e.g., Xerox WorkCentre 7855i). Tetra Tech staff have access to an internal IT shopping website, where they can install popular software for a range of functions: publishing, word processing, geographic information system (GIS), computer-aided design (CAD), data analysis and processing, statistics, project management, and more.

Tetra Tech uses Microsoft Azure as a cloud service provider to host software and programming tools to support enterprise data system design and implementation, modeling and GIS development and application development. Tetra Tech uses Microsoft Office 365 to make the exchange of information, specifications, and requirements among teams, clients, and users as efficient as possible. Finally, Tetra Tech is experienced in and adheres to all industry-standard data management and software design protocols to ensure high-quality products.

Tetra Tech uses electronic communication systems to facilitate data transmission, e-mail, and internet access. Tetra Tech uses DMVPN technology to network all offices and cloud infrastructure. To further enhance our communication in executing projects and sharing data and information, Tetra Tech supports web-based

Microsoft SharePoint and Microsoft Teams as additional means of communication with clients. Both technologies provide interactive, secure file sharing and storage and are easy to use and customize to project needs. They can facilitate efficient communication and transfer of information to the project team and can be used to supplement and support regular communication by phone and in-person meetings.

Tetra Tech also has extensive document and graphics production capabilities. For example, our Fairfax, VA office maintains a fully equipped publications and graphics department with staff skilled in both PC and Macintosh systems. Our desktop publishing and graphics specialists consistently produce high-quality environmental reports, brochures, posters, handbooks, documents, and multimedia products. Tetra Tech’s publications and graphics department has the capability to generate multicolor or black-and-white maps, graphs, presentation charts, viewgraphs, color posters, and other audiovisual materials using a wide range of type styles and page formats.

Software applications used by Tetra Tech for engineering design, GIS development and data processing, and landscape architectural rendering are listed in

Table 1-3, Our GIS resources include fully equipped GIS and computer-aided design (CAD) laboratories. Desktop GIS is widely used by our scientists and engineers on a daily basis to support our projects. More intensive GIS processing is achieved using ESRI’s ArcGIS Desktop Standard, Basic and Advanced Version 10.8, customized MapObjects applications, and dedicated systems.

Table 1-2. Desktop Access Data Processing Hardware

| Equipment | Quantity |
|--|----------|
| High Capacity Network Server | 20 |
| IBM-compatible PC (Dell Latitude 5510 and Precision 5550) | 40 |
| Macintosh PC (Power Mac, etc.) | 1 |
| Notebook/Laptop, IBM-Compatible PC | 68 |
| Windows Internet Server with FTP and Web Site Support | 12 |
| Linux Internet Server with FTP and Web Site Support | 15 |
| Hewlett-Packard DesignJet T1200 PostScript 42-inch plotter | 1 |
| Xerox EX C60-C70 Printer | 1 |
| Xerox WorkCentre 7855i | |

Table 1-3. Engineering/GIS Software and Hardware/Creative Suite Software

| Engineering/CAD | GIS | Other |
|--------------------|-----------------------------------|--|
| AutoCAD, 2015-2020 | ESRI ArcGIS Desktop Advanced 10.8 | Adobe Creative Suite 6 (Fireworks, Flash, Photoshop, etc.) |
| AutoCAD Civil 3D | ESRI ArcGIS Desktop Standard 10.8 | Microsoft Office 365 |
| | ESRI ArcGIS Desktop Basic 10.8 | Microsoft Teams |

| Engineering/CAD | GIS | Other |
|-----------------|---------------------------------|----------------------|
| | ESRI ArcPro | Microsoft Sharepoint |
| | ESRI ArcGIS 3D Analyst | |
| | ESRI Spatial Analyst 10 | |
| | ArcGIS for Server Enterprise 10 | |
| | Garmin GPSMAP 64 unit | |

1.4 PROJECT EXPERIENCE

This section describes Tetra Tech’s experience in supporting state, local, and private entities with education and facilitation to support GI workshops and GI concept designs. Often Tetra Tech’s process for full design includes these preliminary steps as well. As the end product West Virginia’s proposed project is a suite of GI concepts that can be taken to full design as the next step towards implementation.

| Project | Organizing and Facilitating Workshops | Working with Stakeholders | GI Planning and Design | Site Assessments | Estimating Stormwater Volume/Understanding Flood Hazards and CSO Abatement | Calculating Pollutant Load Reductions | Estimating Construction Costs | Developing User-Friendly Concept Plans | Identifying and applying for funding for GI | Experience in developing GI in karst regions | Full GI Project Designs, Construction Documents, Cost Estimates, Permitting and Maintenance Plans |
|--|---------------------------------------|---------------------------|------------------------|------------------|--|---------------------------------------|-------------------------------|--|---|--|---|
| West Virginia Green Infrastructure Planning and Implementation (Martinsburg, Romney) | • | • | • | • | • | • | • | • | • | • | |
| City of Martinsburg, Green Streets Design | | • | • | • | • | • | • | | | • | • |
| Resilient by Design -Huntington, WV | • | • | • | • | | • | • | • | | • | |
| Resilient by Design, Seaford, DE | • | • | • | • | • | | • | • | • | | |
| Green Infrastructure Community Partners Program Technical Assistance | • | • | • | • | • | • | • | • | | | |
| Green and Complete Streets – Building Blocks Technical Assistance Program | • | • | • | • | • | | | | | | |
| Generating Voluntary Stormwater Retention Credits for Market-based Trading | | • | • | • | • | | • | • | | | • |
| City of Virginia Beach Stormwater and Environmental Management Services | | | • | • | • | • | • | • | | | • |
| Pine Hills Green Infrastructure Planning and Design | | | | • | • | | • | • | | | • |

West Virginia Green Infrastructure Planning and Implementation

Client: US EPA Chesapeake Bay Program Office and West Virginia Department of Environmental Protection



PROJECT DESCRIPTION

Tetra Tech is supporting WVDEP's objectives of expanding technical assistance and support to small communities to advance GI to address local water quality, nuisance flooding, combined sewer overflows and source water protection, and state goals for nutrient and sediment reductions to meet the requirements of the Chesapeake Bay TMDL.

As a first step, Tetra Tech assisted WVDEP with the development of GI outreach and marketing materials to let communities in the Chesapeake Bay watershed know that funds and technical assistance for GI are available. The materials were used by WVDEP to recruit small communities in West Virginia for GI assistance. Tetra Tech developed informational flyers and a presentation that WVDEP could present to interested communities.

Following promotion of the program, Tetra Tech helped WVDEP review expressions of interest from communities that provided additional information on their specific water quality/quantity concerns and evaluated whether GI could be an appropriate solution. Romney and Martinsburg, WV were selected to receive GI assistance.

For each community, Tetra Tech planned and facilitated a 1 ½ day GI workshop. The workshops included information on the project background and objectives, and an overview of the basics of GI, low impact development and green streets. This included explanations of the water quality and quantity benefits, as well as other co-benefits. Numerous photos and graphic examples of a range of GI practices were provided to create a better understanding of GI as well as prompt attendees to start thinking about GI in their community. Tetra Tech led discussions with participants on the community strengths, challenges and opportunities for GI implementation. As part of the workshop, Tetra Tech conducted site assessments with the workshop participants to provide an opportunity for community input into GI planning. Following the site assessments, Tetra Tech provided aerial maps, game pieces and other materials to allow participants to draw out their ideas and place GI practices at their chosen locations and help Tetra Tech better understand each community's unique preferences for GI characteristics.

CLIENT

Megan Thyng
US EPA Chesapeake Bay
Program
(410) 267-5786
thyng.megan@epa.gov

and

Teresa Koon
West Virginia Department of
Environmental Protection
Assistant Director
Watershed Improvement
Branch
(304-) 414-3828
Teres.m.koon@wv.gov

PROJECT DATES

2018 – Present

KEY FEATURES

- Stakeholder outreach
- Workshop planning and facilitation
- Site assessments
- Concept design
- Green infrastructure design
- Green infrastructure education



After the workshops, Tetra Tech developed concept designs for priority sites identified during the workshop and site assessment. The concept designs were informed by the information provided by the participants but were modified by Tetra Tech’s engineers to reflect on-the-ground conditions and limitations, such as utilities, topography, property ownership, etc.

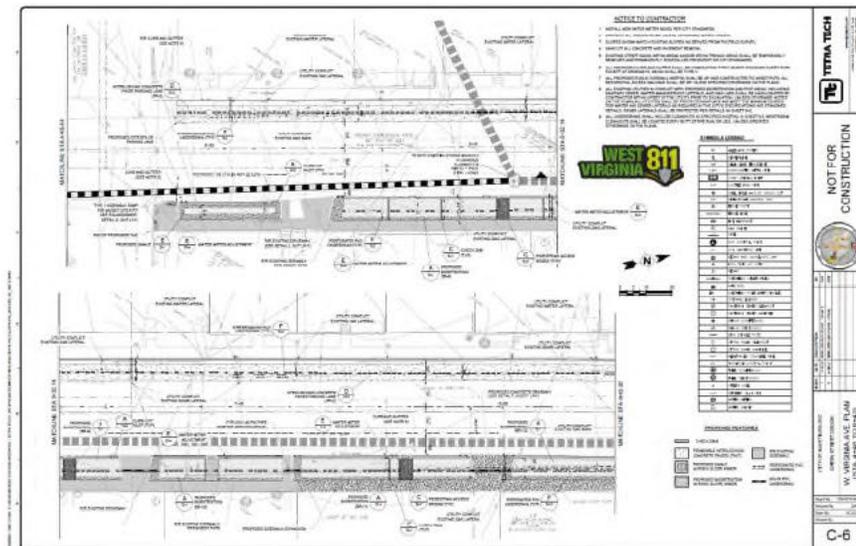
In Romney, the focus was on the large impervious surfaces at the Romney Elementary School and W. Birch Lane by the senior center. Both areas drain to a stream heavily impacted by runoff, causing severe erosion. The concept designs included bioretention and tree plantings. In Martinsburg, the priority area was several city blocks in a part of town developed in the early 1900s with undersized stormwater infrastructure, significant impervious surfaces and persistent localized flooding issues. Tetra Tech developed concept designs for bioretention, permeable pavement and tree plantings.

To document the workshop and concept design process, draft and final reports were developed for each community. These included a summary of background information describing various GI practices and benefits, a listing of participants in the workshop, a summary of the key community issues discussed, priority areas for GI, results of the participants GI planning process and the concept designs. The concept design reports included drainage area delineations, volume treated, estimates of costs, pollutant reduction estimates, full color renderings/illustrations of the recommended GI practices and next steps.

Tetra Tech supported the City of Romney on their application for funding through the US EPA’s G3 grant program by providing technical details and cost estimates for implementation, derived from the concept designs, for their application. This project also provides technical support for full design of GI practices. The Martinsburg concept designs were advanced to full design by Tetra Tech, which is described below.

City of Martinsburg Green Streets Design

Client: City of Martinsburg, US EPA and West Virginia Department of Environmental Protection



PROJECT DESCRIPTION

As part of a joint effort leveraging funds from the City of Martinsburg using grants funds and city funds, and US EPA and WVDEP (through the West Virginia Green Infrastructure Planning and Implementation support task), Tetra Tech designed 4 blocks of GI in downtown Martinsburg, to support the city in their efforts to reduce localized flooding and support WVDEP with their Chesapeake Bay TMDL nutrient and sediment reduction goals. The selected BMPs were based on the results of the design charette conducted with the local community.

Tetra Tech conducted an existing data review and site assessment to build a detailed understanding of site conditions, constraints, and the City's project objectives, and relied on topographic survey and geotechnical investigations contracted by the City. Because Martinsburg is in a karst region, Tetra Tech requested the city obtain a geotechnical karst investigation to ensure that any proposed practices were not placed on existing sink holes or infiltrating into potential sink hole areas.

