

U.S. General Services Administration

GSA Schedule 899 for Environmental Consulting Services

Schedule Contract: GS-10F-0214K

Contract Period: April 27, 2010 through April 26, 2015



Gannett Fleming

*Excellence Delivered **As Promised***



Data Universal Numbering System (DUNS):
00-943-1466

Type of Contractor: Large Business
NAICS: 541330

Contractors Taxpayer Identification Number (TIN): 25-1613591
Cage Code: 0CF73

1a. Awarded Special Item Numbers (SIN):
899 1/899 8 Environmental Consulting Services

1b. Labor Rates: Please see page 28 for Labor Rates.

1c. Labor Category Descriptions: Please see page 29 for full descriptions.

2. Maximum Order Threshold: \$5,000,000 which is reflective of the maximum order for Environmental Services under all SINs.

3. Minimum Order: \$100 which is the minimum order for all environmental services.

4. Geographic Coverage (Delivery Area):
Worldwide.

5. Points of Project Performance: Harrisburg, Pennsylvania and all Gannett Fleming offices.

Gannett Fleming, Inc.
Environmental Planning and Management
William M. Plumpton, CEP, Project Manager
P.O. Box 67100
Harrisburg, Pennsylvania 17106
Telephone: 717-763-7211 ext. 2142
Fax: 717-763-8150
Email: wplumpton@gfnet.com

6. Prices: Shown herein are net prices.

7. Quantity Discounts: None.

8. Prompt Payment Terms: Net 30 days.

9 (a-b). Government Purchase Cards: Gannett Fleming accepts government credit cards on all orders regardless of size.

10. Foreign items: Not applicable.

11 (a-d). Time of Delivery (a-d): To be specified with ordering agency on each task order.

12. FOB Point(s): To be negotiated with ordering agency on each task order.

13a. Ordering Address:
Gannett Fleming, Inc.
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William M. Plumpton, CEP, Project Manager
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Harrisburg, Pennsylvania 17106
Telephone: 717-763-7211 ext. 2142
Fax: 717-763-8150
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13b. Ordering Procedures: The ordering procedures for supplies and services, information on Blanket Purchase Agreements (BPA), and a sample BPA can be found at the GSA/FSS Schedule homepage (<http://fss.gsa.gov/schedules>).

14. Payment Address:
Gannett Fleming, Inc.
Accounts Receivable
P.O. Box 67100
Harrisburg, Pennsylvania 17106

15. Warranty Provisions: Not applicable.

16. Export Packaging Charges: Not applicable.

17. Terms and Conditions of Government Purchase Card Acceptance: No limitations on acceptance.

18.-24a. Not applicable.

24b. Section 508: If applicable, Section 508 compliance information on Electronic and Information Technology (EIT) supplies and services will be addressed on a task order basis. The EIT standards can be found at www.Section508.gov.

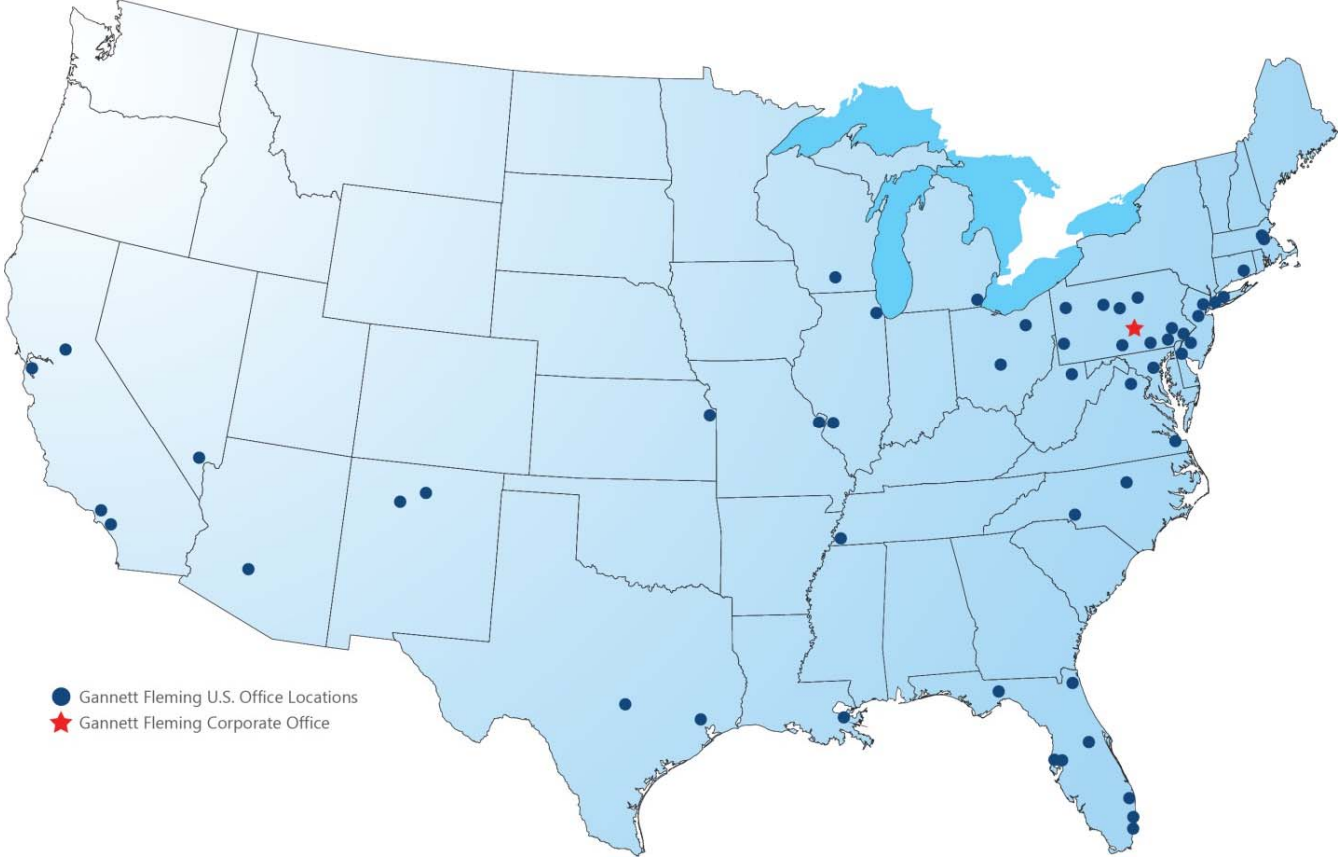
25. Data Universal Numbering System (DUNS):
00-943-1466

26. Contractor is registered in CCR Database:
Gannett Fleming is registered in the Central Contractor Registration (CCR) database.

Gannett Fleming is a global infrastructure firm that provides planning, design, technology, and construction management services for a diverse range of markets and disciplines. With approximately 2,000 highly qualified individuals across a global network of 60 offices, we are united

in our passion to deliver excellence. We have played a part in shaping infrastructure and improving communities in more than 65 countries, specializing in transportation, environmental, water, energy, and facility-related projects.

Figure 1: Gannett Fleming maintains offices across the United States.



Founded in 1915, we embrace sustainability and innovation in our projects and internal activities, achieving results while being responsible stewards of our environment. Our culture of service, ingenuity, and responsiveness empowers us to fulfill our key mission: make our clients successful.

Gannett Fleming is consistently ranked in the top 10 percent on *Engineering News-Record's* Top 500 Design Firms list.

Our firm has the depth of staff and breadth of experience to provide our clients with integrated

services on projects of any size. The diverse expertise of our staff allows us to draw upon specialized personnel to meet unique project requirements.

Exhibit 1: Gannett Fleming employs nearly 2,000 personnel who specialize in transportation, environmental, water, energy, and facility related projects.

Personnel By Discipline			
3	Acoustical Engineer	45	Geographic Information Systems Specialist
327	Administrative	41	Geologist
4	Archaeologist	40	Hydraulic Engineer
30	Architect	8	Hydrogeologist
5	Biologist	1	Hydrologist
96	CADD Technician	6	Industrial Engineer
2	Chemical Engineer	2	Industrial Hygienist
109	Civil Engineer	1	Interior Designer
139	Computer Programmer	9	Land Surveyor
113	Construction Inspector	3	Landscape Architect
57	Construction Manager	19	Mechanical Engineer
4	Cost Engineer/Estimator	1	Mining Engineer
32	Driller	58	Planners
1	Ecologist	4	Risk Assessor
16	Economist	34	Sanitary Engineer
86	Electrical Engineer	2	Specification Writer
30	Environmental Engineer	121	Structural Engineer
68	Environmental Scientist	110	Technicians/Analysts
18	Facilities/Maintenance Support	190	Transportation Engineer
54	Foundation/Geotechnical Engineer	56	Water Resource Engineer
1,945 Total			

Gannett Fleming’s quality policy is to “provide professional services that meet the requirements of clients and involve all personnel in continually improving work processes.” As part of that commitment, Gannett Fleming set and successfully achieved its goal of achieving ISO 9001:2008 certification. This internationally-recognized quality certification helps us to conduct our services in a manner consistent with ISO 9001:2008 standards and requirements that enhances our efficiency and effectiveness to provide quality service and deliverables to meet clients’ requirements.