Tetra Tech developed 30, 60, and 90% designs for permeable pavement and tree planting along two blocks of W. Addition St. and permeable pavement and bioretention along both sides of two blocks of West Virginia Ave. Tetra Tech conducted a hydrology and hydraulic analysis to estimate the volume of stormwater retained by the project and evaluated reductions in peak flow predicted for the proposed designs. To maximize treatment volume, Tetra Tech took advantage of the wide rights of way and streets by bumping out the bioretention systems an additional two feet beyond the existing curb, while still allowing for two-way traffic and parking on both sides of the street. Designs include native vegetation and safety features to prevent pedestrian injury in the bioretention cells. Pedestrian landing strips were also incorporated to facilitate access from parked cars to the sidewalk. Final landscaping plans received input from the City's tree commission to ensure overall acceptability. The design includes details, specifications and special provisions and relies on the West Virginia Stormwater Design Guidance Manual, City of Martinsburg specifications and WV Department of Transportation specification and details. The design report includes estimated construction costs and stormwater modeling results. The 90% design plans have been accepted by the City and are being reviewed for permitting.

CLIENT

Jared Tomlin
Stormwater Coordinator
(304) 263-7187
jtomlin@cityofmartinsburg.org
and

Teresa Koon
West Virginia Department of
Environmental Protection
Assistant Director
Watershed Improvement
Branch
(304-) 414-3828
teresa.m.koon@wv.gov

PROJECT DATES

2020 – Present

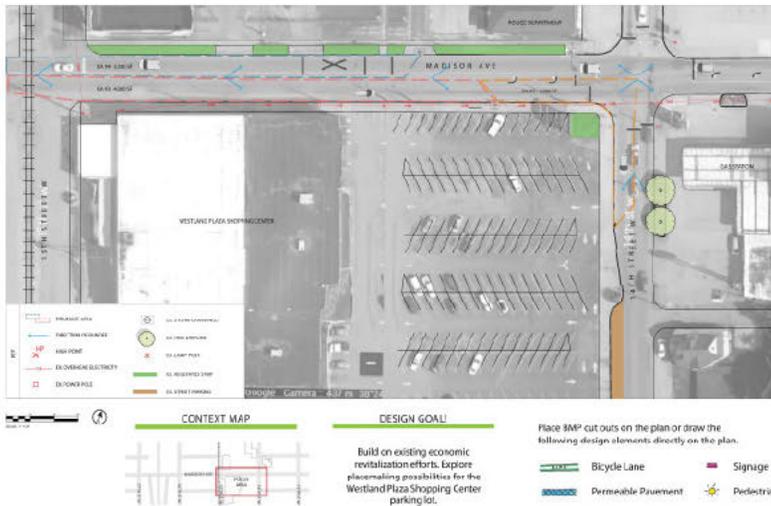
KEY FEATURES

- Green infrastructure
- Construction documents
- Cost estimating
- Karst setting
- Landscape architecture
- Flood control/volume retention
- Nutrient Reduction

Resilient By Design, Huntington, WV

Client: US EPA Office of State and Watershed Partnerships

MADISON AVENUE FOCUS AREA EXERCISE B



CLIENT

Ken Hendrickson
Green Infrastructure Lead
US EPA Region 3
(215) 814-2753
hendrickson.kenneth@epa.gov

PROJECT DATES

2018 – 2019

KEY FEATURES

- Green infrastructure design
- Concept designs
- Stakeholder facilitation
- Workshops

PROJECT DESCRIPTION

Tetra Tech supported US EPA Region 3 Water Protection Division and their partner, Huntington Stormwater Utility, to facilitate a Green Street Design Charette in Huntington, West Virginia. The installation of the BMPs is voluntary and will assist with MS4 goals, Federal Emergency Management Agency (FEMA) hazard mitigation plans, localized storm-related flooding, and supplement an ongoing transportation enhancement project with West Virginia Department of Transportation. Strategies developed during this project produce active community engagement and, once implemented, will provide environmental benefits as well.

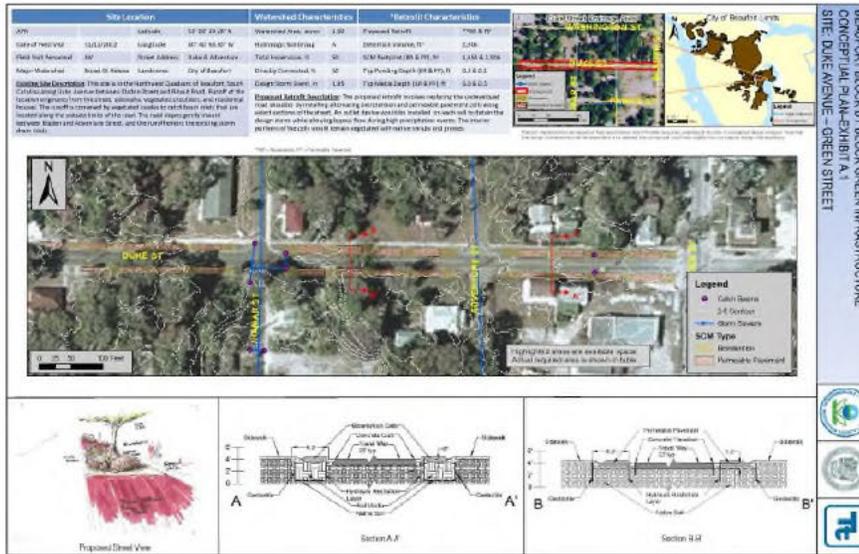
The charette engaged stakeholders with presentations and interactive green street planning exercises led by Tetra Tech, with support from the Low Impact Development Center. The conceptual design graphic set included multiple plan views and perspective graphics to assist stakeholders with developing planning goals. As a value-added component encouraged by US EPA, Tetra Tech provided project information to Marshall University engineering students for inclusion in their 2019 capstone project. Stakeholder input was used in the development of the final strategy. After the initial development of design documents and charette completion, Tetra Tech compiled a charette report to US EPA including stakeholder feedback, state and federal agency key recommendations, and recommended next steps. Site photographs, relevant documents, and exhibits accompanied the report.

Final components of the West Huntington Resilient by Design project included 20% design, storm water modeling, and suggested funding mechanisms. The design report included these development documents in addition to cost estimates for full engineering and construction. Tetra Tech provided estimates of BMP performance, methodology documentation, and recommended next steps.



Green Infrastructure Community Partners Program Technical Assistance

Client: US EPA Office of Wastewater Management



CLIENT

Chris Kloss
 US EPA Office of Wastewater Management
 (202) 564-1438
 kloss.christopher@epa.gov

PROJECT DATES

2012 – 2017

KEY FEATURES

- Green infrastructure design
- Workshop/charette facilitation
- Site Assessments
- BMP/LID prioritization
- BMP/LID concept designs
- Stormwater modeling

PROJECT DESCRIPTION

In 2011 US EPA began a Green Infrastructure Strategic Agenda intended to advance the acceptance of green infrastructure (GI) by highlighting effective programs and overcome the barriers to GI by offering targeted technical assistance. Tetra Tech supported the US EPA’s GI initiative by providing technical assistance to 36 communities across the country covering a range of objectives, including code review, GI design, and cost-benefit assessments. Below are highlights of key partnerships:

Green Infrastructure Pilot Project, Fall River, MA. Developed a GI pilot program in an urban watershed in Fall River that experiences frequent CSOs. Tetra Tech developed a residential rain barrel/ utility discount program, a catch basin retrofit tree-filter standard design, and conceptual design of 12 tree filter retrofits. Pilot project will reduce reliance on sewer separation and other structural solutions.

Evaluating Green Infrastructure to Mitigate Flooding and Climate Change, La Cross, WI. Supported La Crosse with developing a long-term strategy to mitigate flooding by evaluating system-wide GI implementation while considering potential impacts due to climate change. The level of GI implementation needed was derived through modeling analysis of a green street that included both porous pavement and bioretention BMPs.

Conceptual Designs to Reduce Nutrients, Cape Cod Commission. Worked with the Cape Cod Commission to identify areas in environmental justice communities for implementation of nutrient-reducing IG projects. Presented opportunities to stakeholders and collaborated to select potential BMP locations. Prepared conceptual designs for bioretention and permeable reactive barriers, factoring in criteria such as pollutant reduction potential, construction feasibility, land ownership, cost estimates and outreach and environmental justice considerations.

Conceptual Designs for Stormwater Control, City of Beaufort, SC. Supported the City of Beaufort in GI implementation by identifying and developing conceptual designs for two sites. Tetra Tech facilitated a design charrette with multiple city staff. Incorporated the knowledge from the charrette into a full conceptual design utilizing GI concepts. Runoff volumes and approximate BMP sizes were calculated using the US EPA SWMM. Multiple sketches and renderings were developed to show additional details, including the appropriate depths, materials and approximate square footage of each BMP required to meet multiple treatment goals.

Conceptual Designs in Economically Disadvantaged Areas, City of Atlanta, GA. Supported the City of Atlanta in GI implementation in the economically disadvantaged Proctor Creek/North Avenue neighborhood. Conducted detailed site visits of GI opportunities then led a charrette to prioritize the projects based on overarching project goals. Created the selected conceptual design to include bioretention, planter boxes, extended planting strips, and permeable bike lanes.

Green and Complete Streets Building Blocks Technical Assistance Program

Client: US EPA Office of Sustainable Communities



CLIENT

Charles (Chip) Gurkin
US EPA Office of Sustainable
Communities
(202) 564-2778
gurkin.charles@epa.gov

PROJECT DATES

2014 – 2020

KEY FEATURES

Green infrastructure
Green streets planning
Workshop/charette facilitation
Workshop organization
Site Assessments

PROJECT DESCRIPTION

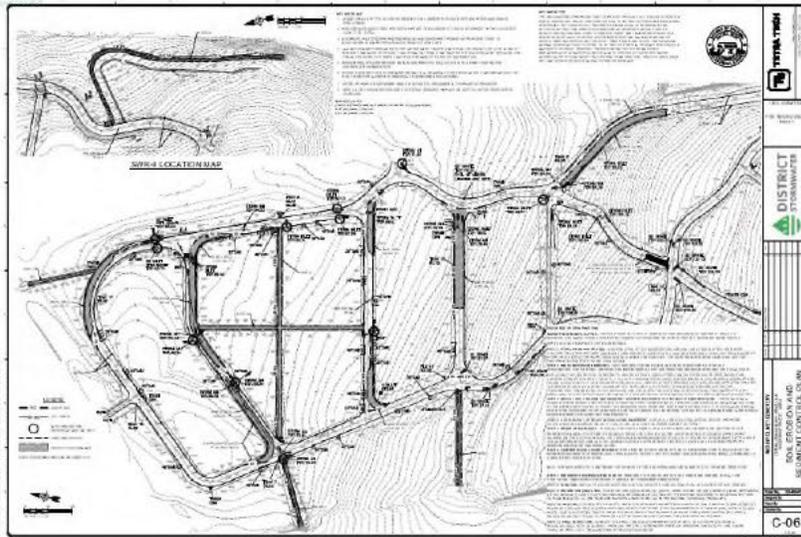
Tetra Tech provided expert services to help refine and implement a Green and Complete Streets tool as part of US EPA's Sustainable Communities Building Blocks Technical Assistance program. The objective of the refined tool is to facilitate a community's review of its overall strategies for street development and stormwater management which can ultimately lead to the development of a community specific Green and Complete Streets Policy. The assistance comprises a community self-assessment, a 2-day onsite visit, and the production of a next steps memo detailing specific steps the community can execute to advance the use of green and complete streets.

The community self-assessment is a checklist that walks the community through a quick assessment of its plans, policies, management practices, and local capacity to support green and complete streets. Completing this checklist provides the community with an understanding of the necessary framework to advance Green and Complete Streets in their area along with a means to identify important gaps to address.

The onsite activities cover 2 days and provide the opportunity for interested community stakeholders to learn more about and plan for specific strategies their community can take to develop or advance a green and complete streets policy. For each of the communities, Tetra Tech facilitates pre-site visit calls to go over the community's self-assessment (i.e., completed checklist) and to identify most important gaps to cover in the workshop. A tailored workshop agenda and materials are then prepared.

Day 1 of the site visit begins with a community tour of existing and potential green and complete street sites and concludes with a community presentation about GI and what the local professionals are embarking upon. Day 2 involves a technical workshop for local leaders and professionals to clarify the most important steps for the local community to advance a green and complete street policy. Tetra Tech provides a "Next Steps" memo for each community to summarize the workshop discussion and highlight the path forward for the communities. A follow up call with the local leadership team provides for closure on the project. In 2020, Tetra Tech developed a virtual online workshop version that was piloted in two cities. To date, Tetra Tech has conducted Green and Complete Streets community assistance projects in the following locations: Pueblo de Cochiti, NM, Norfolk, VA, Muscatine, IA, Camden, NJ, Baltimore, MD, Hartford, CT, Manatee, FL, Detroit, MI, Central Falls, RI, Freemont, NE, and Michigan City, IN.

Generating Voluntary Stormwater Retention Credits for Market-based Trading, Washington, DC Client: District Stormwater LLC/The Nature Conservancy



PROJECT DESCRIPTION

Tetra Tech is supporting District Stormwater LLC to design green infrastructure (GI) practices on private properties throughout the Washington, DC municipal separate storm sewer (MS4) drainage area. The installation of the GI practices is voluntary and is generating stormwater retention credits (SRCs) for the DC Department of Energy and Environment's (DOEE) stormwater credit trading program. The GI projects are part of District Stormwater's initiative to develop (SRCs) that can be sold on the private market to landowners and developers in the District who need to purchase off-site stormwater management credits to meet their stormwater permit requirements. To date Tetra Tech has designed numerous bioretention systems and converted impervious and compact cover to natural areas at Mt. Olivet Cemetery. Tetra Tech was responsible for full design, permitting and design support during construction for two phases of GI implementation at the cemetery (Phase I 2015 – 2017 and Phase II 2018 – 2019). A third phase at the cemetery began in October 2020 and has been completed to the 60% design. Tetra Tech completed the full design and permitting and support during construction for a large bioretention system at Knollwood Military Retirement Community (2019 – 2021).

For each of these projects, prior to developing stormwater solutions, the properties were assessed for stormwater capture and impervious area removal opportunities, and Tetra Tech developed a portfolio of solutions and recommendations that District Stormwater used to select the final combination of BMPs at each site. This allowed District Stormwater to optimize the generation of SRCs, while balancing costs and risks at each site. Across the two completed phases at Mt. Olivet and the Knollwood project, Tetra Tech has designed and generated over 260,000 SRC gallons that are available to be sold on the credit marketplace. These credits are also eligible for the DOEE's price-lock program, which ensures a minimum purchase price per gallon to provide market stability and certainty for voluntary credit developers, like District Stormwater. Tetra Tech continues to perform site assessments and develop concept designs to support future full design and implementation projects.

CLIENT

Aileen Craig
Stormwater Retention Project
Manager
District Stormwater LLC
(585) 489-7556
aileen.craig@districtstormwater.com

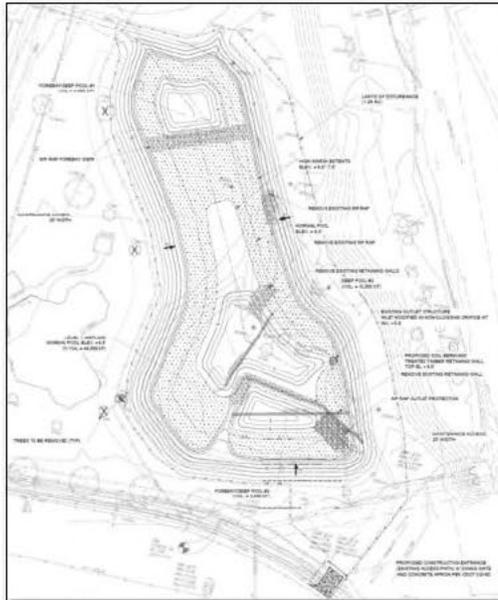
PROJECT DATES

2015 – present

KEY FEATURES

- Green infrastructure
- Site assessments
- BMP concept designs
- Full design services
- Permitting
- Design support during construction





CLIENT

Melanie Coffey, PE
City of Virginia Beach
Stormwater Management
Regulatory Division
3556 Dam Neck Rd.
Virginia Beach, VA 23453
(757) 385-4131
mcoffey@vbgov.com

PROJECT DATES

2018 – present

KEY FEATURES

BMP identification and
prioritization
BMP retrofit design
BMP concept designs
Calculating volume and
pollutant reductions

PROJECT DESCRIPTION

Tetra Tech is assisting the City of Virginia Beach in complying with the requirements of the MS4 permit by providing stormwater and environmental consulting services including planning and engineering design to achieve water quality improvements. The City of Virginia Beach manages stormwater across nearly a 500 square mile area which drains to the Chesapeake Bay and the Atlantic Ocean. Support includes developing and applying watershed-based planning tools, identifying and prioritizing potential projects, and conceptual and full design of stormwater BMPs to improve water quality and mitigate flooding.

North Landing River Watershed BMP Prioritization: Assisted the City in meeting MS4 TMDL requirements in providing a reduction in total phosphorus (TP). Evaluated all parcel and right-of-way (ROW) areas in the watershed to determine feasibility for BMP implementation. Performed primary screening to eliminate unsuitable sites and develop a baseline list of parcels and ROWs potentially suitable for BMPs. Prioritized and ranked sites. Determined TP load reductions, preliminary design costs, and conceptual designs for the top ten sites that provide the greatest volume and pollutant load reductions for the lowest cost.

Lynnhaven Park BMP Redesign: Evaluated the existing BMPs and performed field assessment. Developed preliminary engineering design for two alternatives: a constructed wetland and a wet pond, and prepared a technical memorandum describing the cost and nutrient removal efficiency of both options. Submitted a drainage report, hydraulic and nutrient loading analysis, and 30% design plans for both options. Currently preparing final design plans for a level 1 constructed wetland.

Indian River Road BMP Retrofit: Performed site assessment to determine site constraints and identify opportunities to install a BMP. Evaluated multiple BMP types. Performed preliminary engineering design including hydrologic and hydraulic analysis. Compiled all of the site data and analysis into a stormwater report and developed 30% design plans of the BMPs best suited to that site.

SWMF Review: Reviewed and provided comments on proprietary and non-proprietary BMPs to be used in ROWs and on City property for recommendations to Operations based on BMP effectiveness and operation and maintenance (O&M) requirements.

1.5 CLIENT REFERENCES

Teresa Koon
WVDEP Division of Water and Waste Management
Watershed Improvement Branch
601 57th Street, SE
Charleston, WV 25304
304-414-3828
Teresa.M.Koon@wv.gov

Aileen Craig
District Stormwater LLC
425 Barlow Place, Suite 100
Bethesda, MD 20814
585-489-7556
Aileen.craig@districtstormwater.com

Jared Tomlin
City of Martinsburg
Stormwater Coordinator
800 Boston St.
Martinsburg, WV 25401
304-263-7187
Jtomlin@cityofmartinsburg.org

Melanie Coffey
City of Virginia Beach
Public Works Stormwater Management
Regulatory Division
3556 Dam Neck Rd.
Virginia Beach, VA 23453
757-385-8593
mcoffey@vbgov.com

2.0 GOALS AND OBJECTIVES: ANTICIPATED CONCEPTS AND METHODS OF APPROACH

2.1 SOLICITATION AND SELECTION OF ONE COMMUNITY IN THE LOWER NEW RIVER WATERSHED

Tetra Tech will work with the Southern Basin Coordinator to review questionnaire responses from communities interested in obtaining GI assessment and conceptual designs. In reviewing the responses, Tetra Tech will consider the applicability and suitability of each community's stormwater management issues compared to WVDEP's goals and objectives of the project and the likely ability to identify appropriate locations in the community for GI practices. It is also critical that the communities demonstrate that their local government is interested in and capable of implementing green infrastructure. This is important because the next step after the concept design phase covered in this project is funding and implementation of the project. The community will need to be committed to obtaining design engineering funds and construction funds and be willing to allow the installation of the GI practices. Tetra Tech will look for commitment by evaluating whether the applicant is a local government official and their statements on their own contributions to the project and willingness to integrate GI into the overall stormwater management planning approach for the town.

2.2 ORGANIZING A WELL-STRUCTURED WORKSHOP

Tetra Tech will support WVDEP to identify appropriate stakeholders to include in the GI workshop. Tetra Tech has successfully organized similar workshops for Martinsburg and Romney, WV and can draw on that experience. Stakeholders that should be invited include local government employees, depending on the size of the community, this may include the Mayor, the Planning Department, and the Public Works Department. Other key stakeholders include local watershed groups and other interested community leaders, the Southern Basin Coordinator, other WVDEP staff with a local interest, the Regional Planning and Development Council representative and any local landowners or businesses that may be impacted by a GI project.

Tetra Tech can help identify specific people once the community is selected and will also look to the community's local government leaders to suggest invitees. Tetra Tech can provide an explanatory email or flyer that WVDEP, the RPCD representative and local government can use to promote and explain the purpose of the workshop.

Tetra Tech will work with WVDEP to identify a suitable location for the workshop. Depending on the timeline and COVID-19 pandemic situation at the time of the workshop, Tetra Tech is also able to provide an online workshop format using our Teams capabilities, if that is preferred by the community. Otherwise, if the workshop is held in-person, Tetra Tech will provide input into the amount of space needed for the workshop and any resources that may be needed, including a screen for projecting presentations, tables, and an internet connection. Tetra Tech has significant material resources that can be provided for the meeting,

including easels, flip charts, maps, and GI design “game pieces.” Tetra Tech can also provide suggestions on the types of meeting space that would be appropriate and usually free of charge, including municipal offices/meeting rooms, community centers, school cafeteriums, community organization meeting spaces (e.g., non-profit office spaces), and park meeting spaces.

Tetra Tech anticipates participating in multiple planning calls with WVDEP and the local community leadership to better understand the community needs and context and discuss workshop logistics.

For the previous workshops in Romney and Martinsburg, Tetra Tech provided guidance to the local officials to help make the workshops successful and held several conference calls with the team to explain the workshop structure, suggest attendees, and explain logistical requirements. We provided basic materials such as markers, flip charts and presentations and ensured the local officials were able to provide remaining meeting support materials. Tetra Tech also made arrangements and contingency plans to fill any gaps that the local leaders could not accommodate.

In support of Chesapeake Bay Trust’s Green Streets, Green Jobs, Green Towns (G3) Grant Program Forum, we hosted, supported, and facilitated a live forum while also broadcasting virtually to participants unable to attend in-person. The G3 Forum helped recruit new grant applicants by informing them of the benefits and exposing them to the experiences of successful grantees. We conducted publicity and registration activities including screening of attendees to determine their knowledge of green infrastructure and the G3 grant program; developed forum materials including the agenda, forum website, and some handouts; speaker coordination; on-site logistical support; webinar and video conferencing for off-site participants; and development of the forum summary.

2.3 FACILITATE A WORKSHOP

Tetra Tech will support WVDEP by facilitating a 1 to 2 day workshop for the local government and stakeholders of the selected community. Tetra Tech will work with WVDEP to develop an agenda and promotional flyer to advertise the workshop to the community. The agenda will be based around some key concepts and milestones but will have flexibility to account for community preferences and needs.

Prior to the workshop, Tetra Tech’s team will arrive in the selected community on conduct a reconnaissance site visit to better understand local conditions and the community context. If any potential GI areas have been identified by community leadership during the workshop planning, Tetra Tech will visit these prior to the workshop to ensure we can provide educated guidance when these areas are discussed during the workshop.