At Gannett Fleming, we believe it is our responsibility to play an active role in sustaining our natural world. We take significant and lasting steps to minimize adverse environmental impacts in our activities and our designs. Being a better steward of

the environment helps preserve our natural resources and provides social and economic benefits for future generations.

Stewardship of our natural resources is everyone's responsibility. A leader in environmental services for more than 60 years, Gannett Fleming is committed to addressing environmental challenges. Services include complete assessments of environmental impacts, appropriate protection and preservation of the natural environment, compliance issues in management systems, wetlands, and solid waste facilities, as well as responsible remediation of soil and groundwater contamination.

Through applying sustainable design practices, we are able to meet the needs of our society, while encouraging water reuse, energy efficiency, and material recycling. Gannett Fleming approaches the complex environmental resources challenges by engaging our multidisciplinary engineering, scientific, and technical capabilities.

1. National Environmental Policy Act (NEPA) Compliance and Documentation

1.1 Environmental Compliance

The NEPA of 1969 established a comprehensive environmental policy for the U.S. This legislation has far-reaching effects on environmental protection and conservation. It also affects the decision-making process of federal agencies and how those decisions affect communities throughout the nation.

NEPA, and its corresponding regulations, require federal agencies to involve the public and other governmental agencies in their decision-making processes and consider and document the ultimate environmental implications of those decisions. The NEPA process is intended to help agencies make decisions based on an understanding of the environmental consequences and to take actions that protect, restore, and enhance the environment.

Gannett Fleming has been a leader and innovator in providing compliance and documentation services in accordance with the NEPA to a variety of federal agencies and state and local partner agencies since the mid-1970s. Since that time, we have continually refined and expanded our capabilities to meet the environmental planning and impact assessment

needs of our clients. We strive not simply to work for, but to work with clients in meeting the procedural requirements and fulfilling NEPA goals and objectives.

Ranging from local improvements to regional and statewide projects, Gannett Fleming has the experience and tools to work for a wide range of agencies and types of projects. Our consistent performance in NEPA compliance and documentation is attributable to the extensive experience of our staff, a thorough understanding of regulatory requirements, and our responsiveness and attention to detail. Gannett Fleming provides a committed and knowledgeable interdisciplinary staff of NEPA compliance and documentation specialists – social scientists, economists, biologists and natural resource specialists, archaeologists, architectural historians, and other technical staff – providing creative approaches to environmental impact assessment combined with public involvement and agency coordination. Our assets are enthusiasm, objectivity, expertise, integrity, experience, and credibility. Our specialty is integrating issues and concerns into practical concurrence-based solutions.

Gannett Fleming project teams are led by specialists with strong backgrounds in environmental compliance and sciences. Our project managers are responsible for ensuring that the quality of each team's services reflects Gannett Fleming's high standards for thorough analysis, pragmatic solutions, and clear presentation. We are skilled at managing knowledgeable Teams through each stage of project development to on-time, on-budget completion.

Our compliance and documentation approach focuses on several key aspects which help to ensure effective and efficient services:

- Development of a thorough understanding of the project and critical issues
- Consideration of opportunities for the integration of agency and public objectives
- Identification of a compatible interdisciplinary project team and required resources
- Flexible and responsive project management

- Emphasis on effective agency and public involvement
- Creative problem solving.

We have prepared environmental impact statements (EISs) and environmental assessments (EAs) for a wide range of major federal actions:

- Highway and bridges
- Transit lines and stations
- Intermodal facilities
- Dams
- Water and wastewater systems and treatment facilities
- Pipelines and stations
- Dredging operations
- International border stations
- Government building and facilities
- Offshore oil and gas drilling
- Mining
- Coastal wetlands restoration.

Each federal agency has its own regulations implementing NEPA and its own unique policies, procedures, and protocols. Our consistent performance in NEPA compliance is directly attributable to the extensive experience of our staff, a thorough understanding of the regulatory framework, and our corporate project management protocols. Each project has its own unique challenges and issues. Our wide-ranging experience cuts across individual agency boundaries and helps us to bring proven solutions and experience to new customers with special circumstances.

Gannett Fleming is also a mission contractor to the U.S. Environmental Protection Agency (U.S. EPA) Office of Federal Activities (OFA). We have provided the OFA with a variety of NEPA compliance and closely related services under mission contracts.

1.2 Experience

1.2.1 Environmental Impact Statement for International Falls Land Port of Entry Improvements Study

Client: U.S. General Services Administration, Region 5

Location: International Falls, Minnesota

Gannett Fleming prepared an environmental impact statement (EIS) for the International Falls Land Port of Entry (LPOE) Improvements Study to assist the U.S. General Services Administration (GSA), Region 5. The EIS provides documentation of the planning and potential environmental impact of replacing the international LPOE in International Falls, Minnesota.

Our firm developed and considered no-build and five-build alternatives for the replacement of the existing LPOE. The selected alternative consists of demolishing the existing facilities and constructing a



Figure 1: The selected alternative consists of demolishing the existing facilities and constructing a new state-of-the-art LPOE on a 15-acre site, southeast of the existing site.

new state-of-the-art LPOE on a 15-acre site, southeast of the existing site. The existing LPOE was deficient in size, layout, and functionality, which prevented Customs and Borders Protection and other federal agencies assigned to the LPOE from adequately fulfilling their respective missions.

Primary environmental issues and concerns assessed within the study, include potential impacts to the Rainy River water quality; affects to historic resources that are potentially eligible for the National Register of Historic Places; and the interruption or loss of revenue to the merchants in the International Falls' central business district, due to the changes in traffic patterns.

Our firm provided environmental planning and documentation services in accordance with the National Environmental Policy Act (NEPA), including the regulations of implementing NEPA, and the GSA's policies and procedures for implementing NEPA. Our firm also provided cost estimates in support of conceptual engineering services provided by others.

The EIS was prepared in a readable and understandable format, with color graphics and illustrations. The attractive, concise, and reader-friendly format of the EIS facilitated a timely and smooth public review process.

1.2.2 Environmental Services and Assessments for U.S. Army Reserve Centers

Client: U.S. Army Corps of Engineers, Louisville District

Location: Nationwide U.S.

In support of the U.S. Army Reserve's Grow the Army initiative, Gannett Fleming served as a major subcontractor providing environmental and NEPA support to the U.S. Army Corps of Engineers (USACE), Louisville District for 26 projects located in 11 states throughout the U.S. The projects entailed new construction of U.S. Army Reserve Centers (ARCs) on sites averaging approximately 15 acres in size and mainly consisting of undeveloped land with some sites located on government property. The environmental

conditions, terrain, and habitat at the sites varied greatly from undeveloped desert land to crop fields, to orange groves, to wooded lands and to former pasture/open fields.

This Statement of Work completed by Gannett Fleming for each site consisted of an Environmental Condition of Property (ECP) report and NEPA compliance. NEPA support services provided by Gannett Fleming included development of site-specific biological evaluations (BEs). BEs were prepared in accordance with provisions of the ESA and consultation with the U.S. Fish and Wildlife Service (USFWS). Development of the BEs involved review of species from a variety of ecological regions, including Central Great Plains, Chihuahuan Desert, Central Plains River Valleys, Appalachian Ridge and Valleys, Southeastern Plains, Southern Coastal Plain, and North Central Hardwood Forests. One of these sites involved seven species listed in the USFWS "Red Book" of threatened or endangered species for which additional survey and coordination is being completed with the USFWS.

1.2.3 U.S. 301 Waldorf Area Transportation Improvements Project Environmental Impact Statement

Client: Maryland State Highway Administration

Location: Maryland

The community of Waldorf, Maryland is facing enormous growth pressure and substantial travel demands along the U.S. 301 corridor southeast of Washington D.C. This 13-mile corridor area lies



Figure 2: The U.S. 301 Waldorf Area Transportation Improvement Project was the recipient of a 2009 Federal Highway Administration (FHWA) Exemplary Ecosystem Initiative Award.

within two of the most ecologically valuable watersheds in the state. The Maryland State Highway Administration turned to Gannett Fleming to facilitate the NEPA compliance process and produce an EIS that addressed significant natural resource and community/business impacts. An environmental stewardship program was also developed to provide local and regional environmental enhancements “above and beyond” those required by compensatory mitigation. This program is envisioned as a pilot for future “mega-projects” to provide needed transportation improvements while contributing to environmental and community sustainability. This project was the recipient of a 2009 FHWA Exemplary Ecosystem Initiative Award.

1.2.4 Technical Document Review-Federal Energy Regulatory Commission (FERC) Relicense

Client: U.S. Environmental Protection Agency
Location: Oregon and California

Gannett Fleming provided assistance and environmental expertise by analyzing PacifiCorp relicensing documents and related agency and stakeholder comments and recommendations. PacifiCorp operates the 151-megawatt Klamath River hydroelectric project and was required to apply for relicensing with the FERC five years before the license expired. The relicensing required a thorough examination of environmental-related



Figure 3: The relicensing required a thorough examination of environmental-related resources to establish a balance between development and non-development values.

resources to establish a balance between development and non-development values. Upon filing the draft license application, a draft EIS (DEIS) would be scoped and produced. The purpose of the technical review was to highlight appropriate issues that the U.S. EPA would ask the applicant to address through the NEPA process.

1.2.5 Office of Federal Activities Mission Support

Client: U.S. Environmental Protection Agency
Location: Nationwide U.S.

Gannett Fleming has been a NEPA contractor for EPA’s Office of Federal Activities since 1997. Through this contract, we have worked with EPA headquarters and regional offices, providing services across the country involving: independent technical reviews in support of the U.S. EPA’s Section 309 Review program; preparation of EA and EIS NEPA documentation for U.S. EPA actions; technical resource assessments and compliance activities relative to other statutes and executive orders; and development of technical guidance materials, manuals, and training materials.

“All of Gannett Fleming’s work products have maintained their high quality professional standards and have always been delivered on time and within budget. There is a professional, effective customer-oriented working relationship with Gannett Fleming.”

- Adolph A. Mozynski, Jr., U.S. EPA Office of Federal Activities, Washington, DC

2. Natural Resources

Gannett Fleming provides natural resource services to federal, state, local, and private clients through our team of environmental scientists, biologists, wetland professionals, and ecologists.

Our professionals are leaders in the identification, delineation, mitigation, and management of Waters of the U.S., including wetlands. Our services are guided by the regulations, policy, and principles of

the 1987 USACE Wetland Delineation Manual, Regional Supplements, the U.S. Department of Agriculture (USDA) Food Security Act Manual, plus federal, state, and local regulations.

Gannett Fleming provides permitting services for projects that involve temporary or permanent impacts to Waters of the U.S., including wetlands. We routinely prepare and submit permit applications to local, state, and USACE offices for review and approval.

We provide wetland planning, research, design, construction observation, and post-construction monitoring for projects that require preservation, enhancement, restoration, and creation of compensatory wetland or watercourse mitigation. Gannett Fleming enjoys a solid reputation for offering innovative and cost-effective solutions for mitigation projects. Our wetland mitigation design and construction services have recently won awards from the Pennsylvania and National Consulting Engineers Council.

Services:

- Amphibian, reptile, avian, bat and other small mammal surveys
- Endangered, threatened and/or rare species surveys, and Section 7 ESA consultation
- Botanical surveys, invasive species surveys, and plant community mapping
- Ecological risk assessments
- Bioassessment of streams using U.S. EPA rapid protocols and state Indexes for Biological Integrity
- Natural channel designs for stream mitigation
- Macroinvertebrate and fish surveys
- Water quality testing, analyses, and reporting
- Wetland identification, delineation and mapping with global positioning system (GPS) and geographic information system (GIS)
- Function and value assessments
- Wetland mitigation (banking, restoration, creation)
- Compensatory mitigation for wetlands and stream impacts, including planning, design,

- construction bid packages, construction management, and post-construction monitoring
- State permitting for National Pollutant Discharge Elimination System (NPDES) compliance and wetlands encroachments
- Federal authorizations for Clean Water Act Sections 401 and 404 compliance
- Local land development planning and compliance permitting
- U.S. Coast Guard permits.

2.1 Experience

2.1.1 Analysis of Hydrology and Riparian Water Use, San Timoteo Creek

Client: U.S. Environmental Protection Agency
Location: Riverside County, California

Gannett Fleming provided assistance and environmental expertise for analyzing hydrological conditions at San Timoteo Creek in support of a non-potable wastewater discharge diversion proposed by Yucaipa Valley Water District. Since the proposed changes to the wastewater system were federally funded, the U.S. EPA and the Yucaipa Valley Water District were required to complete an EIS. The proposed diversion from San Timoteo Creek was analyzed because two federally endangered species, the southwestern willow flycatcher and the Least Bell’s Vireo, were within the riparian vegetation of the creek, which is dependent on a consistent hydrology. The purpose of the hydrologic investigation was to determine the necessary baseline flow needed within the creek to maintain baseline riparian vegetation conditions.

2.1.2 West Chatham County Georgia Advance Identification of Wetlands

Client: U.S. Environmental Protection Agency
Location: Chatham County, Georgia

Gannett Fleming wrote the Technical Summary Document (TSD) for the West Chatham County Advance Identification of Wetlands (WCC ADID). Many wetlands in Chatham County have been lost to increasing development and silvicultural



Figure 4: Gannett Fleming wrote the Technical Summary Document (TSD) for the West Chatham County Advance Identification of Wetlands.

pressures. The purpose of the ADID project was to develop a GIS-based model which could determine those existing wetlands best suited for protection, development, and restoration. The Chatham County-Savannah Metropolitan Planning Commission will use the results for planning future growth options. The U.S. EPA, USFWS, and USDA, Natural Resources Conservation Service (NRCS) collected data and literature for the existing conditions in the project area, which covered approximately 45,000 acres in western Chatham County and our firm compiled the preliminary information into the TSD format. The results indicated that many of the existing “pine flatwoods,” which are used for silvicultural operations, are considered jurisdictional wetlands, and subject to protection under Section 404 of the Clean Water Act.

2.1.3 Cumulative-Effects Analysis DeLong Mountain Terminal Navigation Improvements Project

Client: U.S. Environmental Protection Agency
Location: Kivalina, Alaska

Gannett Fleming prepared a cumulative-effect analysis for the DeLong Mountain Terminal Navigation Improvements near the village of Kivalina along the Chukchi Sea in northwest Alaska. The analysis measured the biological effects on terrestrial and marine species and regional water

and air quality and the cultural and social characteristics of the area. Biological considerations included a study of the range and life-history qualities of more than 30 species of marine mammals, marine fish, marine invertebrates, marine vegetation, anadromous fish, freshwater fish, terrestrial mammals, songbirds, and raptors. Cultural and social considerations involved the analysis of potential collective effects on historic and archaeological resources, Cape Krusenstern National Monument, and subsistence practices associated with native Iñupiat people and the overall study area community. Of greatest interest were potential impacts on beluga whales, bearded seal, caribou, and various marine, anadromous, and freshwater fish species, as cumulative effects on these species were identified as potentially affecting both the biological characteristics of the individual species and their contribution to the subsistence culture and economy of the area.



Figure 5: Gannett Fleming prepared a cumulative-effect analysis for the DeLong Mountain Terminal Navigation Improvements near the village of Kivalina along the Chukchi Sea in northwest Alaska.

2.1.4 Threatened and Endangered Species Investigation

Client: Kentucky Transportation Cabinet

Location: Pulaski and Laurel Counties, Kentucky

Gannett Fleming assisted with field investigations for endangered species within the 150-square-mile corridor of the I-66 project area. A large portion of the project area is within the Daniel Boone National Forest. We performed cliff-line surveys for endangered plant species and unique geologic formations including caves. Additional services included electro-shocking streams to establish the presence/absence of endangered fish species. Two rare fish species captured during the stream investigation included blackside dace (*Phoxinus cumberlandensis*) and olive darters (*Percina squamata*). Due to the abundance of caves and mature forest located within the project area, additional responsibilities included mist-netting for endangered bats. Threatened and endangered bat species captured were the eastern small-footed bat (*Myotis leibii*), gray bat (*Myotis grisescens*) and Rafinesque’s big-eared bat (*Corynorhinus rafinesquii*). Endangered bats were banded and fitted with transmitters to determine the location of roosting sites and maternity colonies.

3. Environmental Site Assessments (ESAs)

Phase I and Phase II ESAs are a critical component for establishing necessary baseline environmental data used in formulating sound investment decisions with regard to either the financing or the acquisition of commercial, industrial, and undeveloped properties.

We have conducted thousands of ESAs nationwide at sites ranging from small, undeveloped lots to large industrial facilities. Our team of environmental professionals meet the standards of U.S. EPA and Practices for AAI Final Rule (40 CFR Part 312) and the updated American Society for Testing and Materials (ASTM) E1527-05 standard). Services include:

- Phase I and Phase II ESAs, sampling, and characterizations
- Contaminant sampling – groundwater, surface water, soil, biotic, air
- Human health and ecological risk assessments
- Site remediation feasibility studies
- Remediation/remedial action alternatives identification, evaluation, and selection
- Remedial action plan preparation and design
- Oversight/monitoring of site remediation or remedial actions for regulatory compliance.

3.1 Experience

3.1.1 Brownfields Redevelopment Project - Phase I and II ESA and Feasibility Study

Client: Augusta-Richmond County

Location: Augusta, Georgia

Gannett Fleming conducted the Phase I and II ESAs and prepared a feasibility study that presented the magnitude of site contamination at this abandoned metal scrap yard and options for future site use along with estimated costs to clean up the property. The feasibility study consisted of a risk assessment that considered a risk-based cleanup approach. A site-specific Quality Assurance Project Plan, Sampling and Analysis Plan, and Health and Safety Plan were completed to meet U.S. EPA Region 4 standards.