Tetra Tech will provide an introduction on the project background and objectives, and provide key programmatic information. There will be an education component where our proposed Workshop Facilitator, Jonathan Smith, will provide an explanation of green infrastructure, low impact development and green streets and their benefits. Numerous examples will be described and shown through a collection of diagrams and photographs, so non-technical participants can understand the information. Other key aspects of the workshop will include a facilitated discussion among participants to identify key stormwater problem areas, areas of flooding or other concerns, and identify any relevant community objectives and priorities, such as reducing combined sewer overflows. The facilitator will also walk through a discussion of community

strengths, weaknesses and opportunities related to GI implementation and acceptance. The focus of this discussion will be how to leverage community strengths, take advantage of opportunities and mitigate or minimize any weaknesses that might prevent GI implementation.

Following these discussions, Tetra Tech will lead participants on a site visit to some key areas that present an opportunity for GI implementation. Mr. Smith will discuss each site with the group, reviewing important GI considerations, and reinforcing concepts from the GI introduction presentation. The group will have a chance to participate in evaluating the drainage area, looking for stormwater infrastructure and utility conflicts; and offering suggesting of GI at each site.

Upon returning from the site visit, Mr. Smith will lead the workshop participants through a creative tabletop planning exercise to allow participants to suggest different GI practices and preferences for the sites. This will allow the Tetra Tech team to determine locally desirable GI features and incorporate local input into the concept designs. Tetra Tech will use GI “game pieces” and large-scale maps of the proposed project areas to allow participants to draw out their ideas and place GI practices at their chosen locations. If there are multiple teams of participants, each team will share their ideas and a group discussion will be encouraged to obtain feedback on priority sites and BMPs. Importantly, while Tetra Tech will use the workshop participants input as a guide when selecting and designing GI concept plans, engineering constraints, logistical challenges and cost implications will dictate the final concept designs.

Tetra Tech has successfully used this approach in numerous GI workshops, including those in Romney and Martinsburg, as well as in Huntington, WV and Seaford, DE through US EPA’s Resilient by Design program. The step-wise process of providing background information and education, conducting a site visit and then allowing participants to design GI themselves creates both project buy-in and keeps participants engaged throughout the process.



Workshop participants in Romney and Huntington participate in a site assessment (top) and the tabletop planning exercise (bottom).

2.4 SITE ASSESSMENT

Tetra Tech will conduct site assessments in a multi-phase process. During the workshop planning calls, Tetra Tech will request potential GI locations from the community leaders. Tetra Tech will provide guidance to the local leaders if they are having trouble identifying potential locations. We will ask them to consider the local topography and identify areas of flooding or limited stormwater management, areas with open green space, publicly-owned parcels, and wide rights of way. The list of sites developed by the local leadership will be used during the workshop.

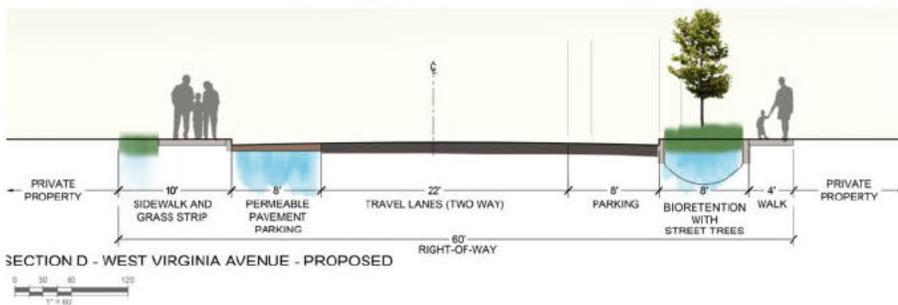
Prior to the workshop, Tetra Tech will conduct a desktop assessment of the sites, identifying preliminary drainage areas, flooding potential, stormwater infrastructure, utilities, land ownership, rights of way and other information. This information will be brought into the field for an on-site technical assessment, timed to coincide with the workshop, where Tetra Tech will refine the drainage areas based on observed conditions, identify any utilities or infrastructure not previously noted in the desktop assessment. Take measurements to the extent possible to identify stormwater infrastructure invert elevations and take photos to capture the existing conditions. The focus of this site assessment is to collect necessary engineering data to develop the concept designs. Using this information Tetra Tech can also estimate the stormwater volume that can be captured in each drainage area.

Tetra Tech will use this technical site assessment to inform the site visit with the workshop participants and to develop the maps that will be used during the workshop GI tabletop planning session. Following the technical site assessment and the planning exercise with workshop participants, Tetra Tech will develop a set of recommended priority sites and appropriate BMPs, which will be shared with the Workshop participants and local leaders. Tetra Tech will share a list of the recommended sites, along with a discussion of the potential risks and benefits at each site. If there are sites that Tetra Tech has determined to be infeasible for GI, the logic behind those decisions will also be shared.

2.5 DEVELOP GI CONCEPTUAL DESIGN

After the workshop and site assessment, Tetra Tech will begin the concept design process for at least one of the selected priority sites. Tetra Tech will select the appropriate BMP or BMPs for the site(s) and develop the concept designs, which will include:

- site layout in plan view and section view, with street-level renderings
- preliminary sizing calculations
- drainage area delineation, with pervious and impervious areas
- estimated stormwater volume capture
- estimated pollutant load reductions based on the West Virginia Stormwater Design Guidance Manual
- cost estimate for design and construction of the proposed concept design(s)



Example section view from our Martinsburg Green Street concept design

Tetra Tech will evaluate the priority sites for GI and select one or more for which to complete concept designs. Tetra Tech will evaluate the utility conflicts and existing stormwater infrastructure to refine the sizing and placement of the BMP(s) based on measurements collected during the site assessment and desktop analysis. The site layout plan is an overhead map view with the BMP overlaid on the area; the section view is a cross section with preliminary measurements of the BMP sizing, depth and relevant layers, such as subsurface media. The section view can also provide an existing conditions view for comparison. Street level renderings will be developed to help non-technical stakeholders visualize the GI project as it will look when complete. An example rendering and section view from the Martinsburg Green Street design are included here as examples.

If the selected community is located in a karst region, Tetra Tech will ensure that this is accounted for in the proposed conceptual design. The concept designs will assume that a liner is required to prevent infiltration into



Example street level rendering from our Martinsburg Green Street concept design

karst voids and prevent the creation of voids through the addition of water into soluble rock formations. At the concept design phase, a lack of infiltration can be accounted for when determining stormwater volume management by the GI practices. During the full design phase, it would be necessary to hire a geotechnical engineer to conduct a geotechnical investigation using electrical resistivity prior to designing any GI practices. This resistivity results would identify likely areas of voids and sinkhole-prone features, which can be either avoided during design or impacts minimized through the inclusion of an impermeable liner on GI practices.

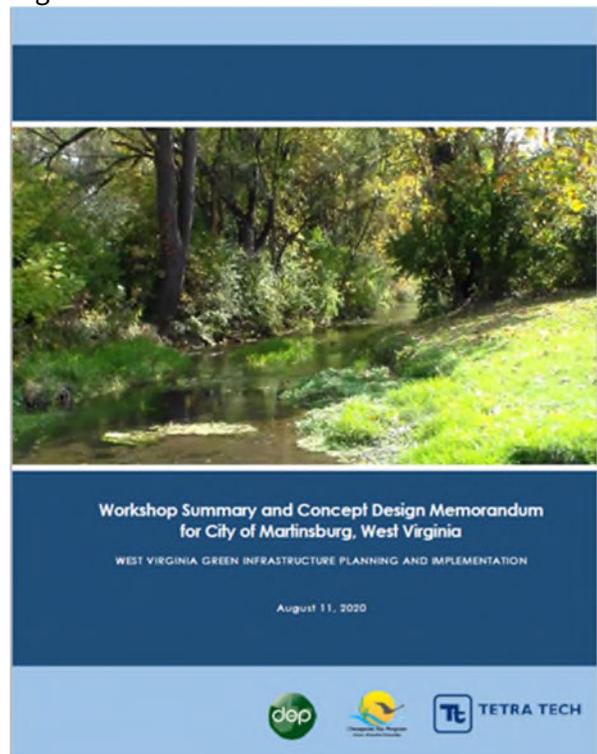
2.6 DEVELOP DRAFT AND FINAL REPORT

Tetra Tech will develop a final report summarizing the GI assessment and concept design process for the stakeholders. This type of documentation is important for the local government to document stormwater issues to be resolved, such as flooding hazards or combined sewer overflow abatement, community setting and stormwater concerns, community strengths and challenges in addressing stormwater with GI, stakeholder decisions, and the site selection, assessment and prioritization process with the stakeholders to inform the development of the concept designs. The report will also document the workshop stakeholder participants, and the site visit tour, including a list of participants.

The report provides a consolidated location to summarize the GI concept design process as well as document the estimated stormwater volume that can be treated by the concept design project, estimated design and construction costs, graphical illustrations of the concept designs and next steps. The selected community's government can use the report to demonstrate progress when applying for design and implementation grants, as well as use the information to help solicit bids for design work.

Tetra Tech will develop a draft report, which will be submitted to both WVDEP and the participating local government to review and provide comment. Comments will be incorporated to ensure that the report is clear, accurate, and reflects the needs of the community.

Tetra Tech has extensive experience in developing reports summarizing GI workshop processes and outcomes. Tetra Tech developed these plans for Romney and Martinsburg, WV during recently developed GI planning and assessment projects. In addition, Tetra Tech has developed numerous concept design plans for District Stormwater during our evaluation of suitable sites across the District of Columbia that provided multiple GI design options for each site under evaluation. We can take our lessons learned and best practices from those workshop, site assessment and concept design process and apply them to our work in the Lower New River watershed.



Assistance with Funding Applications

Tetra Tech will also include information in the final report about sources of funds for further implementation of the design and construction components to take the concept design through project completion. If WVDEP chooses, Tetra Tech can support the selected community with their funding applications. Tetra Tech will identify potential funding sources for the community, which could include state 319 grants, Clean Water State Revolving Fund grants (CWSRF), Appalachian Regional Commission (ARC), and US EPA programs such as the Environmental Justice Small Grants, Urban Waters Small Grants, and Greening America's Communities Program. Tetra Tech will first review the eligibility criteria for any funding programs under consideration and determine whether the concept design is eligible. If eligible, Tetra Tech can help the community prepare their application for funding, which may include providing additional cost estimates, developing a technical approach.

Tetra Tech's Cori Edwards is experienced in completing competitive funding applications and has been very successful in the past. She has worked with numerous small communities in Virginia to obtain Virginia Department of Health Wellhead Protection Grants and each community she has worked with has received full or partial funding for their projects. She also has extensive experience in West Virginia applying for grants on behalf of counties and municipalities for water, sewer, and recreational infrastructure projects. She developed successful applications for Housing and Urban Development (HUD), USDA Rural Development, FEMA Hazard Mitigation Grant Program, Infrastructure and Jobs Council (IJC), Land and Water Conservation Fund (LWCF), CWSRF, and ARC.

Tetra Tech also has experience supporting funding applications for green infrastructure. Following the development of the concept designs and final report for GI in Romney, WV, the City was interested in applying for an US EPA G3 grant to fund full design of the project. The City was leading the application process but required technical assistance from Tetra Tech to respond to several of the application questions, including the project description, cost-efficiency strategies, and developing a scope of work with tasks and estimated hours and costs, including costs for additional required investigation including geotechnical and survey crews.

2.7 GREEN INFRASTRUCTURE PROJECT DESIGNS, CONSTRUCTION DOCUMENTS, COST ESTIMATES, PERMITTING AND MAINTENANCE PLANS

Although not a part of the project specifications in the EOI, Tetra Tech is also providing a methodology for developing full engineering project designs, construction documents, cost estimates, permitting, and maintenance plans.