Figure 6: The Augusta-Richmond County feasibility study consisted of a risk assessment that considered a risk-based cleanup approach.

3.1.2 The Place at Channelside Brownfields Site, Environmental Site Assessments, Phase I and II

Client: Key Developers Group

Location: Tampa, Florida

Gannett Fleming was retained by the former owner and developer of the property, Key Developers Group, to assess the environmental impacts to soil and groundwater on the property (approximately 1-acre), to determine the cost of site remediation and design a Remedial Action Plan (RAP) to remediate site impacts and bring the site to closure. The developer had a very short time frame to complete the site assessment and cleanup due to an accelerated construction schedule. We reviewed technical documents from previous clients describing investigations conducted at the site and on adjacent properties. A Phase I ESA and Phase II ESA had been completed for the subject property. The Phase II included a limited soil and groundwater investigation which revealed the presence of chlorinated solvents. A review of historical documents indicated the presence of a rail spur through the property, which would indicate the potential for other environmental impacts. We designed a soil and groundwater investigation to assess the vertical and horizontal extent of chlorinated solvents and potential impacts of petroleum hydrocarbons and arsenic. Due to the location (historical downtown Tampa) and nature of the property, our firm entered the site into the Florida Brownfield Program.



Figure 7: Finished construction at the Place at Channelside

12-1927Q

3.1.3 Phases I and II Environmental Site Assessment in Silver Lake

Client: Planet Home Living

Location: Los Angeles, California

Gannett Fleming performed a combined Phase I and II ESA for a vacant 3.06-acre greenfield property targeted for residential development. The property is located within the Silver Lake area of Los Angeles, California.

Existing reports identified that the property had been historically used by the California Department of Transportation as a staging area during construction of S.R. 2, the Glendale Freeway. Our firm identified a 2006 geologic and soils investigation report, indicating that debris, concrete pieces, trash, and fill materials of unknown origin had been dumped at the site.

Based on these findings, our firm recommended and performed a limited subsurface investigation to further research whether the historical activities had resulted in potential environmental impacts at the site. The results of the investigation suggested that the fill materials were limited in their lateral and vertical extent and did not appear to contain hazardous substances above regulatory action levels.

As a result of our firm's findings, the client was able to complete the property purchase. The property is currently going through the entitlement process for a new luxury-home community.

4. Cultural Resources Management

Our firm offers a full range of cultural resources management services for projects requiring compliance with Section 106 of the National Historic Preservation Act (NHPA), as well as additional federal, state, and local municipal regulations relating to historic preservation.

Our services for archaeology and historic structures include preliminary assessments and survey (Phase I), evaluation according to National Register of

Historic Places criteria (Phase II), and mitigation measures, including archaeological data recovery and Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER) recording (Phase III). Gannett Fleming works closely with clients, state historic preservation officers (SHPO), local historical commissions, and other agencies to ensure that preservation and economic considerations, such as project design and avoidance measures, are properly addressed.

Services provided include:

- Prehistoric and historic archeological survey, Phases I, II, and III
- Historic structures surveys and evaluations
- Section 106 NHPA facilitation with SHPO and advisory council
- Photography and scale-drawing documentation
- Geomorphology and soils analyses
- Public presentations
- Innovative mitigation strategies.

4.1 Experience

4.1.1 New Jersey Route 29 Freeway Section 10C and 11B Environmental Services

Client: New Jersey Department of Transportation

Location: New Jersey

This project entailed archaeological data recovery and monitoring of 15 historic and prehistoric resources. Six prehistoric site areas and an 18th- and early 19th-century site containing two house foundations underwent full data recovery in a field effort that spanned 14 months. The project included a public outreach program of school tours, an open house, and the participation of two Boy Scouts earning merit badges in archaeology. A series of non-technical reports were developed for distribution to the surrounding community and interested individuals based on the results of this project and other work conducted in the vicinity. The proposed project was on an accelerated schedule that required simultaneous excavation and construction monitoring. The project increased the knowledge and understanding of the prehistoric



Figure 8: The New Jersey Route 29 project entailed archaeological data recovery and monitoring of 15 historic and prehistoric resources.

and early historic populations, as well as the 19th- and 20th-century industries.

4.1.2 Cemetery Investigation for Water Treatment Plant Expansions

Client: Appomattox River Water Authority

Location: Chesterfield County, Virginia

Gannett Fleming conducted an investigation, recovery, and reburial of an unmarked cemetery that was to be impacted by the expansion of a water treatment plant. Under a tight construction schedule, the project entailed the delineation and investigation of a forgotten cemetery containing 95 graves. An archaeological excavation assessed the remains and determined their affiliation in conjunction with historical research. The investigation evaluated the site's National Register eligibility. Public notification and consultation with the Virginia Department of Historic Resources was required to secure an excavation permit for the removal and reburial of the remains in a local cemetery by a licensed mortician.



Figure 9: Gannett Fleming conducted an investigation, recovery, and reburial of an unmarked cemetery that was to be impacted by the expansion of a water treatment plant.

4.1.3 Route 18, Sections 2F, 7E, and 11H Cultural Resource Investigations

Client: New Jersey Department of Transportation

Location: Middlesex County, New Jersey

Our qualified staff performed historic architectural and archaeological surveys and provided recommendations of National Register eligibility and project effect findings. Reports were prepared as technical environmental studies in support of an EA required for the project. The project corridor included the Delaware and Raritan Canal outlet lock and the Thomas I. Agnew House, which are both listed on the National Register of Historic Places. This project resulted in a New Jersey Historic Preservation Office opinion of eligibility for the New Jersey College for Women Historic District and the archaeological site (28-Mi-213). Extensive public involvement, that included workshops to present findings and to generate feedback, was a key aspect of the project. Our firm was responsible for drafting the Memorandum of Agreement necessary due to project impacts on significant resources.

5. Environmental Management Systems (EMS)

Gannett Fleming’s dedicated staff has been providing EMS services since before the ISO 14001 standard was first finalized in 1996. In addition to

our consulting services, our understanding of management system concepts and techniques is bolstered through maintaining EMS auditor certification with the Registrar Accreditation Board Quality Systems Assurance (RABQSA).

In support of our EMS services, we have developed two web-based tools to assist with administration of environmental management programs – E2MS and WebMetrics. These tools are designed to assist organizations in: collecting, organizing, and managing EMS data; achieving and improving sustainable environmental performance; exceeding environmental regulations and management system standards; and obtaining ISO 14001 certification.

Implementation Services:

- ISO 14001 consulting
- System planning and development
- Gap analysis
- Aspects analysis
- Procedures preparation
- Auditing
- Corrective action support.

Training:

- Introductory overviews
- Internal auditing
- Aspects analysis
- Customized programs.

EMS Support Services:

- Pollution prevention (P2) programs
- Environmental performance evaluations (EPE) programs
- Information management systems
- Environmental health and safety (EH&S) system integration.

5.1 Experience

5.1.1 WebEMS Customization and Implementation

Client: U.S. Department of Transportation, Maritime Administration (MARAD)

Location: Various Locations

Gannett Fleming assisted MARAD with full EMS implementation and compliance program development for its headquarters, reserve fleets, fire training center, and the U.S. Merchant Marine Academy, located at six facilities across the United States. Our firm developed this software internally, which is based on ISO 14001 requirements. Since it is web-enabled, personnel from MARAD headquarters and other facilities can upload, view, track, and update progress in meeting key EMS requirements.

5.1.2 EMS Audits

Client: Lloyd's Register Quality Assurance (LRQA)

Location: Nationwide

Gannett Fleming provides EMS auditing for LRQA, which is an ISO 14001 registrar accredited to issue ISO 14001 certificates. LRQA retained our firm on an open-end contract basis to act as a contract auditor on several certification audits throughout the United States.

5.1.3 EMS Support Services

Client: Waste Management, Inc.

Location: Pennsylvania, Virginia, and California

Our firm helped Waste Management, Inc. develop and implement EMSs at several of their solid waste management facilities. Our approach consisted of developing a common EMS template based on Waste Management's existing environmental best management practices. The EMS was deployed to each facility, resulting in an EMS with a common framework regardless of the location. However, the EMS reflects the characteristics of each site based on its environmental risks, regulatory requirements, and management structure. Using this approach, several landfills in Pennsylvania have been certified

to the ISO 14001 standard. We have also implemented an ISO 14001-conformant EMS at five landfills in Virginia. These facilities are pursuing or have attained Exemplary Environmental Enterprise status under the Virginia Environmental Excellence Program.

5.1.4 EMS Implementation

Client: Novozymes Biologicals, Incorporated

Location: Salem, Virginia

Our firm performed an initial EMS gap analysis and implementation plan, assisted in the identification and development of significant environmental aspects, developed EMS documentation for both ISO 14001 and corporate EMS requirements, provided EMS auditor training for the EMS audit team, and assisted in the development of corrective actions. We performed a multimedia environmental compliance audit with key liabilities related to wastewater, waste management, air permitting, chemical inventory and reporting, hazardous materials, stormwater, and spill prevention. We researched regulatory requirements related to client operations at the local, state and federal level. Our firm debriefed the client on the audit results and prepared a report with the results and recommendations.

6. Waste Management Consulting Services

Gannett Fleming provides expertise for solid waste management planning and recycling projects for both governmental and corporate clients. Our staff includes Leadership in Energy and Environmental Design® (LEED) Accredited Professionals and Senior Certified Recycling Professionals.

Services:

- Waste and recycling program evaluation, audits, and implementation
- Waste, recycling, and organics bid specifications development

- Feasibility and site selection studies of municipal waste transfer and processing facilities
- Waste hauling collection and processing equipment
- GIS routing analysis
- Design and permitting of waste, recycling, and organics transfer and processing facilities
- Management, staff utilization, operations, and fiscal improvement analyses
- LEED green building design specifications and certifications
- Sustainability analysis and plan development.

6.1 Experience

6.1.1 Recycling Program Sustainability Plan

Client: Clinton County Solid Waste Authority
Location: Clinton County, Pennsylvania

Gannett Fleming developed a Countywide Sustainability Plan evaluating the economic, environmental, and social aspects of the County's solid waste and recycling program. Work included an analysis of curbside and drop-off recycling programs, economic projections and benefits using the Northeast Recycling Council Benefit Calculator, and analysis of the waste stream. The plan recommended strategies for increasing revenues, decreasing costs, increasing recycling, and decreasing wastes.

6.1.2 Integrated Solid Waste Management Program

Client: Montgomery County Department of Public Works and Transportation
Location: Montgomery County, Maryland

Gannett Fleming is providing on-call solid waste engineering services for a variety of projects involving: quarterly solid waste sampling and statistical analysis at waste transfer facilities, individual business waste audits to support and provide analysis for recycling operations, and design of improvements at solid waste convenience centers. Specific projects include the Quarterly

Municipal Solid Waste Sampling and Analysis. This task involved a quarterly waste characterization study of municipal solid waste delivered to the Montgomery County Solid Waste Transfer Station. By sampling and sorting a representative number of single-family residential, multi-family residential, and nonresidential loads, the Division of Solid Waste Services can gain insight into the composition of each of these waste-generating sectors. The project included elements such as business waste audits where we worked closely with County staff to identify five target businesses at which to conduct waste audits and Damascus Highway Shop/Convenience Center improvements. Our firm evaluated a heavy traffic problem which caused safety hazards and developed the preliminary design for a rear entrance to the depot by building an entrance ramp on a parcel of Washington Suburban Sanitary Commission property that borders the depot.

6.1.3 Recycling Database Development

Client: Munhall Borough
Location: Munhall Borough, Pennsylvania

The Munhall Borough database development project was completed as part of the Solid Waste Association of North America (SWANA) recycling technical assistance program. The program includes the Pennsylvania Department of Environmental Protection (PADEP), the Governor's Center for Local Government Services, and the Pennsylvania State Association of Township Supervisors and benefits Pennsylvania local governments interested in achieving higher recycling rates. Gannett Fleming has completed nearly 50 SWANA recycling projects under this program. Some resulting database special features include: residential and commercial recycling tonnages, tracking/performing specific tasks associated with implementing their recyclables program, and generation and partial completion of the Annual Commercial Recycling Report.

6.1.4 Waste Generation and Capacity Needs Study Waste Diversion/Recycling Enhancement

Client: York County Solid Waste Authority

Location: York County, Pennsylvania

Gannett Fleming evaluated several different databases of historical waste generation and disposal data in York County, and merged this with population data and projections to create a comprehensive picture of historical and future waste generation characteristics in York County. Data from the PADEP, the York County Solid Waste Authority, and the York County Planning Commission were evaluated on waste composition and recycling. Over 30 recycling strategies were examined for potential application to divert additional waste from the waste-to-energy (WTE) facility and prolong the time period that the current WTE can handle all County processible waste without diversion to landfill. Five recycling strategies were developed in detail for possible implementation by the Authority and the County's 72 municipalities responsible for recycling. Those five strategies included "standardization, commercial sector targeting, leaves and yard waste diversions, recycling bin size, and enhanced recycling incentives." Implementation of these five strategies could realistically increase pre-incineration recycling diversions from 20% to 35%. Gannett Fleming recommended a five-year phased implementation period for full implementation of selected recycling strategies.

1. Wetland Management

Gannett Fleming is a leader in the identification, delineation, restoration, and management of wetlands. We provide a range of wetland management services required by a wide variety of clients including transportation, utilities, and the private sector. Proper identification and delineation of wetlands and their boundaries are key to successfully completing a proposed project that involves wetland impacts. Our staff includes several environmental scientists and biologists who are conditionally certified to delineate wetlands by the USACE, Baltimore District. We routinely request and obtain Jurisdictional Determinations from the appropriate state environmental agency and the USACE for larger projects.

Our firm assesses key functions and values using WET 2.0, Hydrogeomorphic methods, and the New England Method. We use backpack-mounted GPS to survey and map wetland boundaries and other Waters of the U.S. for many projects. Gannett Fleming provides full permitting services for projects that involve wetland encroachments and impacts. We routinely prepare and submit permit applications to local, state, and USACE offices for review and approval.

Gannett Fleming provides wetland preservation, enhancement, restoration, and creation services for those projects that require some form of compensatory wetland mitigation. Although we prefer to avoid and minimize wetland impacts during project planning and design, some impacts are unavoidable and require compensation. Gannett Fleming enjoys a solid reputation for offering innovative and cost-effective solutions for difficult mitigation projects. Our wetlands mitigation design and construction services have recently won awards from the Pennsylvania and National Consulting Engineers Council.

1.1 Wetland Services and Tools

- Global positioning systems
- Function and value assessments
- Jurisdictional determinations
- Identification and delineation training programs
- Nationwide, programmatic and individual permits
- Mitigation planning and design
- Wetland enhancement, restoration, and creation
- Construction bid packages production
- Post-construction monitoring and reporting
- Agency negotiation and coordination.

1.2 Experience

1.2.1 Constructed Wetlands

Client: Murphy Oil, USA, Inc.

Location: Superior, Wisconsin

Gannett Fleming provided design and construction oversight services for a constructed wetlands project. Our office interfaced with several regulatory agencies, including the Wisconsin Department of Natural Resources (WDNR), the City of Superior, and the USACE (Two Harbors, Minnesota office) to obtain all the necessary permits for the project. The constructed wetlands polish effluent from the refinery's wastewater treatment plant before it flows into a nearby creek.

- Two, 100-foot-wide by 300-foot-long wetland treatment cells plumbed in parallel
- A flow diversion manhole to permit the operators to bypass the wetlands
- A flow-splitting structure to divert equal volumes of water to each wetland cell
- Effluent level control structures
- Appurtenant wastewater piping.

Each wetland cell was planted with non-invasive cattails, seeded with a WDNR-approved wetlands seed mix, and has an aggregate filtration strip for solids removal. Effluent from the wetland cells is routed to and metered by an existing effluent monitoring station, which reduced project costs. The

design also included new swales for rerouting storm water flow around the wetland cells.

1.2.2 Wetland Mitigation- Phase I

Client: The Clearfield Foundation

Location: Benezetette Township, Elk County, Pennsylvania

Gannett Fleming conducted a site survey, wetland delineation, obtained NPDES permitting, developed an erosion and sedimentation pollution control plan, and provided design and layout services for this ecological remediation construction project. Additionally, our firm coordinated with the Pennsylvania Department of Conservation and Natural Resources to develop an extensive vegetation plan that provided ecological and wildlife benefits to the area.

Prior to the completion of this project, the site was a mix of emergent wetlands and uplands with scattered trees and shrubs. Our firm’s task was to create approximately 14 acres of wetlands, compensating for past impacts from previous development projects, which would enhance the existing quality of the project site. Services provided included:

- Site survey
- Wetland delineation
- Site grading plan design
- NPDES permit preparation, including erosion and sedimentation control plan



Figure 1: Existing Site

12-1927Q

- Extensive vegetation plan
- Construction specifications and contract bid documents preparation.

2. Site Remediation

We have a strong knowledge and understanding of remediation technologies combined with experience negotiating with regulatory agencies to achieve site closure. We serve as a client advocate meeting short- and long-term environmental and economic objectives.

Gannett Fleming’s depth and diversity of capabilities and experience allows us to assemble a high-caliber project team, which is supported by a network of experts working day to day on a wide variety of environmental remediation/oversight projects. The benefits of this system include:

- Management capability to match staff knowledge to specific project requirements
- National clearinghouse of information, both regulatory and technical, available internally for clients
- Hands-on experience on more than 30,000 projects.

Gannett Fleming has provided oversight and inspection for remediation projects valued in the billions of dollars. We have completed remedial design projects involving soil removal/groundwater pump-and-treat technologies, multi-phase extraction, biological and chemical treatment, and innovative in situ technologies including on-going operation and maintenance (O&M). Our experts select the technology based on the site geology and level of contamination.