For a full design plan, Tetra Tech would subcontract to geotechnical firms to conduct boring, soil testing, and infiltration testing for the proposed GI practices and to a survey firm to create a detailed topographic survey of the project area, including any subsurface stormwater infrastructure. This is especially important in areas of karst topography. Tetra Tech would then compile all available data about the site and conduct a hydrologic and hydraulic analysis of the project area(s), the potential BMP practices and the associated drainage areas to

each practice. Modeling would be conducted to evaluate the impact of the BMPs on peak discharge delivered downstream and estimate the volume controlled by the practices.

Tetra Tech would develop 30%, 60%, and 90% design and construction documents, allowing for a round of review after each design phase. Each phase will also include the engineers estimate of probably costs, which will include a contingency factor and be refined at each stage of the design. Cost estimates will be informed by local costing data from the selected municipality, if available, and supplemented with existing project data and RS Means costing data for West Virginia. The final 90% design plan will include the grading plan, demolition plans, hydraulic/hydrologic analysis, section and profiles of the proposed practices, detail sheets, a sediment and erosion control plan, a vegetation planting plan, designed by a landscape architect, and project specific technical specifications.

Tetra Tech will follow the design guidance outlined in the West Virginia Stormwater Design Guidance Manual and will supplement the guidance with design details and specifications from the West Virginia Department of Transportation Standard Details. A maintenance plan will be included with the full design, with details on routine and preventative maintenance, including cleanout frequencies, removal of accumulated sediment, replacement of dead vegetation, repair of erosion point, and removing blockages from trash.

During the permitting process Tetra Tech will submit the 90% plans to WVDEP, if the area of disturbance is over one acre, or to the local stormwater management agency for projects less than an acre. Upon review by the permitting agency, Tetra Tech will make any necessary edits, then finalize the plans and have them stamped/sealed by the Professional Engineer of record.

Tetra Tech has extensive experience developing full design plans which are carried through to permitting and construction. In 2021, Tetra Tech completed the final 90% designs for the City of Martinsburg GI project and is awaiting permit review by the City's MS4 permit reviewers prior to finalizing the plans. In the District of Columbia, Tetra Tech has completed full design and permitting on three projects for District Stormwater (Mt Olivet Cemetery Phase I and II and Knollwood Military Retirement Community). These projects were all permitted with minimal comments from the design reviewers and each project has successfully been constructed. Tetra Tech is also currently developing full design plans for Mt. Olivet Cemetery Phase III, and has completed the 60% designs, which are being reviewed by District Stormwater. These projects are discussed in more detail in Section 1.4, Project Experience.

APPENDIX A: RESUMES

Mr. Ludwig is a director of Tetra Tech’s Water Resources Group offices in Fairfax, VA, and Charleston, WV. He supervises a team of engineers and scientists focusing on watershed planning and management, green infrastructure design, environmental model development and application, and environmental monitoring and assessment. He is a senior environmental scientist with more than 21 years of experience in providing technical and management support to federal, state, regional, and private clients in the areas of water resources, watershed and water quality assessment, watershed modeling, and Total Maximum Daily Load (TMDL) development. Mr. Ludwig has managed more than 50 projects for federal, state, municipal, and private clients throughout the United States and Canada. Working closely with West Virginia Department of Environmental Protection’s (WVDEP’s) TMDL program manager for nearly 20 years, he has provided leadership and energy to produce highly technical and innovative solutions that have helped WVDEP’s TMDL Program become a national leader in TMDL development. He has reviewed National Pollutant Discharge Elimination System (NPDES) permits and assessed measures taken to model the effects of discharge to stream systems. More recently District Stormwater has become a key client in the stormwater design market, and Mr. Ludwig is responsible for client management and oversees a team of engineers working on multiple large retrofit projects for this client.

RELEVANT EXPERIENCE

Voluntary Green Infrastructure Design and Implementation for Stormwater Retention Credit Generation. District Stormwater LLC, Washington, DC (2018-present) Contract manager for the design and implementation of voluntary stormwater BMPs to create Stormwater Retention Credits (SRCs) for District Stormwater to sell on Washington, DC’s open marketplace. Projects have included: 1) Mt. Olivet Cemetery, Phase II (2018-2019), which included a master planning analysis to identify all opportunities for BMP placement and type at the project area and optimize project designs to maximize SRC generation. Bioretention cells were constructed along paved access roads, designed to treat the 1.7” storm event to maximize the amount of credits to be sold on DC’s innovative stormwater credit exchange. Other BMPs include impervious area removal and replacement with trees along underutilized sidewalks throughout the Cemetery. The project resulted in over 90,000 SRCs that District Stormwater made available on the open market; 2) Knollwood Military Retirement Community (2019-2021), one large bioretention system was designed to treat stormwater and alleviate parking lot flooding. Permits were approved and construction was complete by May 2021; 3) Mt. Olivet Cemetery Phase III (ongoing), which expands on the design from Phase II to manage additional stormwater in other areas of the cemetery. Full engineering designs are being developed, after which Tetra Tech will be responsible for permitting and construction management.

NPDES Support, Prince George’s County, MD. (2014 – present) Providing oversight of work conducted under this multi-million dollar on-call stormwater program support contract to a nationally recognized leader in stormwater management and LID advancement. Tasks have included BMP design, permitting and construction management oversight; Chesapeake Bay TMDL Watershed Implementation Plan support; local TMDL restoration plan development; BMP siting

EDUCATION

MS, Environmental Pollution Control, The Pennsylvania State University, 1997
 BS, Environmental Science, Widener University, 1995

REGISTRATION/CERTIFICATION PROFESSIONAL AFFILIATION

American Water Resources Association
 Water Environment Federation

YEARS OF EXPERIENCE

21 Years

YEARS WITH TETRA TECH

20 Years

OFFICE LOCATION

Fairfax, VA

AREAS OF EXPERTISE

Clean Water Act support
 Ecological risk assessment
 Environmental statistics
 Green Infrastructure
 Guidance development
 Hydrodynamic modeling
 Mining-related water quality studies
 Pollutant source assessment
 Safe Drinking Water Act support
 Source water protection
 Stormwater management
 TMDL development
 Water quality assessment
 Water quality modeling
 Watershed management

for rural impervious areas and roads; NPDES monitoring program support including monitoring services for LID retrofits, BMP effectiveness monitoring, physical, chemical, and biological monitoring of selected streams; development of web enabled GIS based flood warning system; and public outreach.

Mt. Olivet Cemetery Stormwater Retention Credit BMP Design-Build Pilot Project, EQR (Prime) and District Stormwater LLC (End Client), Washington, DC. (2015 –2017) Oversaw design and provided construction management of stormwater bioretention systems to generate 80,000 gallons of SRCs at Mt. Olivet Cemetery. Tetra Tech partnered with EQR to design and construct BMPs to maximize treatment volume to generate Stormwater Retention Credits using innovative funding incentives driven by private investors. Oversaw engineering staff in design, permitting and construction oversight. Responsible for client relationship management.

Stormwater BMP Site Search and Concept Designs, Montgomery and Carroll Counties, Maryland, Maryland State Highway Administration. (2014–2016) Contract oversight for identification of stormwater BMP opportunities for state-owned roadways to comply with requirements of the Chesapeake Bay TMDL and SHA's MS4 permit. Managing a joint venture with RK&K and working closely with RK&K on strategic planning, costing and staffing task orders. Oversaw task orders for Montgomery and Carroll Counties. Support included desktop geospatial analysis of SHA rights of way to identify the most promising locations for BMP installation, field verification on a subset of the sites, and concept designs for more than 30 locations. The project required rapid and accurate execution of SHA protocols.

Stevens Institute of Technology Stormwater Projects, Hoboken, NJ. (2017) As contract manager, oversaw the development of construction plans for two GI projects on the campus of Stevens Institute of Technology (SIT). Following a 2nd place finish in the US EPA Campus RainWorks Challenge, SIT identified two locations on campus where GI could be used to address stormwater flooding issues. Tetra Tech developed plans and specifications for a terraced bioretention system as well as a control structure that diverts runoff from a large synthetic turf field to a bioretention area before discharging back into a combined sewer system. As part of the effort, storage and monitoring equipment was considered to use the sites as part of a living laboratory.

Green Infrastructure Stormwater Services, City of Beckley, WV. (2010–2015). Project manager for evaluating GI stormwater improvements on Winger Avenue and in the Pine Hills Subdivision. Products included alternatives analyses, preliminary engineering design, full engineering design, and specifications for the Pine Hills Subdivision.

Stormwater Support, City of Hurricane, WV. (2008–2011). Project manager for as-needed stormwater support services, including review of new construction and redevelopment plans to ensure compliance with city stormwater design specifications and with West Virginia's construction stormwater permit requirements, general stormwater program guidance, construction and post-construction program guidance, LID and GI guidance, ordinance development and review, public outreach/education/involvement, good housekeeping and pollution prevention for municipal operations, illicit discharge detection and elimination, and stormwater design manual development.

Statewide West Virginia TMDL Development Support, WVDEP and US EPA Region 3. (2002–present)

Project manager for the past 18 years to develop and fine-tune a TMDL methodology to address various water quality impairments in West Virginia. This innovative TMDL modeling approach was developed using the Mining Data Analysis System (MDAS) to simulate in-stream flow and water quality conditions (based on point and nonpoint contributions) throughout several large watersheds. More than 3,500 TMDLs have been developed in West Virginia using this methodology to meet strict consent decree deadlines, including 1,650 waterbodies and eight different pollutants (pH, aluminum, iron, manganese, chloride, selenium, siltation, and biological impairments).

Ms. Aileen Molloy is an Environmental Scientist with 18 years of experience in water resources management. She provides technical and programmatic support to federal, state, and local government clients in watershed management, stormwater management, green infrastructure and low impact development design and TMDL development. She also provides general and technical support for various projects related to watershed management and planning, watershed characterization, literature reviews, data compilation and analysis, and technical writing. Recent projects include managing and providing technical assistance to multiple states in developing statewide nutrient reduction framework strategies and managing stormwater BMP siting and design projects for the Maryland State Highway Administration, District Stormwater and Martinsburg, WV. Ms. Molloy has also served as the Chesapeake Bay nutrient and sediment TMDL technical support liaison for Pennsylvania and the District of Columbia. She has experience developing BMP implementation strategies and load reduction calculations.

RELEVANT EXPERIENCE

Green Infrastructure Design, City of Martinsburg Stormwater Management, City of Martinsburg, WV (2020 – present) Project Manager for green infrastructure (GI) design project in Martinsburg, WV. Responsible for managing engineering team, client relationship, and schedule and budget. Tetra Tech developed GI designs along four city blocks to help manage stormwater runoff to improve water quality and reduce localized flooding concerns. The project is within a residential area, developed in the early 1900s. Designs include bioretention systems along rights of way to two blocks, and permeable pavement along the four blocks. To maximize treatment volume, Tetra Tech took advantage of the wide rights of way and streets by bumping out the bioretention systems an additional two feet beyond the existing curb, while still allowing for two-way traffic and parking on both sides of the street. Designs include native vegetation and safety features to prevent pedestrian injury in the bioretention cells. Pedestrian landing strips were also incorporated to facilitate access from parked cars to the sidewalk. Final landscaping plans received input from the City’s tree commission to ensure overall acceptability. Designs are complete and awaiting final review by the City of Martinsburg.

West Virginia Green Infrastructure Planning and Implementation, US EPA Chesapeake Bay Program Office and West Virginia Department of Environmental Protection. (2018 – present) Project manager and technical expert for GI workshops and concept design plans. Responsible for managing engineering team and organizing GI workshops for two communities in West Virginia (City of Romney and City of Martinsburg). Project included stakeholder workshops on GI education, site visits to select priority projects and concept design plans for high priority GI projects. Deliverables included a workshop and concept design report for each community summarizing the workshop, stakeholder input, community stormwater issues and concerns and concept designs for multiple GI projects in each community.

Mt. Olivet Cemetery Stormwater Retention Credit Green Infrastructure Buildout Phase III, District Stormwater, Washington, D.C. (2020 - present) Project Manager for Phase III design and implementation of voluntary stormwater BMPs to create Stormwater Retention Credits (SRC) to sell on Washington, DC’s open marketplace. Project includes developing full engineering design plans, based on optimized practices selected from a previous master planning analysis conducted by Tetra Tech, within Mt. Olivet Cemetery in Northeast DC. Bioretention cells are being designed

EDUCATION

MEM Ecosystem Science and Management, Duke University (2005)
 BS Biology and Marine Science, University of Miami (2000)

YEARS OF EXPERIENCE

18 Years

YEARS WITH TETRA TECH

12 Years

OFFICE LOCATION

Fairfax, VA

AREAS OF EXPERTISE

- Clean Water Act program support
- Stormwater management
- Green infrastructure/LID
- Technical writing
- Water quality assessment
- Watershed characterization
- Watershed management

along paved access roads, to treat the 1.7" storm event to maximize the amount of credits to be sold on DC's innovative stormwater credit exchange, which is based on the volume of stormwater treated. Work requires coordination with the District's Urban Forestry Division to ensure protections and minimize impacts to the Heritage trees at the project site. Responsible for managing Tetra Tech team, schedule and budget, and subcontractors performing geotechnical and arborist services at the site. Upon completion of design work, Tetra Tech is responsible for permitting and construction support.

Knollwood Military Retirement Community Stormwater Retention Credit Green Infrastructure Design, District Stormwater, Washington, D.C. (2019 – 2021) Project Manager. Led the identification and design of a voluntary stormwater BMP to develop SRCs. Project included a master planning analysis to identify potential opportunities for BMP placement and type at the site. BMP configurations were assessed for cost, risk and acceptability to the Knollwood leadership. A final optimized recommendation that maximized credit generation while reducing cost and risk was selected. As a result of the analysis, the client selected a large bioretention system, which Tetra Tech then designed. Tetra Tech was responsible for the permitting process and construction support. Construction was completed in May 2021. Design challenges included poor infiltration, steep slopes and significant conflicts with special and heritage trees that required coordination with District Department of Transportation and design adjustments to minimize impact to these trees. Managed subcontractors including landscape designers, arborists, and geotechnical engineers, and team of Tetra Tech designers and support staff.

Resilient By Design Green Infrastructure, Huntington, WV and Seaford, DE. US EPA Region 3 (2018 - 2019) Project Manager. Led a team of engineers and environmental scientists in the preparation and delivery of design charrettes in Huntington WV and Seaford, DE to support the development of GI concept designs. The project included interactive design charrettes where stakeholders were given the opportunity to share their GI design preferences, and site assessments throughout each community. Final reports were developed, summarizing each design charrette, including the community strengths, challenges, and opportunities for GI, funding sources, design preferences, conceptual drawings, drainage area analysis, preliminary BMP sizing, and costs.

Green Infrastructure Stormwater Retention Credit Assessment, District Department of the Environment, Washington, D.C. (2018 - 2021) Project Manager. Managed a collaboration with District Stormwater to assess properties within the District with large impervious area for stormwater retention credit generation viability. Project also includes master planning for sites deemed viable and BMP design work for sites that move forward with secured private capital funding. Site viability is assessed based on opportunity areas, costs, risks and landowner acceptance. Projects will result in voluntary stormwater BMP credits that provide landowner relief from stormwater fees. Assessment have resulted in site visits to six sites and master plans for three, which led to full design work, under a separate contract.

Mt. Olivet Cemetery Stormwater Retention Credit Green Infrastructure Buildout Phase II, District Stormwater, Washington, D.C. (2018 - 2019) Project Manager. Led Phase II identification, design, and implementation of voluntary stormwater BMPs to create SRCs. Project included a master planning analysis to identify all opportunities for BMP placement and type at the Phase II project area within Mt. Olivet Cemetery. BMP configurations were assessed for cost, risk and acceptability to the Cemetery leadership. A final optimized recommendation that maximized credit generation while reducing cost and risk was selected. Bioretention cells were constructed along paved access roads. Other BMPs include impervious area removal and replacement with trees along underutilized sidewalks throughout the Cemetery. Responsible for managing Tetra Tech team, schedule and budget and subcontractors performing survey work at the site. Worked closely with The Nature Conservancy/District Stormwater to utilize private capital to fund the first large-scale voluntary stormwater BMP project to be sold as credits on the open marketplace.

Mr. Jonathan Smith has more than 25 years of experience in assisting communities in adopting sustainable stormwater management solutions to address flooding and surface water quality issues in a manner that also meets community specific objectives such as ecosystem restoration, urban revitalization, and watershed scale improvements. He is an Engineering Manager for Stormwater Services for Tetra Tech and serves as a lead technical services provider to municipal, state, and federal clients. For the past several years Mr. Smith has worked extensively with municipalities across the country to advance the use of green infrastructure through code revisions, policy updates, technical support, design manuals, and outreach and education. Mr. Smith was an Extension Engineer at North Carolina State University for more than 11 years. Under his leadership, several innovations in stormwater management practices were developed regarding practice design and performance.

RELEVANT EXPERIENCE

Mt. Olivet Cemetery Stormwater Retention Credit Green Infrastructure Design Phase III, District Stormwater, Washington, D.C. (2020 - present) Senior Engineer/Engineer of Record. Leading Phase III design of voluntary stormwater BMPs to create Stormwater Retention Credits (SRC) to sell on Washington, D.C.'s open marketplace. Project includes developing full engineering design plans, based on optimized practices selected from a previous master planning analysis conducted by Tetra Tech, within Mt. Olivet Cemetery in Northeast D.C. Bioretention cells are being designed along paved access roads to treat the 1.7" storm event to maximize the amount of credits to be sold on D.C.'s innovative stormwater credit exchange, which is based on the volume of stormwater treated. Responsible for development of design products, oversight of design staff, and final review of all design products. Upon completion of design work, Tetra Tech is responsible for permitting and construction support.

West Virginia Green Infrastructure Planning and Implementation, US EPA Chesapeake Bay Program and West Virginia Department of Environmental Protections, (2018 - present) Serving as Lead Subject Matter Expert for US EPA Chesapeake Bay Program coordinating with WVDEP to develop outreach materials promoting GI as a tool to address flooding, CSOs and source water protection goals in West Virginia communities. Served as Lead Facilitator working directly with two WV communities (City of Romney and City of Martinsburg) to host 1 ½ day workshops to identify and assess potential sites for GI implementation. Led development of concept designs for a priority site in each community.

Devereux Meadows Park, Greenway, and Stream Restoration Project, City of Raleigh Department of Parks, Recreation, and Cultural Resources, Raleigh, NC (2017 - present) Managing project to provide environmental assessment, remediation, planning, and design services for the implementation of a municipal park and greenway on a flood-prone 14-acre city-owned parcel. The project site has an extensive history of industrial uses and known subsurface contamination. Tasks completed to date include the completion of a Phase II Environmental Site Assessment and other

EDUCATION

BS Biological & Agricultural Engineering, North Carolina State University (1995)

Graduate Course Work: 21 units focused on hydrology and stormwater management, North Carolina State University (1998-2006)

REGISTRATION/CERTIFICATION

Professional Engineer: Maryland License No. [REDACTED] (2021), North Carolina License No. [REDACTED] (2000), Virginia License No. [REDACTED] (2008); Georgia License No. [REDACTED] (2021), District of Columbia, provisional No. [REDACTED] (2021)

LEED-Accredited Professional

YEARS OF EXPERIENCE

26 Years

YEARS WITH TETRA TECH

11 Years

OFFICE LOCATION

Marion, NC

AREAS OF EXPERTISE

- Green Infrastructure
- Hydrologic and Hydraulic Design
- Low Impact Development
- Ecosystem Restoration
- Program Development and Support
- Public Facilitation

evaluations of site conditions and potential contamination. The development of concept design alternatives and an extensive public engagement is ongoing. The project site is surrounded by an area of significant current and projected future development growth near Raleigh's vibrant Downtown district and will serve as a gateway connecting Raleigh's downtown core with neighborhoods to the north.

On-Demand Services Contract – Category C – Watershed Management Services, Gwinnett County Department of Water Resources, Gwinnett County, Georgia (2019 – Present) Senior QA/QC Reviewer. Leading Review of Engineering Plans, Specifications, and other Design related documents for annual on-demand engineering services contract with the Gwinnett County Department of Water Resources. Supporting the implementation of watershed improvements to protect and improve in-stream water quality and aquatic habitat. Completed or ongoing projects include Watershed Improvement Plan (WIP) support, stream delisting evaluation, ordinance evaluation, BMP retrofit concepts and design, wetland support, master planning, permitting, and construction management.

Resilient by Design, US-EPA Region 3, Huntington, West Virginia and Seaford, Delaware (2018-2019) Lead subject matter expert in developing resilient design for future improvements of a multiblock section of a downtown commercial street in Huntington, West Virginia. Served as Lead Facilitator for a green street charrette which gathered information from the public on preferred green streets elements. Information gained served as a basis for the development of a 20% design package for Huntington and concept designs for Seaford. Produced final design charette reports for each community that summarized the stakeholder processes, preferences and decisions for each project.

Making a Visible difference: Building Blocks for Sustainable Communities Program, Nationwide. US EPA-Office of Community Resilience. (2015-2020). Lead Workshop Facilitator. Served as lead facilitator providing technical assistance to communities across the country for the purpose of integrating green streets into each communities' existing complete streets policy. Services included assessment of green street potential in local targeted project areas, facilitation of a 1 ½ day workshop for local stakeholders, and preparation of a "Next Steps" memo which describes specific actions the community can take to advance the implementation of green streets to create more sustainable communities.

Integrating Green Infrastructure and Hazard Mitigation Planning, US-EPA Office of Resilient Communities, Brown County, Wisconsin (2019 - present) Providing GI subject matter expertise for US EPA Office of Community Revitalization project to catalyze efforts in Brown County and its municipalities to integrate application of GI with its All Hazard Mitigation Plan (AHMP). This US EPA Building Blocks hybrid combines GI and flood resilience expertise used in other Building Blocks assistance projects to assess opportunities for mitigation of flooding, watershed protection, and enhanced community resilience. Cofacilitating a multi-session virtual workshop to obtain community input, prioritize opportunities, and develop a path forward for updating the AHMP.

North Carolina DOT Highway Stormwater Program Limited Services Contract. Raleigh, NC (2014 - present) Lead Technical and Project Manager. Served as Task Manager on a project to evaluate the impact of pending dissolved metals standards on the NCDOT Highway Stormwater Program. Served as lead technical reviewer on projects to implement retrofit stormwater management practices into highway rights-of-way.

City of Virginia Beach Stormwater and Environmental Management Services. Virginia Beach, VA (2018 - present) Lead Technical/QA/QC reviewer. Providing quality assurance and quality control services for a variety of design tasks for the City of Virginia Beach Stormwater Management Regulatory Division. Conducted senior level design review of project deliverables including retrofit stormwater management facilities at Lynnhaven Park and Indian River Road. Provided technical guidance to project engineers regarding incorporation of best design practices and innovative stormwater management techniques.

Mr. Robert Tucker is a water resources/bio and agricultural engineer with over a decade of experience in onsite wastewater management, stormwater BMP and retrofit design, hydraulic and hydrologic modeling, and integrated watershed planning. His software proficiencies include AutoCAD Civil3D, ArcGIS, EPA/PC SWMM, HEC-RAS/HMS/2, and various other hydraulic/hydrologic modeling products. Mr. Tucker is also a regenerative farmer by trade and brings a unique perspective and skillset to his engineering profession.