2.1 Investigation and Remediation Approach

The initial step in effective management of a contaminated site is understanding the nature and extent of the contamination. Hydrologic studies, soil boring investigations, soil vapor studies, evaluation of remedial options, and human health and ecological risk assessments are vital inputs for the

design, construction, and implementation phases that follow.

Gannett Fleming assesses the feasibility and cost-effectiveness of various remedial strategies through remedial alternatives evaluation, pilot studies, in situ groundwater monitoring analysis, and soil remediation.

The construction and observation phase includes installation of recovery wells, treatment, and disposal; installation of monitoring systems; and implementation of in situ remediation systems. This phase also entails shop drawing review, construction inspection, scheduling, and evaluating contractor change orders and claims.

Our firm provides system start-up and shake-down, O&M manual preparation, collection and interpretation of data for system performance, and on-site O&M. We believe that during this period it is critical to assess monitoring data and determine if remedial goals are being met and make necessary adjustments to assure maximum performance.

Gannett Fleming provides system design and O&M, recovery system parameters and contaminant concentration for soil, groundwater, and vapor.

Our goal is to utilize leading-edge technology. To achieve direct environmental and economic benefits for our clients, we employ our greatest strength – our creativity – in addressing complex environmental remediation and compliance issues. We are continually developing and implementing new techniques.

2.2 Remediation Techniques

Gannett Fleming considers the expected life-cycle of the overall project and develops a practical, site-specific remedial approach that achieves client environmental objectives in the most cost-effective manner. As part of a life-cycle approach, we utilize specialized expertise to determine whether or not a particular in situ technology is applicable for a given site.

If appropriate, we conduct a pilot test to provide the site-specific data for the full-scale system design and implementation. Gannett Fleming is successful in recognizing and overcoming costly effects that a specific hydrogeologic environment could have when applying a given remedial technology.

2.3 Soil Vapor Extraction (SVE)

A typical SVE system couples vapor extraction wells with blowers or vacuum pumps to remove vapors from the vadose zone, thus reducing residual levels of soil contaminants. By applying a vacuum and removing vapors from extraction wells, vapor flow through the unsaturated soil zone is induced. Contaminants volatilized from the soil matrix are captured by airflow to extraction wells or trenches. An above-ground treatment system then condenses, adsorbs, or incinerates the vapors. In some cases, vapors can be emitted to the atmosphere through diffuser stacks.

Gannett Fleming has employed the SVE technology at many different sites to provide remediation of petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), organic compounds, and hydrogen sulfide in the subsurface media. We have performed numerous investigations concerning the evaluation, testing, and installation of pilot and full-scale SVE systems.



Figure 2: A typical SVE system couples vapor extraction wells with blowers or vacuum pumps to remove vapors from the vadose zone, thus reducing residual levels of soil contaminants.

Determining whether or not the SVE technology is applicable at a given site and then designing, operating, and maintaining a site-specific SVE system can be quite challenging. Gannett Fleming commonly utilizes a computer-aided design (CAD) software package to assist our remediation engineers in accomplishing state-of-the-art SVE design.

2.4 Vacuum-Enhanced Recovery (VER)

VER (also known as “bio-slurping”) is the application of a vacuum, or negative pressure, to a well and formation in order to enhance the liquid yield of that well by increasing the total net drawdown. VER also increases the mass removal of the contaminants because, by lowering the water table, resultant air movement increases volatilization and biodegradation in the vadose zone. VER systems can be applied to achieve several remedial goals:

- Enhance the overall recovery of liquid contaminants, especially under low yield conditions
- Dewater contaminated zones and then use the vacuum to move air through the formation to volatilize or biodegrade the residuals in soil
- Remove liquid contaminants and volatilize or biodegrade the residuals in soil.



Figure 3: VER (also known as “bio-slurping”) is the application of a vacuum, or negative pressure, to a well and formation in order to enhance the liquid yield of that well by increasing the total net drawdown.

The use of VER systems on environmental remediation projects involves a modification to the approach used in classic dewatering systems. VER has been used as a standard approach toward dewatering and stabilizing low permeability aquifers, increasing the speed of dewatering more permeable aquifers, and enhancing oil recovery.

The basic premise behind pumping wells is that the withdrawal of groundwater from a central point causes a decline in the groundwater levels within the vicinity of the well (cone of depression) which induces groundwater flow toward the well. The area within which all of the water flows to the extraction point or well is referred to as the capture zone. The capture zone determines the area that will be contained and/or remediated by a given extraction system.

VER techniques are beneficial to remedial efforts in hydrogeologic environments exhibiting low transmissivities, which result from either a thin saturated thickness or low permeability that prevents the formation of a significant capture zone. As a result, the number of wells required to contain or remediate an area is large. The purpose for VER is to increase the drawdown beyond the saturated thickness by using a vacuum so that the discharge and the capture zone can be increased beyond that which can be achieved by pumping alone. The extraction of air due to the applied vacuum in the de-watered zone enhances the rate of natural biodegradation and volatilization of the constituents.

2.5 In Situ Air Sparging (AS)/ Biosparging

In situ AS is an appealing remedial option when volatile or easily biodegradable organic contaminants are present in the groundwater. The in situ AS process can be defined as the injection of compressed air at controlled pressures and volumes in the groundwater table below the deepest known point of contamination.

In situ AS is often used in conjunction with vacuum extraction systems to remove the stripped



Figure 4: In situ AS is often used in conjunction with vacuum extraction systems to remove the stripped contaminants and has broad appeal due to its simplicity and low costs.

contaminants and has broad appeal due to its simplicity and low costs. The concept of the process has attracted the attention of many and has the potential of being perceived as the “cure-all” for remediating all the sites with dissolved VOCs in groundwater. The difficulties encountered in modeling the multi-phase AS process have caused this technology to be dependent on empirical information for the engineering design of these systems. The controversy as to whether the injected air travels in the form of bubbles or as discrete air channels has added to the confusion in designing these systems. It is just as important to know “what not to do” as it is to know “what to do” when designing this technology.

We have designed and/or implemented both pilot- and full-scale AS systems in conjunction with SVE. In addition, we offer the expertise of engineers and scientists with direct experience in the successful design, installation, and O&M of sparging systems.

A primary feature that distinguishes Gannett Fleming within the environmental engineering field in utilizing the sparging technology involves our integration of specialized hydrogeologic expertise into remediation system design. As a result of our specialized knowledge and understanding of the potential impacts of hydrogeology on remedial systems, our team of experts has successfully developed modifications to the air sparging

technology to overcome geologic and hydrogeologic limitations of the technology.

2.6 In Situ Air Permeable Reactive Zones

Contaminated groundwater has been managed by conventional pump-and-treat programs which often require long-term system operation, are expensive to operate and maintain, and rarely are effective in meeting stringent groundwater cleanup objectives. These particulars are especially true for groundwater contamination problems involving dissolved heavy metals.

In situ permeable reactive walls and zones are emerging technologies that have been evaluated, developed, and implemented within the last few years. These technologies are gaining widespread attention due to the increasing recognition of the limitations of pump-and-treat systems and the ability to implement most of the treatment processes used in an above-ground system in an in situ environment.

Advantages of using an in situ permeable reactive zone to address the remediation of groundwater include:

- Inexpensive installation and operation costs
- Inexpensive infrastructure costs
- No disposal of water/wastes
- An unobtrusive system
- Deep-site remediation (if needed).

Groundwater contaminant plumes that are dispersed and located at significant depths are difficult to remediate with pump-and-treat methods. When dealing with inorganic contaminants, the required process sequence to remove the dissolved heavy metals present in the groundwater becomes very complex and costly. The disposal of the metallic sludge, in many cases as a hazardous waste, is also very cost prohibitive. In situ treatment methods that are capable of achieving the same mass removal reactions in an in situ environment are evolving and gaining prominence in the remediation industry.

The concept of in situ permeable reactive zones is based on the creation of a subsurface zone, where migrating contaminants are intercepted and permanently immobilized or degraded into harmless end products. The successful design of these reactive zones requires the ability to engineer two sets of reactions between the injected reagents and: the migrating contaminants; and, the subsurface environment to manipulate the biogeochemistry to optimize the required reactions, in order to effect remediation.

2.7 Enhanced Reductive Dechlorination (ERD)

ERD is intended to facilitate and expedite the biological reductive dechlorination of contaminants. This technology stimulates indigenous microbiological organisms through the engineered addition of electron donors, which contain degradable organic carbon sources.

The general mechanism behind the application of ERD technology relies on enhancing or inducing bioremediation through periodic subsurface injection of a soluble electron donor solution (typically comprised of a carbohydrate such as nano iron, cheese whey, high fructose corn syrup, lactate, butyrate, or benzoate). Through periodic subsurface substrate injection, the ERD technology alters existing aerobic or mildly anoxic aquifers to anaerobic, microbiologically diverse, reactive treatment zones. Within such zones, conditions are conducive for the bioremediation of contaminants.

ERD can be an effective method for degrading various chlorinated solvents dissolved in groundwater chloroethenes, chloroethanes, and chloromethanes.