RELEVANT EXPERIENCE

Green Infrastructure Design, City of Martinsburg Stormwater Management, City of Martinsburg, WV (2020 – present) Design engineer for green infrastructure (GI) design project in Martinsburg, WV. Responsible for developing CAD-based designs. Developed full designs based on the concept plans created for the project under a separate task. Responsible for standard details, erosion and sediment control, plan and cross-section views and costing. Communicated with various utility companies to try to minimize impacts to water and gas lines in areas where the survey could not detect subsurface infrastructure. Designs include bioretention systems along rights of way to two blocks, and permeable pavement along the remaining two blocks. To maximize treatment volume, Tetra Tech took advantage of the wide rights of way and streets by bumping out the bioretention systems an additional two feet beyond the existing curb, while still allowing for two-way traffic and parking on both sides of the street. Designs include native vegetation and safety features to prevent pedestrian injury in the bioretention cells. Pedestrian landing strips were also incorporated to facilitate access from parked cars to the sidewalk. Designs are complete and awaiting final review by the City of Martinsburg.

Lynnhaven Park Water Quality Improvement Project, City of Virginia Beach, Virginia (2019-Present) Led the preliminary engineering design alternatives for Lynnhaven Park. An existing stormwater BMP was constructed as an extended detention pond, however after several redesigns and failed implementation, Tetra Tech was contracted to improve the existing facility as either a wet pond or constructed wetland. A properly function BMP at this site will be eligible to help the City meet MS4 permit goals for phosphorus reduction. Preliminary engineering design support has been well-received and will be followed up with full design and implementation in the near future.

Indian River Road and Lynnhaven Parkway Water Quality Improvement Project, City of Virginia Beach, Virginia (2019-Present) Provided geospatial analyses and assisted in preliminary engineering design alternatives for a publicly-owned corner parcel at the intersection of Indian River Road and Lynnhaven Parkway. Design alternatives included consideration of both proprietary and non-proprietary devices such as wet and dry swales, bioretention cells, sand

EDUCATION

MS, Bio and Ag Engineering, North Carolina State University (2007)

BS, Environmental Engineering, North Carolina State University (2004)

REGISTRATION/CERTIFICATION

Professional Engineer, Civil/Water Resources: NC License No. [REDACTED] (2013)

NC Certified Professional in Low Impact Development

PROFESSIONAL AFFILIATION

American Ecological Engineering Society

American Society of Agricultural and Biological Engineers

YEARS OF EXPERIENCE

14 Years

YEARS WITH TETRA TECH

12 Years

OFFICE LOCATION

Research Triangle Park, NC

AREAS OF EXPERTISE

Sustainable site design

Integrated resource management

Stormwater master planning

Stormwater retrofit screening, prioritization, and design

Onsite wastewater design

Hydrologic and hydraulic studies

Watershed management planning

Regenerative agriculture and agroecology

filters, Filterra bioretention boxes, and continuous deflective separation units. Preliminary engineering design support has been well-received and will be followed up with full design and implementation in the near future.

Garner Creek Retrofit BMP Design, Gwinnett County Department of Water Resources, Lawrenceville, GA. (2018-Present) Lead design engineer on a project to implement multiple retrofit BMPs adjacent to a large public high school. The practices, which include two bioretention areas and a stormwater wetland, treat 12.4 acres of school property and are designed to integrate with a previously designed stream restoration project. Additional features include an ADA compliant walking/cross-country path, outdoor classroom incorporated around one of the bioretention cells, a native meadow, and multiple opportunities to expand student engagement in stormwater management and ecosystem restoration.

Green Infrastructure Design, Alpharetta, GA. (2016-present). Lead project engineer for several stormwater retrofits that include institutional-scale rainwater harvesting and reuse, bioretention, regenerative stormwater conveyance systems, and waste containment implemented as part of Foe-Killer Creek Watershed Improvement Plan. Also lead the cost-analysis in support of City's policy revisions for GI that evaluated stormwater management costs for several re-development scenarios, which supported the cost-benefit of GI stormwater management in urban redevelopment compared to conventional approaches. Project deliverables included final construction plans and specifications, as well as requirement permitting.

Advancing Green Infrastructure and LID, City of Raleigh, NC (2015-present). Engineer and facilitator as part of strategic capacity building effort to implement GI and LID throughout the City. The project includes a code review and revision to eliminate barriers and build incentives; new design templates for roadways; a cost-effectiveness tool; site planning factsheets; and operation and maintenance guidance. Principal designer in development of new standard details for GI practices installed with City rights-of-way.

Pine Hills Green Infrastructure Design and Construction, City of Beckley, WV (2011-2015). Lead engineer on project for Beckley Sanitation District to design and manage the construction of a series of GI and drainage improvements into a 6.6-acre residential subdivision watershed experiencing flooding of homes. Green infrastructure components included bioretention, bio-swales, as well as culvert and structure replacement. BMP design included hydrologic and hydraulic modeling using StormCad, construction plan assembly in AutoCAD, and quantities and cost estimates.

Green Infrastructure Community Assistance Program, US EPA (2012 - 2017). As a part of the US EPA's Green Infrastructure Community Partners Project, provided technical assistance to communities throughout the country. Led and assisted with various GI implementation concepts and designs for communities in Sanford, ME, Atlanta, GA, Norfolk, VA, Albuquerque, NM, Falls River, MA, and Spartanburg, SC. Specific project needs included CSO reductions, urban redevelopments, urban agriculture, etc., and technical assistance work ranged from conceptual site layouts, construction detail development, preliminary calculations and construction cost estimates, and hydrologic modeling studies.

Building Blocks for Sustainable Communities Technical Assistance (2015). For US EPA Office of Sustainable Communities, helped conduct community research and workshop presentations/facilitation to address local flooding and provided community outreach for workshops. Technical assistance included participating in on-site tours to review representative problem areas and green BMP opportunity sites; presenting to elected officials; conducting all-day workshop with staff, elected officials and key stakeholders; developing high priority action plan; and writing a Next Steps Memo for the elected board's consideration.

Mr. Montali has nearly 40 years of professional experience in the water resource management areas of NPDES permitting, numeric, narrative and antidegradation Water Quality Standards, Watershed assessment, Pretreatment, Impaired Waters listing and reporting, and TMDL development. Over a long career with the West Virginia Department of Environmental Protection, he served as the Team Leader of the NPDES Permitting Team, the West Virginia Pretreatment Coordinator, and the West Virginia TMDL Program Manager. His experience with WVDEP and subsequently Tetra Tech includes more than 15 years of past and continuing experience with the activities of the Chesapeake Bay Program Partnership where he served as the West Virginia representative on numerous workgroups and committees, including the continued co-chairmanship of the Modeling Workgroup through the Midpoint Assessment where a new Phase 6 suite of models were developed and approved for use in recalculation of planning targets upon which jurisdictional Phase III Watershed Implementation Plans were based in 2019. Mr. Montali's current Chesapeake Bay Program activities include providing technical assistance to West Virginia partners on multiple facets related to execution of the WV Phase III WIP.

RELEVANT EXPERIENCE

Supporting West Virginia DEP as liaison to the Chesapeake Bay Program and Technical Expert (2006-present)

Serving as the West Virginia jurisdictional representative on workgroups and committees, including the Modeling Workgroup (Co-chair 2013-present), Water Quality Goal Implementation Team, Wastewater Treatment Workgroup, Agricultural Modeling Subcommittee, and Toxic Contaminants Workgroup

Recently Mr. Montali provided coordination of Chesapeake Bay Green Infrastructure grant funding and participation in the development of Green Infrastructure Conceptual Plans for Romney, WV and Martinsburg, WV, serving on the team developing and advising WVDEP on outreach materials and participating in the workgroup meetings and site assessments for both towns.

In addition, he frequently participates in the activities of, and technical assistance to West Virginia representatives of the Agricultural Workgroup, Urban Stormwater Workgroup, Watershed Technical Workgroup and the Land Use Workgroup. He also participated in the Expert Panels for Onsite Wastewater Treatment Systems Nitrogen Reduction Technology (Final Report February 2014) and Onsite Wastewater Nutrient Attenuation (Final Report August 2016). He was a member of the Steering Committee for the Scientific and Technical Advisory Committee (STAC) Workshop *Development of Climate Projections for Use in Chesapeake Bay Program Assessments* (March 2016).

Mr. Montali provides technical assistance to West Virginia decision makers with respect to policy considerations before the Management Board and Principle Steering Committee

He provided support for Watershed Implementation Plan Development, including technical support for WV negotiation of planning targets, participating in West Virginia Phase I, II and III WIP development, advising on BMP planning with consideration of WVDEP and Partner Agency program capacity, wastewater source characterization, Model BMP input deck development and technical writing of portions of WIP documents.

EDUCATION

B.S. Environmental Engineering, The Pennsylvania State University (1981)

YEARS OF EXPERIENCE

39

YEARS WITH TETRA TECH

4

OFFICE LOCATION

Charleston, WV

AREAS OF EXPERTISE

Chesapeake Bay Program

TMDL development

Watershed Quality Assessment and Reporting

Water Quality Standards (numeric, narrative, antidegradation)

NPDES Permitting (municipal, industrial and mining)

Watershed modeling data development and output review

Technical writing/editing

He also provides technical assistance to West Virginia agency staffs relative to annual progress reporting and 2-yr Milestone planning and reporting.

TMDL Development, West Virginia Department of Environmental Protection (2001-2016)

While at WVDEP, Mr. Montali lead the planning, coordination, and oversight of TMDL development projects for West Virginia Department of Environmental Protection. Responsibilities and accomplishments include development and approval of thousands of TMDLs for stream/impairment combinations, significant experience in coal mining settings with both active and legacy mining impacts, development of TMDL for total metals, pH, dissolved aluminum, fecal coliform, selenium, and biological integrity, organized TMDL development under the Watershed Management Framework, planned projects as Watershed TMDLs where prescribed loads predict attainment in impaired tributaries as well as mainstems, project included stressor identification with respect to biological integrity nonattainment, incorporated results of intensive stream monitoring and source tracking/characterization, developed a TMDL alternative for phosphorus nuisance algae impacts to Greenbrier River, participated in public comment and US EPA-approval issue resolution, and was responsible for writing technical reports.

Water Quality Standards / Water Quality Assessment and Reporting, West Virginia Department of Environmental Protection (2002-2014)

While at DEP, Mr. Montali lead the West Virginia CWA Section 303(d) List and 305(b) Report development, which included developing numeric water quality criteria assessments, narrative water quality criteria assessments (biological integrity, algae), developing listing methodologies and documentation, documenting listing decisions, and leading public comment and US EPA approval issue resolution. He also was responsible for antidegradation water quality standards and implementation regulations and guidance development including public presentations and public comment and US EPA approval issue resolution and revisions to water quality criteria.

NPDES Permitting and Pretreatment, West Virginia Department of Environmental Protection (1981-2000)

Mr. Montali was a NPDES Permit writer and then Team Leader for industrial and municipal wastewater discharges. His work addressed technology-based requirements, water quality based effluent limitation development per US EPA Technical Support Document, CSO and SSO program policies and procedures.

As the West Virginia Pretreatment Program Coordinator, he implemented technology-based requirements for industrial users of POTWs pursuant to Categorical Standards, indirect discharge limitation development to address 40 CFR 403 general and specific prohibitions, reviewed and approved POTW Program development and reporting and conducted POTW program auditing and Industrial User inspections.

Élise Cormier is a registered landscape architect (RLA) and Natural Resources professional with 18 years of experience in assisting communities throughout the U.S. in planning and designing nature-based recreation places, specializing in a community-rooted approach and native ecosystem design and restoration. Ms. Cormier is experienced in leading design charrettes, planning stakeholder engagement, and applying community input to site analysis, master planning, and construction documents. Ms. Cormier’s work includes development of nature-based recreational sites and greenspaces, application of sustainable design practices for educational facilities, and retrofitting green infrastructure for public spaces. She is knowledgeable in native plant communities and experienced with their use in sustainable design. Ms. Cormier’s background includes formal training in charrette facilitation and interpretive planning. She specializes in working with rural communities and serves as a resource lead for Citizens’ Institute on Rural Design.

RELEVANT EXPERIENCE

Green Infrastructure Design, City of Martinsburg, West Virginia (2020-present) Landscape Architect. Tetra Tech prepared construction-ready drawings based on concept report to implement green street retrofits on two primary corridors in Martinsburg, West Virginia. Project funded by Chesapeake Bay Trust Green Streets, Green Towns, Green Jobs (G3) Grant, the City of Martinsburg, and US EPA West Virginia Technical Assistance task. Working on grant timeline, developed construction drawings to address project goals for stormwater treatment, with infiltration to extent feasible in karst geology. Role included preparing native planting design for stormwater BMPs and reviewing proposed renovations to sidewalk/pedestrian for ADA compliance.

West Virginia Green Infrastructure Planning and Implementation Workshop and Concept Design, City of Martinsburg, West Virginia, U.S. Environmental Protection Agency (2020) Landscape Architect. Prepared renderings to illustrate proposed design retrofits for two street corridors in City of Martinsburg. Team collected public input during charrette, followed by conceptual design development and supporting renderings to guide city’s decision-making on green street retrofits. Renderings included plan-view and perspective illustrations to assist city and public with visualizing the outcome of the green street retrofits. Renderings used to illustrate concept design proposals and preliminary hydrology modeling in concept report delivered to City and US EPA.

Mount Olivet Cemetery Green Infrastructure Design Phase III, The Nature Conservancy, Washington, D.C. (2020–Present) Landscape Architect. Working with team of engineers to develop bioretention areas to manage stormwater flows within the cemetery and reduce stormwater fees under the Stormwater Regulations of the District of Columbia. Design focuses on protecting heritage trees, reducing impervious surfaces (primarily roads), introducing native

EDUCATION

MLA, Landscape Architecture, North Carolina State University, 2006

MNR, Natural Resources, North Carolina State University, 2006

BA, Geology, Smith College, 2000

REGISTRATION/CERTIFICATION

Registered Landscape Architect: Georgia [REDACTED] Alabama (794)

Certified Charrette Facilitator, National Charrette Institute (NCI), Portland OR (2014)

PROFESSIONAL AFFILIATION

American Society of Landscape Architects (ASLA)

YEARS OF EXPERIENCE

18 Years

YEARS WITH TETRA TECH

4 Years

OFFICE LOCATION

Atlanta, Georgia

AREAS OF EXPERTISE

Native Plants and Ecosystems

Green Infrastructure/BMPs

Green Streets/Multi-Use Trails

Nature-Based Playgrounds

Public Engagement/Charrettes

Renderings and Exhibits

Rural Community Design

Recreation/Natural Area Design

Office Operations/Contract Management

plantings, and blending with the design of the historic cemetery. The resulting GI practices are intended to generate Stormwater Retention Credits (SRCs) to meet regulatory requirements.

DWR Central Campus Improvement Project, Gwinnett County Department of Water Resources, Gwinnett County, Georgia (2019–Present) Project Manager/Landscape Architect. Collaborated with DWR on a series of concepts for headquarters campus to introduce GI demonstration, public education, and employee health opportunities. Concept illustrations led to stakeholder support for further design exploration. Multi-disciplinary design team currently developing full campus master plan for water walk, outdoor workshop/meeting areas, employee health amenities, and curated selection of GI practices to capture and treat runoff on site. Master plan accompanied by phased costs for multi-year implementation, special projects to highlight watershed health, and presentation-level renderings to communicate vision to DWR leadership and funding partners.

Project Planning for the North Landing Watershed TMDLs, City of Virginia Beach, Virginia (2019–Present) Landscape Architect. Tetra Tech collaborated with City of Virginia Beach to identify locations within the North Landing Watershed for implementation of GI retrofits. Developed renderings of proposed retrofits to support city consideration and public awareness of the various retrofit options.

Garner Creek Demonstration Stormwater Best Management Practice Design, Gwinnett County Department of Water Resources, Lilburn, Georgia (2018-Present)

Landscape Architect. Developed site plan and native planting plan in coordination with engineered BMPs and stakeholder input. BMPs will treat runoff for the drainage area at Parkview High School and include bioretention basins and engineered stormwater wetland. Facilitated stakeholder input with Parkview High School students, faculty, and administration to obtain stakeholder preferences for the outdoor classroom features. Tetra Tech developed the conceptual plan, prepared construction documents in coordination with county's stream restoration design for adjacent stream reach, and supported permitting. Currently Tetra Tech is providing construction management services. Tetra Tech assisted DWR in preparing Georgia Association of Water Professionals award application. In 2021, Garner Creek project received the GAWP Stormwater Innovation Award and was recognized at the ASCE Georgia Section Annual Awards Gala.

BMP Maintenance Education for HOAs and Property Management Firms Phase II: Individual BMP Maintenance Sheets, Gwinnett County Department of Water Resources, Gwinnett County, Georgia (2020 - 2021) Landscape

Architect/Project Manager. Promoted smart stormwater practices in Gwinnett County by preparing educational materials to guide property management entities in maintaining BMPs per county standards. Team of engineers/graphic designer developed set of fact sheets, maintenance checklists, and illustrations to communicate responsibilities and expected costs. Materials placed on county website for public reference. Tetra Tech is currently supporting DWR with Phase III.

One Justice Square Smart Stormwater Retrofit Design, Gwinnett County Department of Water Resources, Lawrenceville, Georgia (2018 – Present) Landscape Architect. Developed design to retrofit existing campus with GI BMPs to meet Georgia Stormwater Management Manual Guidelines, provide water quality treatment, and educate developers and professional designers. Monitoring program will show effectiveness of the GI BMPs at reducing pollutants. Designed site plans for trails and outdoor classroom areas with native plantings.

Ms. Cori Edwards is an Environmental Scientist and GIS Analyst with over 11 years of experience with infrastructure project management, grant writing, source water protection, and over 16 years of experience with ESRI ArcMap software. Cori is co-creator of the Nutrient Pollution Risk Assessment GIS tool used to identify and rank locations for BMP placement based on pollution potential to surface and groundwater within Lancaster County, Pennsylvania. Her expertise includes advanced experience with ArcGIS and Trimble Global Positioning System (GPS) technology. She is proficient with Microsoft Office (Word, Excel, Access, and PowerPoint), the Agricultural Conservation Planning Framework (ACPF), meeting facilitation, public education, and outreach. She has authored source water protection plans, American Water Infrastructure Act (AWIA) risk and resilience assessments and emergency response plans, Federal Emergency Management Agency (FEMA) hazard mitigation plans, Federal Transit Administration (FTA) and Federal Highways Administration (FHWA) Title VI and disadvantaged business enterprise (DBE) programs, and National Environmental Policy Act (NEPA) environmental assessments for WV Housing & Urban Development (HUD) programs in compliance with local, state, and federal authorities.

RELEVANT TETRA TECH EXPERIENCE

Resilient By Design Green Infrastructure Huntington, WV, US EPA Region 3, (2018-2019) Served as both GIS specialist and liaison to local officials. Facilitated charette meetings and participated in site assessment of GI locations within Huntington. Compiled and created GIS and spatial data for project maps and the charette presentations. Developed the final report summarizing the key community issues, practice prioritization and concept designs.

US EPA Risk and Resilience Assessment and Emergency Response Plan, Athens Water, Athens, WV (6/2020 - Ongoing) Project Manager and technical lead creating a Risk and Resilience Assessment and Emergency Response Plan for Athens Water to fulfill the American Water Infrastructure Act (AWIA) of 2018 regulations.

Pennsylvania 319 Plans, US EPA Region 3 Water Protection Division, Multiple Locations, PA (2020 - 2020) As the project GIS Analyst, provided GIS support for three watershed-based implementation plan updates including the following HUC 10 watersheds: Pine Creek, Conewago Creek, and Upper Swatara. Located geospatial data and developed maps for reports and analysis.

Source Water Protection Plan Updates and Support, Individual Utility Clients, Statewide, WV (2017-Ongoing) Project Lead. Updated existing source water protection plans for Wilderness PSD, Buffalo Creek PSD, Big Bend PSD, McDowell County PSD, Green Valley Glenwood PSD, City of Fairmont, City of Summersville, City of Mount Hope, City of Oceana, Town of Gilbert, Town of Athens, and the

EDUCATION

MGIS Pennsylvania State University, (2018)

BA Geography/Cartography & GIS, Concord University (2006)

PROFESSIONAL AFFILIATIONS

WV Association of Geospatial Professionals 2017-2020

American Water Resources Association 2020

YEARS OF EXPERIENCE

11 Years

YEARS OF WITH TETRA TECH

4 Years

OFFICE LOCATION

Charleston, WV

AREAS OF EXPERTISE

Source Water Protection

ArcGIS & GPS

Grant & Technical Writing

National Environmental Policy Act Environmental Review

Hazard Mitigation Planning

Town of Man. Led protection team meetings. Mapped potential sources of contamination using field investigations and GIS. Drafted standard protocol for water sampling. Coordinated with WVDHHR to provide updates within the online portal developed in 2019. Applied for grants on behalf of clients to the WV Source Water Protection Grant program and successfully acquired mobile pumps for Wilderness PSD and the Town of Gilbert.

East Fork Watershed ACPF, Clermont Soil and Water Conservation District, Multiple HUC 12s, OH (2020- 2020)

GIS Analyst, Technical Author. Performed Digital Elevation Model (DEM) hydro conditioning for seven 12-digit hydrologic unit code (HUC12) watersheds. Utilized Agricultural Conservation Planning Framework (ACPF) tool for hydro conditioning steps 1-3. Conducted technical support and troubleshooting for an additional HUC12s. Compiled ACPF workflow with troubleshooting guide.

Total Maximum Daily Load (TMDL) Support for West Virginia Watersheds, West Virginia Department of Environmental Protection, Statewide, WV (2017-Ongoing)

GIS Analyst, Technical Author. Provides GIS support, technical writing, pollutant source report, and map figure creation for watershed groups D3, E3, E4, and C4 representing these river watersheds: Upper Guyandotte, Lower Guyandotte, Hughes, Big Sandy, Twelvepole, and Lower Ohio. Created elevation mosaics and performed QA/QC for subwatershed delineation. Calculated disturbed areas represented by oil and gas industry activity and unpaved roads not represented by existing TIGER datasets. Performed GIS analysis, creation, and modification and QA/QC for land use representation and metals modeling.

PREVIOUS PROJECT EXPERIENCE

Region I Hazard Mitigation Plan Update, Multiple Clients, Mercer, McDowell, Monroe, Raleigh, Summers, & Wyoming Counties, WV (2015)

Project Manager. Formed the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage in accordance with Title 44 Code of Federal Regulations (CFR) §201.6 and section 322 of the Stafford Act, 42 U.S.C 5165. Evaluated natural hazard risk to individual communities. Conducted extensive public outreach and stakeholder collaboration meetings. Served as technical lead updating the FEMA hazard mitigation plans for McDowell, Mercer, Monroe, Raleigh, Summers, and Wyoming Counties in West Virginia.

Maxwell Hills Traffic Study, New River Transit Authority, Beckley, WV (2015)

Project Manager. Coordinated charette style meetings with local stakeholders and consultants to complete a traffic study for a residential neighborhood in Beckley, WV. Compiled stakeholder input and maps. Facilitated meetings and provided reports to the Fayette Raleigh Metropolitan Planning Organization.

Extreme Weather At-Risk Roadway System Analysis, Fayette Raleigh Metropolitan Planning Organization (FRM), Beckley, WV (01/2015-06/2016)

Project Manager. Established a scope of work and identified activities to pursue assessment of roadway infrastructure fulfilling Task II of FRM's 2015-2016 Unified Planning Work Program (UPWP). Performed roadway system mapping, report generation, and presentation to FRM's Technical Advisory Committee and Policy Board on the identification of areas vulnerable to extreme weather events including flooding, water pooling, and snow accumulation enabling community leaders to prioritize roadways and identify best practices to increase safety and mediate risks at individual site-specific locations.