2.8 Monitored Natural Attenuation (MNA)

The best remedial system may be no system. Many factors influence the migration and control of groundwater plumes. When biodegradable organics are present, naturally-occurring biogeochemical reactions should be taken into account in designing

a remediation system. Biogeochemical reactions may be occurring at the same rate as other factors (such as diffusion) which are releasing the contaminants to the groundwater, thus resulting in MNA and some degree of control of the contaminant plume.

MNA can be an integral part of a remediation strategy. Natural attenuation can be applied to remediate hydrocarbons, chlorinated organics, and metals. Remedial approaches involving natural processes include:

- Monitoring-only approach.
- **“Hot-Spot” Remediation** – Remove higher concentrations of contaminants and use natural attenuation to remediate the lower contaminant levels.
- **Limited Intervention** – Assist/enhance natural attenuation processes by integrating biosparging, and organic addition.
- **Active Remedial Systems** – Use MNA to support decisions to halt active remedial system, such as pump-and-treat.

The key to determining MNA effectiveness is to interpret the differences in biogeochemical parameters between impacted and non-impacted unsaturated and saturated zones. Gannett Fleming is experienced in using the several techniques to demonstrate MNA presence:

- **Microbial Enumeration** – Perform population estimates by using laboratory techniques, respirometry.
- **Specific Degraders** – Determine whether part of the natural population has adapted to degrade the contaminants of concern.
- **Inorganic Carbon** – Confirm mineralization, fate of contaminants, and/or production of by-products via analysis of dissolved gases in groundwater.
- **Biomodeling** – Utilize modeling techniques to integrate the biological processes (both aerobic and anaerobic) into fate and transport of contaminants.

2.9 Innovative Approaches

Gannett Fleming performs site investigation and remediation for industrial and commercial sites, brownfields, facility compliance, and facility closures. We utilize a variety of innovative, remedial-focused investigation and cleanup strategies to achieve our clients' site-specific environmental and financial goals. Our clients have benefited from substantial cost savings due to our extensive knowledge and experience in providing tailored and cost-effective remedial solutions. Clients demand and deserve the best possible solutions to their complex project challenges. Our proven technologies go beyond expectations.

2.9.1 Continuous Multichannel Tubing (CMT®)

Our firm utilizes CMT® to provide a simple, low cost method for installing up to seven discrete depth screened intervals not piezometers in the same borehole. CMT® provides detailed 3-D water level and water quality data, allowing zones of high concentrations to be identified quickly and with less risk of "missing" small, preferential pathways that may not be detected with traditional wells with longer well screens.

2.9.2 Micro-Wells

Our firm has installed micro-wells at sites to achieve cost savings versus traditional larger wells. These wells are smaller in diameter (0.75-inch to 1-inch) than conventional 2-inch diameter wells and can be installed rapidly using a Geoprobe® rig at low cost. These wells can be made temporary or permanent and can be sampled using several standard groundwater sampling methods.

2.9.3 Horizontal Wells

Gannett Fleming utilizes horizontal wells to recover and control groundwater or as a sparging/SVE system. The implementation of horizontal wells is usually preferred under building foundations and other inaccessible areas where vertical drilling is not possible.

2.9.4 Hydraulic/Pneumatic Fracturing

Hydraulic and pneumatic fracturing technologies are now being used for the in situ treatment of contaminant-impacted sediments. Fracturing techniques can effectively increase the flow of vapors and liquids through low permeable formations, reduce remediation time requirements, extend the applicability of in-situ technologies to a low permeable environment, and deliver supplements to a fractured formation.

Hydraulic and pneumatic fracturing are techniques originally employed by the mineral development industry and date back as early as the 1940s. As for the environmental industry, the technologies were developed to accelerate the recovery of the target compound. Both technologies require fluid injection at a rate and pressure which exceed the in situ stresses of the sediments at flows exceeding the permeability in the geologic formation.

Hydraulic fracturing employs water or other incompressible fluids to propagate fractures. A low-pressure guar gum and sand mixture is used as a "propping" agent to maintain fractures. Pneumatic fracturing relies on high pressure air (or other compressed gas) flow rates. Propping agents are not used.



Figure 5: Hydraulic and pneumatic fracturing technologies are now being used for the in situ treatment of contaminant-impacted sediments.

Based on testing to date, fracturing has been found to improve vapor permeabilities by 3 to 1,000 times. For sites where fracturing was found to be a viable alternative, radial influences are reported at 10 to 25 feet from the point of fluid injection. Fracturing technologies are applicable for the following types of environments:

- Over-consolidated sediments
- Rock formations
- Saturated and unsaturated formations.

Gannett Fleming used pneumatic fracturing to increase the permeability of a tight formation and injected a mixture of carbon substrates and nanoscale, zero-valent iron to treat a trichloroethylene (TCE) source area located under an existing building. Groundwater samples collected from two wells located 20 to 30 feet downgradient of the former source area showed a 99 percent reduction of TCE from 6 to 8 weeks after injections.

2.9.5 In Situ Chemical Oxidation

Our firm has used several types of chemical oxidation compounds including potassium permanganate, hydrogen peroxide mixtures, and Fenton's Reagent at industrial sites to cost-effectively treat petroleum and chlorinated hydrocarbon-affected soils and groundwater and significantly reduce contaminant mass. Remedial goals can be achieved much faster using oxidation in lieu of bioremediation, but it is not applicable to all sites or contaminants.

2.9.6 Phytoremediation

Phytoremediation, or vegetative remediation, is a technology that has proven to be effective in numerous full- and pilot-scale studies for in situ treatment of soil and groundwater. The technology utilizes plant species to accumulate or break down organic and inorganic contaminants through natural biochemical processes. Many inorganic compounds that are environmental contaminants are vital plant nutrients used for growth and development by the vegetation. These nutrients are absorbed by the root system from the surrounding soil and groundwater

media. In phytoremediation, contaminants are treated by bioremediation in an environment conducive to biodegradation in the root zone, contaminants metabolized or transferred by vegetation, or contaminants bioaccumulated in the plant tissues. The application of phytoremediation incorporates tree or plant species to optimize conditions for contaminant breakdown.

Plant tissues can bioaccumulate heavy metals and metabolize organic compounds. Moderately hydrophobic contaminants – which include benzene, toluene, ethylbenzene, xylene (BTEX) compounds; chlorinated solvents; nitrotoluene ammunition wastes; and excess nutrients, such as nitrate, ammonium, and phosphate – are readily addressed by phytoremediation.

Phytoremediation is often used in conjunction with other remedial technologies. Advantages of using phytoremediation as an alternative remedial approach or as part of a life cycle remedial action include:

- Provides a low-cost alternative
- Reduces potential for transfer of contaminants from existing medium to another because of minor disturbance to the site
- Creates an aerobic environment
- Controls migration of contaminants plume
- Provides a “polishing” step to cleanup site after implementing removal measures
- Creates cultivated vegetation for aesthetically pleasing view
- Provides a “low profile” alternative
- Creates a desirable habitat for wildlife.

2.9.7 On-Site Soil Treatment Biopiles

We have constructed on-site treatment biopiles to successfully bioremediate soil to state clean-up standards more cost-effectively than disposal or other options. We recently treated 2,000 cubic yards of petroleum-contaminated soil using a combination of chemical oxidation treatment with hydrogen peroxide and soil pile bioventing. Significant cost savings were achieved versus landfilling.

2.10 Experience

2.10.1 Underground Storage Tank Removal

Client: Allied Systems Holdings, Inc.

Location: Janesville, Wisconsin

Gannett Fleming provided environmental consulting services for the removal and disposal of a 20,000-gallon underground storage tank (UST), which formerly contained diesel fuel. Our firm coordinated the field work with the tank remover and the site contact; documented the work of the tank remover; collected soil samples under the UST, piping runs, and dispensers per Department of Commerce (Commerce) "Tank Closure Assessment" requirements; sent the collected soil samples for analysis for diesel range organics and petroleum volatile organics; completed the appropriate forms; and prepared a site assessment report for submittal to Commerce and the WDNR.

2.10.2 Emergency Petroleum-Spill Cleanup

Client: Confidential

Location: New Smyrna Beach, Florida

Gannett Fleming initiated field response activities, which included a soil excavation and field screening, after a diesel fuel/water mix splashed from an aboveground storage vessel during its relocation. The mixture was released onto the sand above the high tide mark near the line of former primary dunes at the Hiles Road Beach access ramp in New Smyrna Beach. The release was reported to the Florida Department of Environmental Protection (FDEP) Bureau of Emergency Response (BER). The screening and sampling activities were conducted according to FDEP standard operating procedures.

Soils within the identified discharge area were excavated to a depth of about two to four feet below land surface. Because of the environmentally sensitive location in which the release occurred, both BER and FDEP's Sea Turtle Monitoring Division were present during the cleanup.

The initial soil screening for the excavation was based upon the olfactory senses of FDEP and our



Figure 6: Gannett Fleming initiated field response activities, which included a soil excavation and field screening, after a diesel fuel/water mix splashed from an aboveground storage vessel during its relocation.

firm's personnel, and the results were obtained using an organic vapor analyzer (OVA) equipped with a flame ionization detector. Excavation continued until the scent of petroleum hydrocarbon was undetected.

Positive OVA readings were obtained from the stockpiled impacted sand. The impacted sand was removed and disposed of off-site. Our firm collected samples from the sidewalls and floor to confirm the removal. The samples indicated that the petroleum impacted soils were removed from the site and that the impact of petroleum discharged into an environmentally sensitive location was prevented by the expedient removal of the contaminated soil.

BER issued a letter closing the case and requiring no further assessment.

2.10.3 Residential Redevelopment of Former Auto Dealership and Oil Field

Client: CityView

Location: Wilmington, California

Gannett Fleming provided environmental services during the acquisition and redevelopment of a 7.68-acre site, consisting of two properties that were historically used for oil field operations and subsequently as car dealerships and automobile repair operations. The properties are being developed into a single- and multi-family residential neighborhood.



Figure 7: Our firm conducted the initial Phase I ESA to identify REC, or potential environmental concerns associated with the historical use of the properties.

To assist the developer, our firm conducted the initial Phase I ESA to identify recognized environmental conditions (REC), or potential environmental concerns associated with the historical use of the properties. Our firm performed evaluations of soil and soil vapor, including a methane evaluation, and performed a groundwater investigation to evaluate the RECs and environmental concerns identified.

Our firm also evaluated the riparian and wetland areas along the property boundary, and assessed the implications of these areas with respect to the proposed development footprint. To assess the areas, our firm performed a jurisdictional delineation survey, developed maps depicting the wetland and non-wetland boundaries, and identified suitable mitigation measures.

Our firm was asked by the client to investigate the source of a hydrocarbon odor that was emanating from an adjacent property. To investigate, our firm conducted an air quality and odor assessment to determine the potential emission sources; and evaluated chemicals used and stored on adjacent properties, potential risks to human health, and emission requirements. As part of the investigation, regulatory agencies with jurisdiction over the adjacent property facility were contacted to determine the availability of complaints, violations, site inspection reports, etc., to identify historical odor issues and resolve the problem.

2.10.4 Phase I ESA of Plaza Mexico Redevelopment Project Area

Client: City of Lynwood

Location: Lynwood, California

Gannett Fleming is currently managing all aspects of environmental work associated with the redevelopment of a large, master-planned, mixed-use development project comprising approximately 20 acres. Current activities include interfacing with the City of Lynwood to prepare Brownfield grant applications, preparing the remedial action plan, conducting the pilot study and ongoing groundwater monitoring, and providing litigation

support for cost recovery purposes. The most heavily impacted property is a former aerospace manufacturing facility which comprises approximately 4 of the 20 acres. The primary contaminants of concern include chlorinated solvents and petroleum hydrocarbons. Prior investigations revealed the likely presence of a dense, non aqueous phase liquid (DNAPL) at the site resulting in groundwater concentrations of TCE as high as 160,000 µg/L and soil concentrations as high as 750,000 µg/kg. The cleanup cost was estimated to range from \$6 to 12 million, depending on the ultimate land-use and requirements for off-site remediation. A total of 13 remedial alternatives for groundwater and six alternatives for soil were evaluated as part of the feasibility study. The proposed remedial approach consists of ozone injection for groundwater with hydraulic containment of the off-site groundwater plume, and soil vapor extraction.

2.10.5 Crude Oil Spill Remediation – Residential Neighborhood

Client: Vintage Petroleum

Location: La Habra Heights, California

Gannett Fleming was retained to remediate the site of a crude oil pipeline rupture near a residential neighborhood in 2009. The petroleum release occurred on a steep slope adjacent to a small stream, which was affected by the release. Numerous regulatory agencies were involved in the emergency response, including the Regional Water Quality Control Board, California Department of Fish and Game, USFWS, and the USACE, with the U.S. EPA serving as the lead agency.

Immediately following the response activities, our firm was retained to remediate the site under a cleanup and abatement order issued by the U.S. EPA, which also set the target cleanup goal for the site at 1,000 mg/kg. Due to concern over slope stability and further impacts to the stream and native vegetation, the U.S. EPA requested that the remediation be conducted using bioremediation, in

lieu of excavation and off-site disposal, and recommended a mix of nitrate and phosphate. Our firm modified the remedial program through the simultaneous addition of Oxygen Releasing Compound to the nitrate/phosphate admix.

Following baseline sampling and delineation to refine the treatment area, the admix was applied to the affected area using grout mixers to till the soil and admix together. The steepness of the slope precluded the use of more robust mixing/tilling equipment at the site. A collection trench, lined with Sphagnum peat moss, was constructed at the toe of the slope to prevent nutrient and sediment runoff into the stream.

Water was applied on a biweekly basis to maintain optimum moisture conditions for the duration of the project, which was estimated at six months. Periodic manual tilling of the soil was also performed.

Within six months of admix application, hydrocarbon levels in the soil were measured generally below 1,000 mg/kg, with the exception of two small recalcitrant areas, which were manually excavated. Following the verification sampling, our firm prepared and submitted a closure report to the U.S. EPA. Our firm completed the remediation on time and on budget, which allowed for the transfer of this site to another Vintage asset, as scheduled. The U.S. EPA issued site closure in May 2010.



Figure 8: Due to concern over slope stability and further impacts to the stream and native vegetation, the U.S. EPA requested that the remediation be conducted using bioremediation, in lieu of excavation and off-site disposal, and recommended a mix of nitrate and phosphate.

**GSA 899 Environmental Services Schedule GS10F0214k
Labor Categories and Hourly Prices**

Labor Category Description	4-27-2012	4-27-2013	4-27-2014
	4-26-2013	4-26-2014	4-26-2015
A. PROFESSIONAL			
Program Manager	\$125.00	\$128.75	\$132.61
Professional Level 4	\$115.00	\$118.45	\$122.00
Professional Level 3	\$102.91	\$106.00	\$109.18
Professional Level 2	\$75.00	\$77.25	\$79.57
Professional Level 1	\$58.00	\$59.74	\$61.53
B. TECHNICAL			
Technician**	\$53.00	\$54.59	\$56.23
Clerical**	\$41.38	\$42.62	\$43.90

Note: Includes annual escalation of 3.0%.

SCA Eligible Contract Labor Category	SCA Equivalent Code – Title	WD Number
Technician	30090 – Environmental Technician	05-2447
Clerical	01111 – General Clerk I	05-2447

The Service Contract Act (SCA) is applicable to this contract and it includes SCA applicable labor categories. The prices for the indicated SCA labor categories are based on the U.S. Department of Labor Wage Determination Number(s) identified in the matrix. The prices offered are based on the location where a preponderance of the work would be performed.

Labor Category	Education / Experience	Duties / Responsibilities
A. PROFESSIONAL		
Program Manager	Master's degree or equivalent plus 9 years or more experience	Oversees all aspects of work performed under the contract. Ensures that Task Orders (TOs) are assigned to appropriate project managers and staff, and that work is completed in accordance with the requirements of the contract and the respective TO SOW.
Professional Level 4	Master's degree or equivalent plus 7 years or more experience	Plans, conducts and supervises projects of major significance, necessitating advanced knowledge and the ability to originate and apply new and unique methods and procedures. Supplies technical advice and counsel to other professionals. Generally operates with wide latitude for unreviewed action or decisions.
Professional Level 3	Master's degree or equivalent plus 5 or more years experience	Plans, conducts and supervises assignments normally involving smaller, routine projects, or under general supervision of project manager, plans and conducts technical components of larger projects. Estimates and schedules work to meet completion dates. Directs assistants. reviews progress and evaluates results; makes changes in methods, design or equipment where necessary. Operates with some latitude for unreviewed action or decision.
Professional Level 2	Master's degree or equivalent plus 5 years or more experience	Plans and conducts small, routine projects where minimal evaluation is required, or under supervision of a project manager or senior personnel, carries out assignments associated with larger, complex projects. Translates technical guidance received from supervisor into usable data applicable to the particular assignment; coordinates the activities of juniors or technicians. Work assignments are varied and require some originality and ingenuity.
Professional Level 1	Bachelors degree or equivalent plus less than 3 years experience	Lowest or entering classification. Works under close supervision to senior personnel or project manager. Gathers and correlates basic data and performs routine analyses. Works on less complicated assignments where little evaluation is required.
B. TECHNICAL		
Technician	2 yrs. or more experience	Performs assignments that are normally standardized. Operates testing or processing equipment of moderate complexity. May construct components or subassemblies of prototype models. May troubleshoot malfunctioning equipment and make simple repairs. Extracts and processes test data.

Note: For each labor category listed above requiring a master's degree or equivalent, the equivalent of a master's degree is a bachelor's degree and an additional two (2) years of relevant work experience.

For each labor category listed above requiring a bachelor's degree or equivalent, the equivalent of a bachelor's degree is an associate's degree or a 2-year community college degree and an additional two (2) years of relevant work experience.



Gannett Fleming

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